



هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

Cost of Capital Draft Determination

20 July 2009

Ref: MCD/07/09/049

Request for comments:

The Telecommunications Regulatory Authority ("TRA") invites comments on this consultation document from all interested parties.
Comments should be submitted no later than **23 AUGUST 2009 4PM**.

Responses should be sent to TRA for the attention of the General Director preferably by e-mail (or by fax or post) to:

The General Director
cost-capital-consultation@tra.org.bh
Telecommunications Regulatory Authority
P.O. Box 10353, Manama, Kingdom of Bahrain
+973 1753 2125

Purpose: To set the cost of capital to be used in subsequent calculations for the costs of provision of regulated telecommunications services in the Kingdom of Bahrain

Instructions for submitting a response

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Responses should include:

- the name of the company/institution/association etc.,
- the name of the principal contact person, and
- full contact details (physical address, telephone number, fax number and e-mail address),
- in the case of responses from individual consumers, name and contact details.

In the interest of transparency, TRA intends to make all submissions received available to the public, subject to the confidentiality of the information received. TRA will evaluate requests for confidentiality in line with relevant legal provisions and TRA's published guidance on the treatment of confidential and non-confidential information.¹

Respondents are required to mark clearly any information included in their submission that is considered confidential. Where such confidential information is included, respondents are required to provide both a **confidential** and a **non-confidential** version of their submission. If a part or a whole submission is marked confidential, reasons should be provided. TRA may publish or refrain from publishing any document or submission at its sole discretion.

Once TRA has received and considered responses to this consultative document, TRA will issue a final version of **the Cost of Capital Determination**, together with the report on the consultation.

¹ TRA (2007), "A Guidance Paper issued by the Telecommunications Regulatory Authority on its treatment of Confidential and Non-confidential Information", Guidance Paper No. 2 of 2007, September 10th.

DETERMINATION

HAVING REGARD TO THE TELECOMMUNICATIONS LAW, ALL ADMISSIBLE EVIDENCE AND SUBMISSIONS RECEIVED BY THE TELECOMMUNICATIONS REGULATORY AUTHORITY, THE ANNEX TO THIS DETERMINATION WHICH SETS THE REASONING FOR THIS DETERMINATION, THE TELECOMMUNICATIONS REGULATORY AUTHORITY HEREBY MAKES THE FOLLOWING DETERMINATION:

1. The value for the nominal cost of capital for the Bahrain Telecommunications Company B.S.C (“Batelco”) and MTC-Vodafone Bahrain B.S.C. (“Zain”) is 9%.
2. This Determination shall take effect from its date of issue.
3. This Determination shall be effective for two years from its date of issue, unless circumstances justify otherwise

For the Telecommunications Regulatory Authority
Alan Horne
General Director
XXXXX

Reasoning for the Cost of Capital Determination

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List of acronyms

APV	adjusted present value
AMEX	American Stock Exchange
AW	all world
BD	Bahraini dinar
BFV	Bloomberg Fair Value
Bp	basis points
CAPEX	capital expenditure
CAPM	capital asset pricing model
DMS	Dimson, Marsh and Staunton
EBITDA	earnings before interest, tax, depreciation and amortisation
ERP	equity risk premium
EV	enterprise value
FTSE	Financial Times Stock Exchange
IMF	International Monetary Fund
IV	implied volatility
IVPN	Internet Protocol virtual private network
KWD	Kuwaiti dinar
LIBOR	London Interbank Offered Rate
MM	Modigliani–Miller
MTR	mobile termination rate
NYSE	New York Stock Exchange
PPP	purchasing power parity
S&P	Standard & Poor's
TRA	Telecommunications Regulatory Authority of the Kingdom of Bahrain
USD	United States dollar
VPN	virtual private network
WACC	weighted average cost of capital

Executive Summary

- a) The objective of the Determination is to set the appropriate level of the cost of capital for regulated telecommunications services in the Kingdom of Bahrain. TRA proposes a nominal cost of capital of 9% for both fixed and mobile telecommunications services regulated in Bahrain. This Determination shall be effective for two years from its date of issue, unless circumstances justify otherwise.
- b) This estimate lies within the upper half of the estimated range, based on a rigorous analysis of the latest economic and capital market data. It is also consistent with relevant regulatory precedents.
- c) TRA is of the view that at this stage there is no sufficient, robust evidence to support the introduction of a differential in the cost of capital estimates between different regulated business activities. In particular, there is no robust evidence to conclude that the level of systematic risk differs between the relevant fixed and mobile services. Therefore, TRA proposes to set a single cost of capital for all regulated telecommunications services in Bahrain.
- d) For both conceptual and practical reasons, TRA is of the view that it is appropriate to estimate the cost of capital from the perspective of an international investor who holds a diversified portfolio of investments. The alternative approach also considered by TRA (which estimates the rate of return from the perspective of the local, potentially less diversified, investor using recent data from the local capital markets) produces a similar estimate.
- e) The estimates are based on a notional, equity-only capital structure, which ensures that the regulated companies retain discretion to choose their optimal capital structures. Since there are limited incentives for companies in Bahrain to increase leverage (ie, there is no corporate taxation), TRA sees limited risk of this approach overstating the true, lower cost of capital that companies might be able to achieve by increasing leverage.
- f) TRA's estimate also takes into account the current, Bahrain-specific characteristics, as well as the global market characteristics that might affect the expected rate of return, including recent volatility in capital markets, the relative illiquidity of the local stock market, and the country risk for which an international investor might expect compensation. Specific premia for these factors are incorporated into the cost of capital estimates (where relevant) in line with the conservative approach to the cost of capital estimation adopted by TRA to ensure that investments by the regulated companies are financeable.

Introduction

1. This Draft Determination sets out TRA's approach to estimating the cost of capital and the evidence used to estimate both a range and a point estimate.² The cost of capital is an essential input to calculate the cost of regulated telecommunications services, and therefore has direct implications for the regulated companies, consumers and other stakeholders.
1. TRA wishes to emphasise that this Draft Determination which may result in the regulation of Zain mobile termination rates ("MTRs") is without prejudice to the ongoing consultation on MTRs.³

Purpose of the Determination

2. The objective of the Determination is to set the appropriate level of the nominal cost of capital and therefore the rate of return applicable for regulated telecommunications services in the Kingdom of Bahrain. It will apply to Bahrain Communications Company B.S.C ("Batelco") and, without prejudice to the ongoing consultation on MTRs, to MTC-Vodafone Bahrain B.S.C. ("Zain") for regulatory purposes.
3. The estimated cost of capital will be an input into companies' regulatory accounts and the bottom-up cost models that TRA intends to develop in 2009 and 2010. Consequently, the allowed rate of return will be used to determine the prices that Batelco and Zain can charge for services supplied in markets in which they have significant market power and/or are dominant. Given the current environment and the expected timeline for the implementation of bottom-up cost models, TRA considers that setting the cost of capital for a period of two years is appropriate.
4. For this Determination, the cost of capital is estimated for a notional telecommunications company in Bahrain providing a range of telecommunications services. This is based on an empirical analysis of underlying risk and other parameters of the cost of capital, detailed below. This approach is also consistent with TRA's position expressed in the Draft Statement on MTRs that there is no longer any compelling reason for asymmetric MTRs between Batelco and Zain.⁴

Background to this Determination

5. Batelco provides a wide range of fixed-line and mobile telecommunications services to customers in Bahrain. Zain is the other current provider of mobile services in Bahrain and also offers fixed wireless services. A third mobile licence was awarded to Saudi Telecom Company ("STC") in March 2009. Only Batelco is currently subject to price regulation. Zain MTRs will, without prejudice to the completion of the ongoing consultation on MTRs, be subject to price regulation for termination services on its mobile network.
6. TRA has previously estimated the cost of capital for Batelco in 2003 and 2005.⁵ A review of these two determinations suggests that some elements of the approaches

² This document is based on analysis by Oxera Consulting Ltd.

³ TRA (2008), "Dominance Designation for Termination Services on Individual Mobile Networks", Draft Determination, and "The Regulation of Mobile Termination Services", Draft Statement, November 25th.

⁴ TRA (2008), "The Regulation of Mobile Termination Services", Draft Statement, November 25th.

⁵ See TRA Determination of 20 November 2005 (available at http://www.tra.org.bh/en/pdf/Batelco_WACC_Determination_final_formattedd.pdf), and Determination

adopted previously require revision in order for the estimate to be based on appropriate empirical techniques and for the analysis to be more in line with the best practice on cost of capital estimation.

7. The parameters of the cost of capital are not static and may vary over time. Consequently, they need to be updated periodically. Interest rates around the world have decreased substantially since the start of the global financial turmoil in August 2007. Risk premiums have been volatile, and the riskiness of companies and industries relative to the overall equity market may have changed. The new evidence and up-to-date market information need to be reflected in the latest estimates.
8. Furthermore, the Bahraini telecommunications market has seen Zain's market share grow rapidly, culminating in the Draft Statement on the regulation of MTRs and Draft Dominance Determination, which concluded that both Batelco and Zain are dominant for termination services on their mobile networks. The upcoming cost of capital determination will therefore be used, for the first time and without prejudice to the ongoing consultation on MTRs, to set the cost of capital to regulate Zain's MTRs.
9. This new Determination takes the changed economic environment into account when setting the cost of capital.

Base-case scenario: the international investor

10. The cost of capital is the weighted average of different forms of capital, where different sources of capital are used—in particular, the costs of debt and equity. In the context of Bahrain, the cost of equity is the main driver of the weighted average cost of capital (“WACC”) because there are limited tax incentives associated with debt financing, and domestic operators exhibit relatively low levels of gearing.
11. The WACC estimate may be sensitive to assumptions about the degree to which investors are globally diversified. For the reasons outlined below, TRA believes that the appropriate base-case assumption is to consider the required rate of return to an international investor that holds a globally diversified investment portfolio, in line with corporate finance theory. There are a number of reasons for this; some of the key conceptual ones are listed below.
 - Portfolio theory suggests that since risks are less than perfectly correlated across countries, investors can reduce the total risk of their portfolios by internationally diversifying their investments.
 - The Bahraini market is likely to account for only a proportion of large investors' investment portfolios, and hence is unlikely to be considered separately from other Middle Eastern or other markets when these investors make investment and asset allocation decisions.
12. There are also a number of reasons related to the empirical estimation of parameters of the cost of capital that support this base-case assumption, including the following.

- Potential problems with the robustness of pricing signals might mean that the local Bahraini capital markets do not provide robust estimates of the cost of capital parameters.
 - The available Bahraini benchmarks for the risk-free rate might not provide accurate estimates given the limited activity in the Bahraini government bond market.
 - There is insufficient data to provide robust estimates of the equity risk premium (“ERP”) for Bahrain.
13. However, given that the regulated activities of Batelco and Zain take place in Bahrain, the evidence based on local market benchmarks is also taken into consideration. This is used to estimate the cost of capital under an alternative scenario based on an investor that holds a less internationally diversified investment portfolio. This estimate is used as a cross-check on the results under the base case.

Application of the CAPM to the cost of capital

14. The cost of capital is a key value driver for a capital-intensive, regulated business since it sets the allowed return on invested capital. It represents the weighted average return across the components of a company's capital structure.
15. A key parameter of the WACC is the cost of equity. As this is not directly observable, a number of models and approaches can be used to estimate it. Industry practitioners and regulators commonly use the capital asset pricing model ("CAPM") in setting the cost of capital for regulated entities.⁶
16. This Determination estimates the cost of capital from the perspective of an investor with an internationally diversified portfolio of assets. Results under the base case are checked against an alternative scenario, in which it is assumed that investors hold less diversified portfolios, and parameters are estimated using data from Bahraini capital markets.
17. The remainder of the section is structured as follows:
 - the conceptual issues associated with the assessment of the cost of capital are summarised;
 - the models and approaches that can be used to estimate the cost of equity are described, and the CAPM is presented;
 - the approach to checking the sensitivity of results to the assumption that investors hold internationally diversified portfolios is outlined.

Conceptual issues

18. The cost of capital is the expected rate of return on the capital invested in a firm, which compensates the providers of capital for both the time value of money and the underlying risk of the business. It depends on the firm's risk characteristics, the market in which it operates, and the current situation in capital markets.
19. The WACC represents the average return across the different components of a company's capital structure, weighted by the proportion of each component in the overall capital structure of the firm. It represents the cost to a firm of raising funds to finance existing operations and/or to undertake new investment.
20. Investors need to recover efficient investment costs—referred to as the return "of" the capital invested—along with the expected return on investment—the return "on" capital. In a regulatory context, the return of the invested capital is remunerated through the allowed depreciation charge, whereas the return on the invested capital is remunerated by applying the WACC to the company's invested capital.
21. The regulatory WACC is a key value driver for a capital-intensive regulated business. Adjustments to the WACC have a direct impact on the cost base of operators and allowed rates of regulated services; hence, setting a WACC commensurate with a firm's underlying business risks is essential if the firm is to be

⁶ See, for example, Ofcom (2008), "A New Pricing Framework for Openreach – second consultation", December 5th; ARCEP (2008), Decision numbers 2008-0162 and 2008-0163; Competition Commission (2008), "Stansted Airport Ltd, Q5 Price control review—Presented to the Civil Aviation Authority", October 23rd; Competition Commission (2007), "Report on the economic regulation of Heathrow and Gatwick Airports", September 28th; Commerce Commission of New Zealand (2005), "Determination on the application for pricing review for designated interconnection services", April 11th.

able to finance its functions without making excessive profits, which would be detrimental to consumers.

22. Determination of the WACC requires estimation of each of the different components of a company's capital structure. However, for simplicity, these are typically limited to the cost of debt and the cost of equity (weighted by the market values of debt and equity respectively), or just the cost of equity, which is equivalent to the overall cost of capital in the absence of debt.
23. The WACC can be expressed on a different basis depending on the treatment of corporate taxation. The vanilla WACC (ie, post-tax cost of equity, pre-tax cost of debt) represents the allowed rate of return excluding tax allowances. However, since corporate taxes are not applicable to the activities of Batelco and Zain in Bahrain, pre-tax WACC that includes tax allowances will be equal to the vanilla (and post-tax) WACC, and can be expressed as:⁷

$$(r_d \times g) + r_e \times (1 - g)$$

where g is gearing, r_d is the cost of debt, and r_e is the cost of equity.

Models for the cost of equity

24. In general, the costs of debt and equity can be measured based on past and/or current data. Although the required return to equity is not directly observable, a number of asset pricing models can be used to estimate the cost of equity, including:
 - the CAPM;
 - arbitrage pricing and multi-factor models;
 - direct proxies.
25. The CAPM relates the cost of equity of a particular firm to its exposure to systematic, or non-diversifiable, equity market risk. Systematic risk relates to the possibility that returns may deviate from expected returns in correlation with the market returns. The CAPM asserts that investors do not need compensation for non-systematic risk because it can be eliminated through portfolio diversification. The level of exposure is expressed as a single beta factor describing the correlation between returns on the firm's equity and the overall equity market. The CAPM is commonly used by industry practitioners and regulators in setting the cost of capital for regulated entities, indicating that it is widely considered as the model of choice when estimating the cost of equity.⁸

⁷ The corporate tax rate does not take into account personal taxation. In practice, investors do face personal taxation, but this is not taken into account in the cost of capital to corporations.

⁸ See, for example, Ofcom (2008), "A New Pricing Framework for Openreach – second consultation", December 5th; ARCEP (2008), Decision numbers 2008-0162 and 2008-0163; Competition Commission (2008), "Stansted Airport Ltd, Q5 Price control review—Presented to the Civil Aviation Authority", October 23rd; Competition Commission (2007), "Report on the economic regulation of Heathrow and Gatwick Airports", September 28th; Commerce Commission of New Zealand (2005), "Determination on the application for pricing review for designated interconnection services", April 11th, and (2005), "Draft Guidelines on the Commerce Commission's Approach to Estimating the Cost of Capital", October.

26. Arbitrage pricing and multi-factor models, such as the Fama–French three-factor model or Cahart’s four-factor model, represent alternatives to the CAPM.⁹ Robust estimates of the cost of capital derived from multi-factor models depend on the availability of a considerable amount of data to estimate both the premiums for, and individual companies’ exposure to, the specified risk factors. In the case of Bahrain, there appears to be no sufficient market data to estimate these risk factors robustly. This suggests that the application of models other than CAPM is unlikely to offer additional reliable insight into required returns. These empirical models are also often criticised for lacking strong theoretical foundations.
27. Direct proxies, such as observed yields on corporate debt, might also be used in the cost of capital estimation. Given the seniority of debt over equity in a company’s capital structure, the additional risk to which equity investors are exposed implies that the upper bound of the yield on corporate debt could be seen as a lower bound to the cost of equity. The rates of return targeted by equity investors might also be used as a proxy for the cost of equity. However, there are typically few directly observable proxies that do not carry biases and can be independently verified.
28. In the absence of adequate data to implement the alternative models and having regards to the strong theoretical foundations of the CAPM and its widespread use by regulators and practitioners TRA has used the CAPM to estimate the cost of equity in line with international regulatory practice.

The capital asset pricing model

29. The required return to equity is often estimated using the CAPM where the required return on a given asset is determined by the relative contribution of that asset’s risk to the risk of the overall market portfolio. A central principle of this model is that investors hold a broad portfolio of assets so that the idiosyncratic risk of any single asset is diversified away, leaving only the systematic risk component. Therefore, only the systematic risk component is expected to be remunerated through the return on the market portfolio.
30. The degree to which the expected return to any one specific asset is correlated with the expected return on the market for all assets determines investors’ required returns on a forward-looking basis.
31. According to the CAPM, the required return to an asset is estimated as follows:

risk-free rate + equity beta of the asset × ERP

where:

- equity beta is the risk of the asset relative to the market, estimated as:

$$\beta = \frac{\text{Cov}(R_e, R_m)}{\text{Var}(R_m)}$$

where:

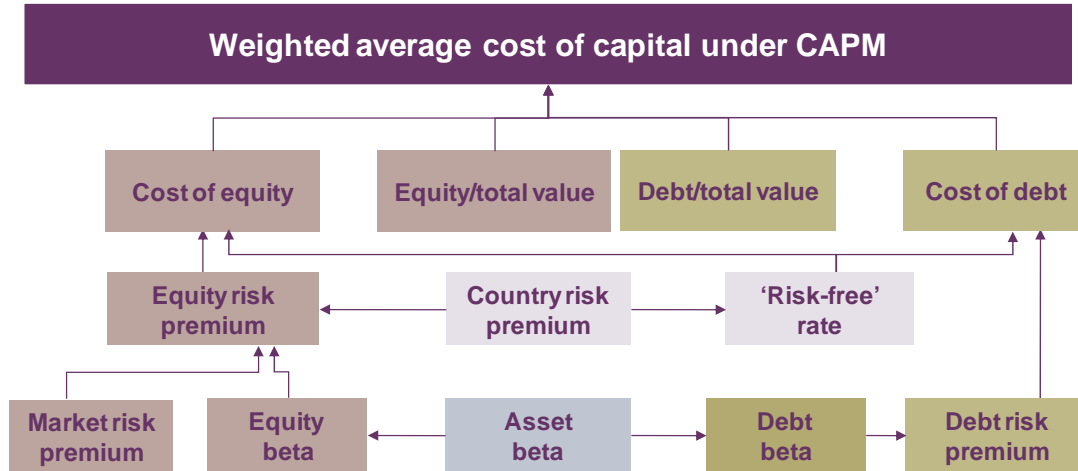
- R_e is the return on the asset, R_m is the return on the market portfolio (proxied by a broad equity market index), and $\text{Var}(R_m)$ is the variance of the market portfolio;

⁹ Fama, E. and French, K. (1992), “The Cross-Section of Expected Stock Returns”, *Journal of Finance*, 47:2, June; Cahart, M. (1997), “On Persistence in Mutual Fund Performance”, *Journal of Finance*, 52, 57–82.

- ERP is estimated as the excess return on the market portfolio over the risk-free rate ($r_m - r_f$).

32. Figure 1 presents a stylised illustration of the relationship between the individual cost of capital parameters under the CAPM.

Figure 1 Parameters of the weighted average cost of capital



Source: TRA.

33. Some of the main parameters in the WACC—gearing, the debt risk premium and asset beta—are specific to the activity or company being assessed. The other parameters—the risk-free rate and the ERP—are generic to all applications of the CAPM at any given time.

Base-case and alternative scenarios for the cost of capital

34. The CAPM suggests that investors can diversify exposure to idiosyncratic risks by investing in a global portfolio of securities. This is optimal because, by diversifying, investors reduce risk. In practice, it is not always the case that all investors hold fully diversified investment portfolios. For example, investors sometimes exhibit a preference for domestic equities (termed the “home-bias puzzle”), whereby investments outside the home country are held in a lower proportion than would be the case in a market value-weighted portfolio.¹⁰

35. Although the home-bias puzzle might indicate that investors have preferences for investments that are located geographically near to their home market, international capital markets are closely interlinked and global investors have access to capital markets across the world. Improved information flows and global links across economies facilitate cross-country diversification. Nevertheless, to the extent that variations across markets in expected inflation, country risk and liquidity could be a significant factor for the cost of capital, these factors have been controlled for in this Determination where relevant.

36. Therefore, in this Determination, TRA estimates the cost of capital under a base-case scenario from the perspective of an international, globally diversified investor. This is the preferred scenario because it assumes that investors are both rational and diversify their investments.

¹⁰ French, K. and Poterba, J. (1991), “Investor diversification and international equity markets”, *American Economic Review*, **81**, 222–26.

37. An alternative scenario is also considered as a cross-check on the estimates from the base case. In this alternative scenario, the cost of capital is estimated from the perspective of a less diversified, “domestic” investor. Provided that the difference between the results under the two scenarios is not material, TRA considers the results estimated under the base case to be more robust and conceptually preferable.

Capital structure

38. The capital structure of a company describes the relative proportions of different types of financial security in the overall financing of a company. In the context of cost of capital analysis, capital structure is usually focused on the relative proportions of debt and equity. Leverage, or gearing, is the ratio of debt to total capital.
39. The optimal capital structure for a company is determined by a number of factors, including corporate taxation rates and the costs of financial distress. In general, companies would be expected to target an optimal capital structure that maximises the value of the company, while minimising the associated cost of capital, although other considerations might cause the actual and optimal capital structures of a company to differ.
40. Instead of using the actual level of gearing, regulators typically adopt a level of gearing that is reflective of a notional, reasonably efficiently financed company. This approach allows the regulated company greater discretion to choose its optimal capital structure. Adopting a notional capital structure also ensures consistent treatment across regulated companies.
41. The remainder of the section is structured as follows:
 - the drivers of optimal capital structure are summarised;
 - Batelco and Zain's actual capital structures are analysed, and the extent to which the current capital structures are likely to represent the efficient forward-looking structures is assessed;
 - the concept of a notional capital structure in the regulatory context is discussed;
 - the approach proposed by TRA to capital structure is presented.

Drivers of optimal capital structure

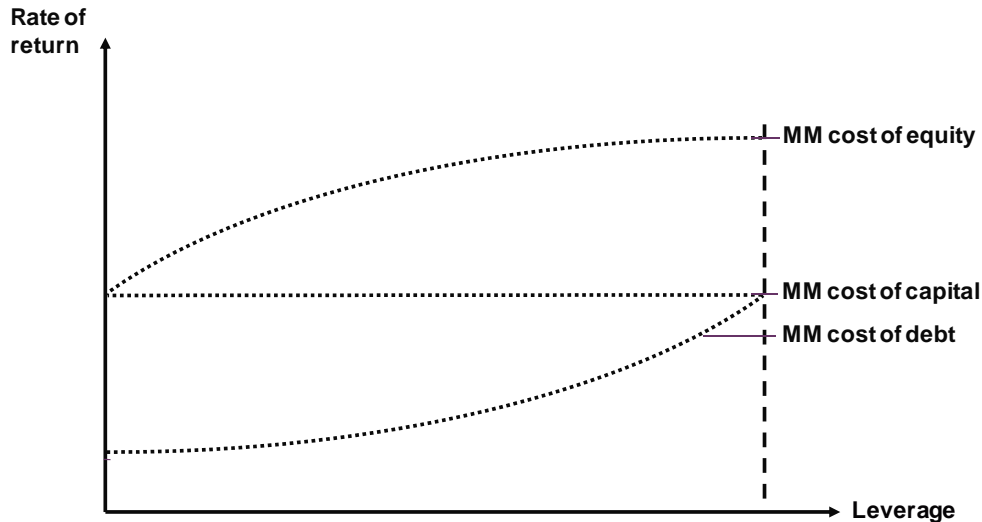
42. The conceptually most transparent approach to estimating the appropriate rate of return is to start by assuming an equity-only capital structure.¹¹ Indeed, Modigliani and Miller (MM) argued that a firm's value—and the associated cost of capital—are independent of the underlying capital structure, and hence there is no single, optimal capital structure.¹² Figure 2 shows that, under the MM framework, an increase in leverage or gearing raises the cost of equity and the cost of debt, as equity and debt become more risky, leaving the overall WACC unchanged since the increased cost of both debt and equity offsets the effect of using debt to replace the relatively more expensive equity.¹³

¹¹ Brealey, R. and Myers, S. (1991), *Principles of Corporate Finance*, 4th edition, chapter 19.

¹² Modigliani, F. and Miller, M. (1958), "The cost of capital, corporation finance and the theory of investment", *American Economic Review*, **48**:3, 261–97.

¹³ The figure assumes a positive cost of financial distress—ie, as gearing increases, the cost of debt increases owing to the higher probability of financial distress.

Figure 2 Cost of capital under changes in leverage



Source: TRA.

43. Modigliani and Miller's invariance proposition relies on a set of assumptions, including no corporate taxes. The strength of the MM analysis is that these assumptions highlight the factors that might affect the sensitivity of the cost of capital to leverage. For example, relaxing the "no taxes" assumption provides incentives (in jurisdictions where debt interest payments are tax-deductible) to issue more debt. If there are limited costs associated with financial distress, the result would be that the cost of capital can be lowered with increases in leverage. In such a situation, the firm might be incentivised to adopt a capital structure with a substantial amount of debt in order to reduce its cost of capital.
44. Since it is unrealistic to assume that the costs of financial distress are negligible, the optimal financing structure in the presence of both a positive corporate tax rate and the costs of financial distress might lie somewhere between equity-only and debt-only financing.
45. The MM analysis suggests that if an optimal capital structure exists, it will depend on the degree to which the MM assumptions do not hold in each particular case. In general, firms would be expected to make decisions about leverage by balancing the expected benefits and costs associated with increased leverage—for example, the benefit of tax-deductibility of interest against the cost associated with increased probability of financial distress.
46. These decisions about leverage can be informed by delineating the cash-flow effects of financing choices, and hence calculating the adjusted present value ("APV") of planned investments. An alternative approach is to incorporate the effects of financing decisions in a single step by adjusting the WACC that is used to discount cash flows.
47. The implication for regulation is that an estimate of the WACC based on an equity-only capital structure can be combined with separate adjustments to the allowed revenue, if required, to pass on to consumers any specific benefits associated with a particular capital structure, if relevant and deemed appropriate. Although an equity-only capital structure used for cost of capital estimation on a 'pre-tax basis' (ie, including allowance for tax payments in the WACC) would be likely to

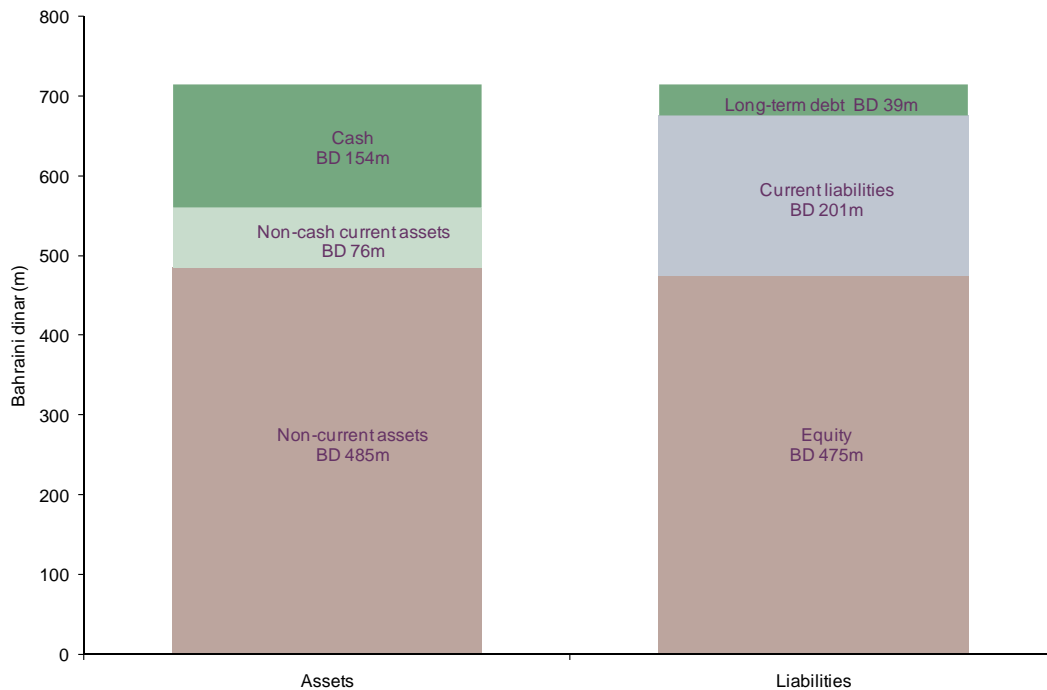
overestimate the required rate of return in the presence of corporate taxation, this consideration is not applicable to Bahrain.

48. In the context of companies based in Bahrain, given that there are no corporate taxes, the benefits of a leveraged capital structure might be low, and therefore an equity-only capital structure represents the most transparent and conceptually appropriate basis for estimating the cost of capital. The sensitivity of results to an equity-only capital structure is checked in Appendix 1, where a gearing level of 20% is assumed.

Actual capital structures of Batelco and Zain

49. The actual capital structures of the regulated companies may provide an indication of the optimal capital structure for these companies, assuming that financial managers take decisions about capital structure aimed to maximise value.
50. The companies' actual capital structures may differ from what is optimal for reasons other than taxation and the costs of financial distress. For example, a company may choose to increase gearing as a means of reducing free cash flows and enforcing discipline on managers. Alternatively, it may choose to raise debt instead of equity to avoid the risk of sending a negative signal to the market about its earnings prospects—the “pecking-order” theory of financial structure.
51. Furthermore, the capital structure is likely to be set from the perspective of the overall group, which may deviate from the optimal structure for constituent companies within the group, and in particular for the regulated activities in Bahrain.
52. As the primary location of Batelco's business activities is in Bahrain, its actual capital structure would be expected to be similar to the capital structure of a notional telecommunications company operating in Bahrain. Figure 3 illustrates Batelco's balance sheet as at 2008. Although debt (both long- and short-term) is recorded on the balance sheet, the positive net working capital (cash and equivalents less short-term debt) offsets the long-term debt. This implies that net debt—and hence gearing for Batelco—were zero at that time.

Figure 3 Composition of Batelco's balance sheet (Bahraini dinar, million)

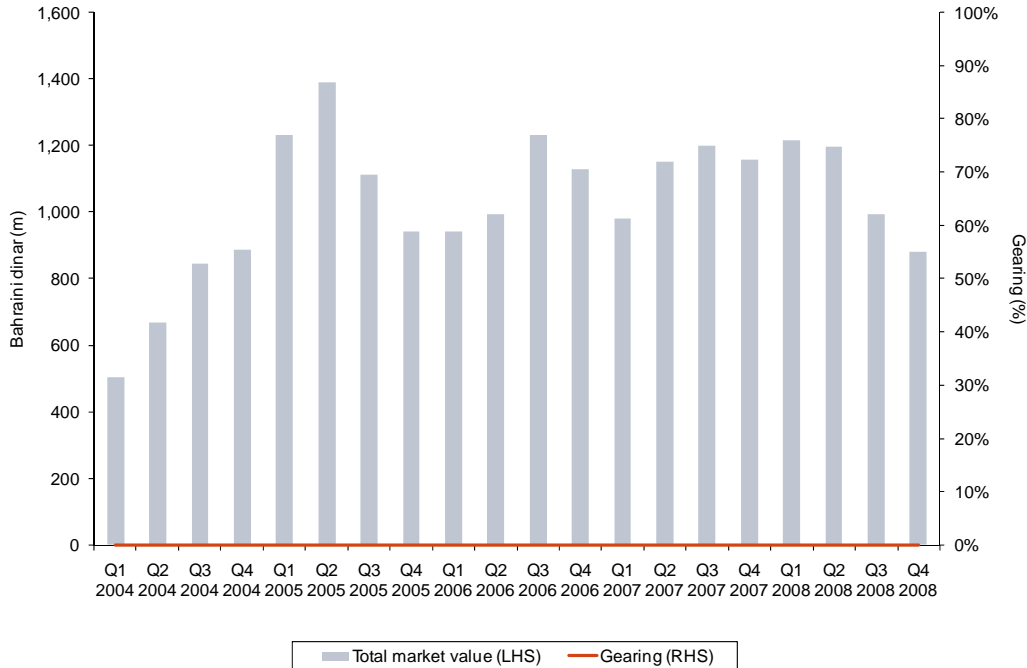


Note: The breakdown is shown on the basis of 2008 accounts.
Source: Annual report.

53. Figure 4 plots Batelco's market value of equity and gearing over time. Given that net debt has been zero since 2004, gearing has also been zero. This level of gearing might be expected in view of the absence of corporate taxes in Bahrain (the primary location of Batelco's regulated business operations), which means that there are no expected tax benefits from issuing debt for firms pre-dominantly operating in Bahrain (or other tax-free zones).¹⁴

¹⁴ A firm operating under such circumstances might still issue debt as a disciplining tool on management or because of transaction costs and liquidity considerations.

Figure 4 Estimates of market value of equity and gearing for Batelco



Note: Net debt = short-term + long-term borrowings – cash and equivalents – marketable securities – collaterals. Gearing is estimated as the ratio between net debt and the sum of net debt and the market value of equity.

Source: Bloomberg, TRA calculations.

54. Given that Bahrain is the primary location of Batelco’s activities, the company’s actual capital structure may be a good proxy for the optimal capital structure of a notional telecommunications company operating in Bahrain.
55. In contrast, Bahrain is not the primary location for Zain’s business activities—it derives only 3% of its revenue from Bahrain.¹⁵ Therefore, Zain’s actual capital structure would not be expected to be a reliable indication of the optimal capital structure for a notional telecommunications company operating in Bahrain.
56. Figure 5 illustrates Zain’s balance sheet as of 2008. The proportions of long- and short-term debt in the balance sheet, combined with negative net working capital, imply positive net debt and gearing for Zain.

¹⁵ Zain (2008), “Earnings release – 2008 Q4”.

Figure 5 Composition of balance sheet of Zain (Kuwaiti dinar, million)

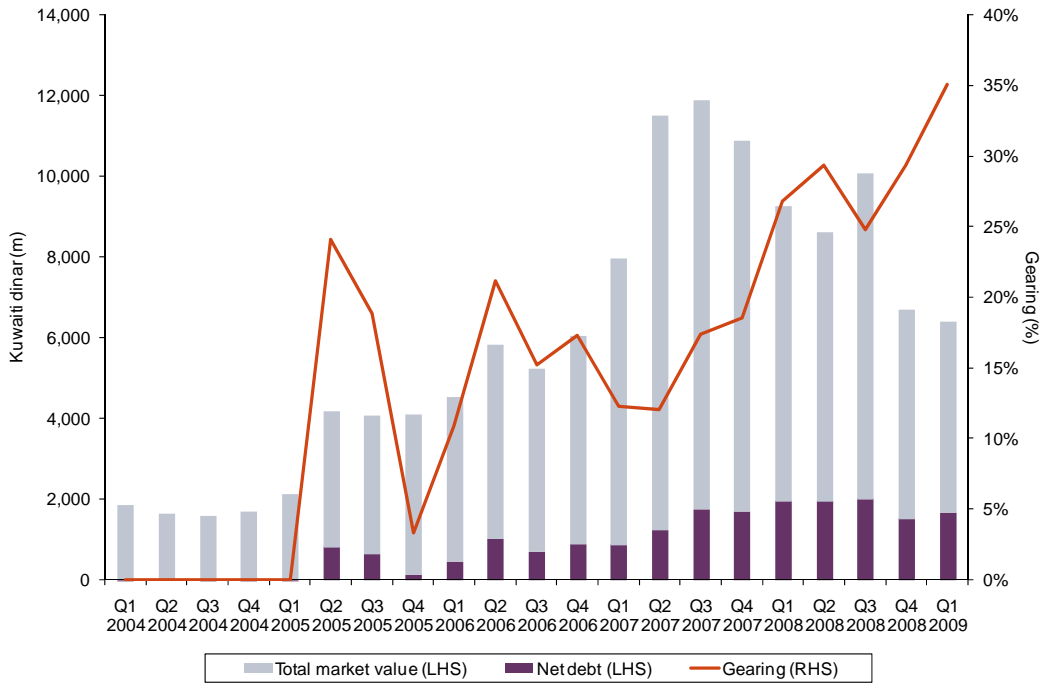


Note: The breakdown is shown on the basis of 2008 accounts.
Source: Annual report.

57. Figure 6 shows the trend in market value of equity, net debt and gearing over time for Zain. One explanation for the trend of increasing gearing may be that this represents a relatively short-term deviation from the optimal long-term capital structure. This might arise, for example, if debt finance is perceived to be a more flexible means of funding Zain's recent acquisitions and international expansion than equity issuance.
58. A combination of Zain's relatively high cash flow and the requirement that several Middle Eastern governments have stipulated for initial public offerings might be expected to lead to a reversal in the trend towards increased gearing, once the rate of expansion slows in the longer term.¹⁶

¹⁶ Several Middle Eastern governments have required initial public offerings as part of the award of mobile licences.

Figure 6 Estimates of Zain’s market value of equity, net debt and gearing (Kuwaiti dinar, million)



Note: Net debt = short-term + long-term borrowings – cash and equivalents – marketable securities – collaterals. Gearing is estimated as the ratio between net debt and the sum of net debt and the market value of equity.

Source: Bloomberg, TRA calculations.

59. Since Bahrain accounts for a very small proportion of Zain’s operations, and Zain’s current level of gearing may not be indicative of the longer-term level that would be expected for a mobile telecommunications company operating in Bahrain given the tax environment, it is unlikely to provide an appropriate basis to determine the level of gearing for this Determination.
60. The actual capital structure of Batelco suggests that low or zero gearing is appropriate for a company operating in Bahrain. The actual capital structure of Batelco provides a cross-check on the assumption that the optimal capital structure is close to zero gearing.

Capital structure in the regulatory context

61. Regulators generally set the cost of capital for regulated entities by using a notional gearing assumption—ie, the level of gearing that might be characteristic of a reasonably financed company carrying out similar operations as the company under consideration—instead of the actual level of gearing. As such, this approach ensures a consistent treatment of the cost of capital for different firms within the industry. The approach reflects a regulatory position that firms, rather than the regulator, are best placed to undertake decisions related to capital structure.
62. In jurisdictions where there is a positive rate of corporate taxation, one of the main advantages to increasing gearing is the tax-deductibility of interest payments. Regulatory attention to notional gearing attempts to limit the potential for over-/under-recovery of tax expenses when the cost of capital is set on a pre-tax basis. If notional gearing is set higher than the actual level, the company may under-recover

its cost of capital unless it increases gearing to take advantage of tax shields implicitly assumed in the cost of capital set by the regulator. However, if the notional gearing level is set lower than the actual level, the regulated company may be able to over-recover its cost of capital compared with what it would incur under the notional capital structure. This is because the company would receive more remuneration for tax than the tax expense actually incurred (on average).

63. When there is a positive rate of corporate taxation, the appropriate notional level of gearing may be determined by reference to regulatory precedents for similar companies and/or the gearing levels of comparator companies. Regulators may also undertake a financeability analysis to assess what gearing level a company is able to support while retaining access to reasonably priced debt finance.
64. As there is no corporate taxation in Bahrain—and hence no risk of companies over-recovering their tax expenses—TRA considers that there is no reason to assume a notional capital structure that contains debt.

Proposed approach to capital structure

65. The absence of any corporate taxes in Bahrain indicates that the optimal capital structure is likely to be close to 100% equity, owing to the absence of tax shield benefits associated with issuing debt. The company may still choose positive gearing because of some benefits associated with debt, such as lower agency costs. However, TRA believes that the risk of overestimating the cost of capital by adopting a zero-gearing approach is small because the potential gains to the company from adopting higher leverage, and hence bringing the cost of capital down, are likely to be limited.
66. For regulatory purposes, assuming zero gearing would be expected to allow the company at least a sufficient return to cover its cost of capital under any capital structure. A 100% equity-financed structure could be seen to represent an upper bound for the actual cost of capital and allow full recovery of investment costs.
67. A company could still choose to take on some debt instead of relying on 100% equity finance if it can benefit from the lower cost of capital compared to the zero gearing assumption, or generate other benefits such as access to a liquid source of finance. Therefore, an advantage of assuming an equity-only capital structure in the regulatory determination is that the company is implicitly given discretion to choose the optimal corporate financial policy.
68. For the reasons set out above, TRA is of the view that zero gearing is appropriate for the calculation of the cost of capital for the provision of regulated telecommunications services in Bahrain.

Question 1: Do you agree with the capital structure proposed by TRA? Please elaborate.

Risk-free rate

69. The risk-free rate is a key parameter of the cost of capital, to which risk premiums are added to estimate the costs of equity and debt. The nominal risk-free rate comprises the real risk-free rate adjusted for inflation.
70. The nominal risk-free rate is typically estimated with reference to the yield to maturity on debt instruments that are notionally assumed to be free of default risk. Once proxy measures for the risk-free rate have been identified, there are two critical aspects to the estimation process in a regulatory context: the maturity of the proxy security; and the relative weights to place on historical and current data, which might be an important consideration at a time of significant volatility in interest rates.
71. The risk-free rate could be estimated based on the yields on the Bahraini government debt securities. Alternatively, as interest rates across different countries are conceptually related according to a set of interest parity conditions, the nominal risk-free rate for Bahrain could be estimated with respect to the current trading yields on government debt from other countries. The estimate might require adjustment for risk, expected devaluation and other factors, where relevant.
72. The remainder of the section is structured as follows:
 - the risk-free rate is defined;
 - issues associated with estimating the risk-free rate in the regulatory context are reviewed, before presenting estimates of the risk-free rate based on Bahraini government securities;
 - the conceptual relationship between the risk-free rates in different countries, as predicted by international parity conditions, is discussed and used to identify a suitable international proxy for the risk-free rate in the Bahraini market;
 - factors that might bias the predictions of such parity conditions are considered, alongside the evidence on these factors, before presenting estimates of the risk-free rate based on US Treasury bond yields;
 - TRA's proposed ranges for the nominal risk-free rate are summarised.

Definition of the risk-free rate

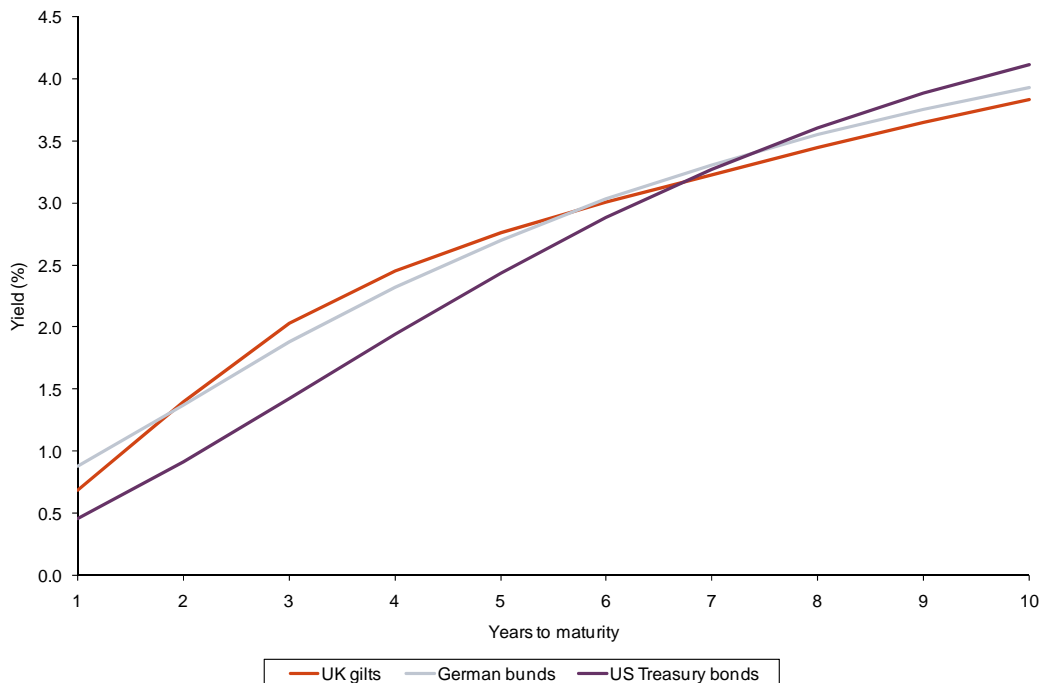
73. The risk-free rate reflects the remuneration that investors require for inter-temporal transfers of consumption. In a sense, therefore, it is a measure of the time value of money: the return an investor requires as compensation for sacrificing current consumption in favour of future consumption.
74. A risk-free asset can be defined as one where the actual return is equal to the expected return. This necessarily requires that, when holding a risk-free asset, the investor is not exposed to any risk over the investment horizon.
75. The risk-free rate is a parameter used to estimate both the cost of equity and the cost of debt. Investors require additional risk premiums in the form of higher expected returns if they are to hold risky, rather than risk-free, assets.
76. In the context of the regulation of telecommunications services in Bahrain, the relevant definition is the nominal risk-free rate, which is implicitly comprised of a real

risk-free rate and an expected level of general price inflation. Expected inflation, and hence nominal risk-free rates, can vary from one geographic market to another, and is therefore an important consideration when estimating the risk-free rate in an international context.

Estimation of the risk-free rate in the regulatory context

77. The nominal risk-free rate is typically estimated with reference to the yield to maturity on debt instruments that are notionally free of default risk. Where the yields to maturity on nominal government bonds are observed, they typically provide suitable estimates of the nominal risk-free rate if the risk of government default is low.
78. Besides the identification of suitable proxies, determining the nominal risk-free rate involves:
- selecting the appropriate maturity of the proxy measure;
 - considering the balance between spot yields and historical averages in case there are large deviations.
79. The impact of the choice of maturity on the estimate of the risk-free rate depends on the slope of the yield curve. Figure 7 shows a consistent upward-sloping pattern across yield curves in mature capital markets, demonstrating that investors currently require higher annual returns for investing over longer time horizons.

Figure 7 US, UK and German yield curves (%)



Note: Yield curves as at June 8th 2009.

Source: Federal Reserve Bank, The Bank of England, Deutsche Bundesbank and TRA calculations.

80. When choosing the maturity for the nominal risk-free rate, a number of approaches can be considered, including:
- matching the maturity to the duration of the price control;

- ensuring that firms are able to access capital markets for future funding requirements;
 - matching the maturity to the useful economic lives of assets.
81. Matching to the length of the price control period would align the maturity of the risk-free rate to the period over which the cost of capital used for setting output prices is fixed. If the regulated company were to raise financing for the duration of the current price control and then refinance, it would effectively align its actual cost of raising capital with the regulatory determination of the allowed rate of return for the next price control. This is the approach favoured by a number of regulators.¹⁷
 82. Since there is no defined length for the regulatory period in the case of Bahrain, this cannot be used as a unique reference point for determining the appropriate maturity for the risk-free rate. However, the period for which the present Determination will apply (ie two years) can be taken as a useful reference point
 83. Companies' financing and investment decisions do not always match the duration of the price control and investors typically face residual value risk beyond the next control period. Therefore, it is appropriate also to consider maturities that are longer than the length of the control period as the basis for the maturity of the risk-free rate proxy.
 84. The estimated cost of raising capital should also take into account the maturity of instruments that broadly match the company's asset lives. This implicitly assumes a degree of asset-liability matching for the company, and may thereby reduce its risk exposure from any asset-liability mismatch that would occur otherwise. Analysis of regulatory accounts suggests that the weighted average remaining asset life for the regulated companies is approximately seven years, suggesting that maturities up to seven years might be considered.
 85. Taking the above considerations into account, TRA considers the appropriate benchmark for the maturity of the risk-free rate to be a range from two to seven years. For the purpose of this Determination and faced with the current steep yield curve, TRA intends to follow a conservative approach and estimate the risk-free rate based on government debt instruments of up to seven years' maturity.
 86. The second key measurement issue is the trade-off between using spot yields or historical averages. In efficient markets, there is no reason to assume that the price signal based on the latest spot estimate is not indicative of the expected, forward-looking returns. However, at times of significant volatility, some consideration may need to be given to long-term historical averages. This approach requires caution because the spot yields should reflect all the relevant, current information and expectations, and hence the most up-to-date price of raising capital.
 87. Any estimate of the risk-free rate is subject to a greater degree of uncertainty now than before the financial crisis. The recent increase in volatility of yields on nominal US treasury bonds is seen in Figure 8, which shows that the 50% confidence interval for forecasts of the treasury bond yield is wider when calculated using yields from the period after the start of the financial crisis than before it.

¹⁷ For example, Ofcom's preferred maturity is five years as this broadly matches the length of charge control review periods. Ofcom (2009), "A New Pricing Framework for Openreach", May 22nd.

Figure 8 Increase in uncertainty around the nominal risk-free rate



Note: Based on Merrill Lynch US Treasury Index with maturities 5–7 years. Confidence intervals for the risk-free rate (RFR) are calculated as follows: yield at June 24th 2009 $\pm 0.67 \cdot T \cdot \text{standard deviation}$ (where standard deviation is based on daily changes in yields and T is the forecast time period after June 24th 2009). Source: Datastream, TRA calculations.

88. The volatility of Treasury bond yields illustrates the current uncertainty associated with yields going forward. It suggests that additional headroom might be appropriate to limit the risk that the regulatory determination of the risk-free rate significantly differs from the actual risk-free rate in the future and hence allows the companies to finance their operations over the regulatory period.
89. Based on the above considerations, TRA proposes to allow for some additional headroom in the risk-free rate to reflect the asymmetric risk that this uncertainty presents for financing.

Estimation from Bahrain government securities

90. Conceptually, the “risk-free” rate for a less diversified, domestic investor can be proxied by the yields on debt issued by the Government of the Kingdom of Bahrain.
91. However, as the nominal yield on debt issued by the Government of the Kingdom of Bahrain should include a country risk premium, it may not meet the strict definition of a “risk-free” asset, but rather a combination of the risk-free rate and the “country risk premium”. Long-term Ijara Sukuks (Islamic Al-Salam securities) are denominated in US dollars and have a maturity between three and ten years, whereas short-term Sukuks are usually denominated in Bahraini dinars and have maturities ranging between 91 and 182 days. The latter would therefore be expected to include a currency risk premium as well. Figure 9 shows the quarterly average nominal yields on long- and short-term Sukuks as reported by the Central Bank of Bahrain.

Figure 9 Yields on government securities issued in Bahrain (%)



Note: This figure reports the average quarterly return on short- and long-term Ijara-Sukuk securities over the period considered.

Source: Central Bank of Bahrain and TRA calculations.

92. The yield on the long- and short-term Bahraini government securities ranged from around 4.0% to 5.5% between the fourth quarter (Q4) of 2005 and Q3 2007. Since the onset of the financial turmoil in Q3 2007, yields have declined significantly, similar to the pattern observed in international markets.
93. On June 11th, the Bahraini government issued a five-year maturity Ijara Sukuk bond of \$750m. This bond provides the latest available information and was trading at a price equivalent to a yield to maturity of 5.8% as at June 24th 2009.¹⁸
94. Table 1 shows the yields on long- and short-term Sukuks averaged across different time periods. The yield on long-term Sukuks has averaged around 3.9%, measured over the past five years. Data on spot yields for long-term Sukuks is not available, but the three-month average is 2.4%.

¹⁸ Datastream.

Table 1 Average yields on debt issued by the Government of the Kingdom of Bahrain (%)

Averaging period	Short-term Al-Salam Sukuks (90–182-day maturity)	Long-term Ijara Sukuks (3–10-year maturity)
3-month average	1.4	2.4
1-year	2.0	3.9
3-year	4.0	4.5
5-year	3.6	3.9

Note: The figures reported are based on the average quarterly return on short- and long-term Sukuks. Spot yields are not reported in the data available from the Central Bank of Bahrain.

Source: Central Bank of Bahrain, TRA calculations.

95. Given that TRA intends to estimate the risk-free rate based on government bonds up to seven years' maturity, the yield on long-term Ijara Sukuks might provide a reasonable proxy for the underlying nominal risk-free rate in Bahrain. However, the robustness of these estimates might be undermined for two reasons:
- Al-Salam Sukuks are priced as a spread to the London Interbank Offered Rate (LIBOR)—a reference rate driven by various factors in international capital markets (e.g. inter-bank borrowing)—and implicitly include a risk premium for the possibility of default by the Bahraini Government over and above the perceived default risk of international banks;
 - the Government of the Kingdom of Bahrain issues long-term Ijara Sukuk securities on an ad hoc basis and these are therefore priced infrequently. In the absence of frequent data on secondary market trading of these securities, they are less likely to provide an accurate estimate of the current risk-free rate.
96. Given available information, the Ijara Sukuks and the bond issued on June 11th are two essential sources of information to estimate the domestic risk-free rate. The resulting estimate reflects the combined risk-free rate and country risk premium required by a less diversified investor. No country risk premium needs to be added when calculating the cost of capital from the perspective of the less diversified investor, as the proxies used to estimate the risk-free rate already incorporate such a premium.
97. The yield on the bond issued by the Bahraini government on June 11th suggests that a nominal risk-free rate of up to 5.8% might be appropriate. Yields on the long-term Ijara Sukuks calculated by the Central Bank of Bahrain suggest a lower rate, nearer to 2.5%.
98. Given that TRA proposes to provide additional headroom in the risk-free rate to allow for the uncertainty created by turmoil in financial markets, a range of 3.5–5.8% for the risk-free rate is proposed, assuming a less diversified, domestic investor. The width of this range reflects the uncertainty of estimates based on data for securities issued by the Government of the Kingdom of Bahrain.

Risk-free rate in the international context

99. The potential shortcomings of using data based on government bonds issued by the Kingdom of Bahrain can be addressed by estimating the risk-free rate with reference to the current trading yields on government debt from other countries. The resulting estimate of the risk-free rate might provide more reliable information about

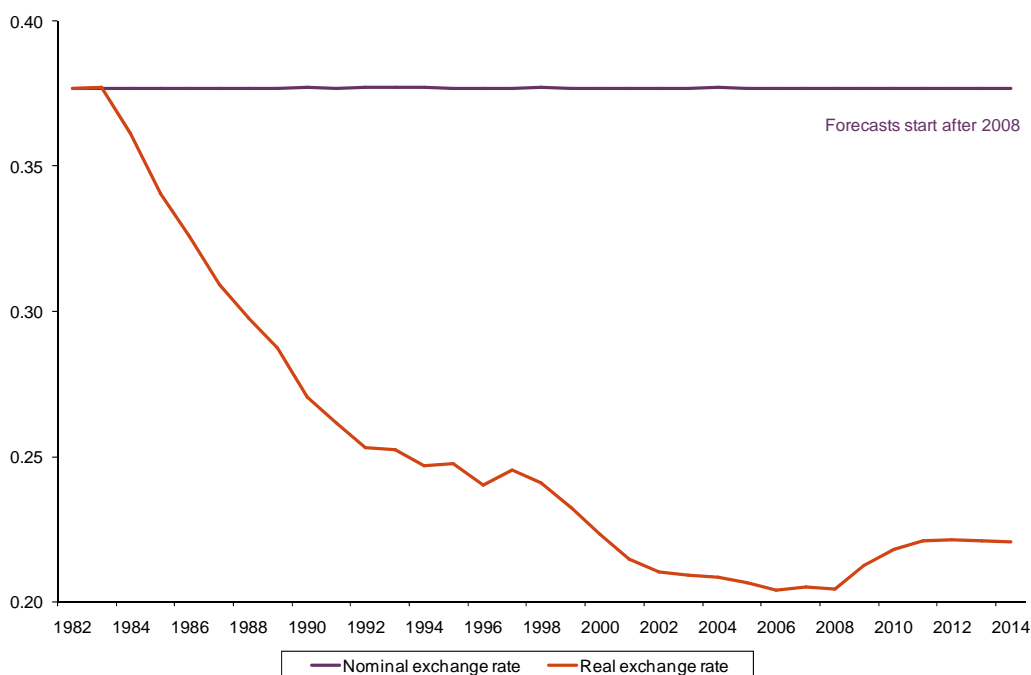
- investors' expectations regarding the risk-free rate because it is based on instruments that are frequently traded in liquid financial markets.
100. There is a relationship between interest rates in different countries, which is characterised by a number of 'parity conditions'. The interest rate parity condition specifies a relationship expected to hold between interest rates or yields on securities issued in different jurisdictions. In particular, the so-called 'uncovered interest parity' condition implies that the differential between domestic (eg, Bahrain) and foreign or 'world' (eg, US) interest rates will be equal to the expected change in the price of the domestic currency in terms of the foreign currency, assuming free capital mobility and no risk.
 101. With the fixed exchange rate between the Bahraini dinar and US dollar—based on an arrangement where the Central Bank of Bahrain can buy and sell US dollars at rates very close to the official exchange rate—and assuming no risk of a change in this regime, expected currency depreciation would be zero. Hence, the domestic and foreign interest rates might be expected to be equal. Therefore, given the fixed exchange rate, the yields on US government debt can be seen as the appropriate reference point for the risk-free rate for an investor investing in Bahrain.
 102. Even where the nominal exchange rate is fixed, the real exchange rate might change over time, if there is a difference in inflation between the domestic and foreign market. If the domestic market (eg, Bahrain) has lower inflation than the foreign market (eg, the USA) and the nominal exchange rate is fixed, the domestic currency is appreciating in real terms. Thus, under the same interest rates and in the absence of a risk differential, an investor in the domestic market would benefit compared with one investing (and consuming) in foreign markets in the event that the inflation rate in Bahrain is lower than in the foreign market.
 103. Using the law of one price, according to the purchasing power parity (PPP) condition, under the assumption of small or negligible transaction costs and import tariffs, the difference in nominal interest rates between two countries would then be equal to the difference in expected inflation. In other words, if there is a positive inflation differential and arbitrage is possible, PPP requires that the nominal interest rates differ by the difference in inflation such that real interest rates in the two countries remain equal.
 104. If the interest parity and PPP conditions hold, the interest rate in the USA provides the appropriate reference point for the international investor investing in Bahrain. If the international investor was assumed to invest (and consume) in Bahrain, he would be earning Bahraini nominal interest rate, but the same real interest rate as the investor investing in the assets abroad (eg in the USA). If the international investor was to invest in Bahrain but use the returns to consume abroad (eg, in the USA), he would then need to earn the equivalent of the nominal US interest rate that would provide him with the appropriate compensation for the same real interest rate as well as the difference in inflation.

International risk-free rate in practice

105. Persistent inflation differentials between Bahrain and the USA would imply continuous changes in the real exchange rate, despite the fixed nominal exchange rate between the Bahraini dinar and the US dollar. This would also imply persistent differences in nominal interest rates, even if the interest parity conditions hold. This might not be sustainable in the long run.

106. Figure 10 shows the real and nominal exchange rates between the Bahraini dinar and the US dollar. Whereas the nominal exchange rate has been fixed at 0.376 dinars to the dollar, the dinar has appreciated steadily in real terms against the US dollar. This suggests that differences in inflation rates between the USA and Bahrain have persisted for several years, suggesting a difference in the nominal interest rates as well. That is, a higher nominal interest in the USA would have been expected to compensate investors for higher inflation in the USA compared with the return on Bahraini assets.
107. Nevertheless, the evidence suggests that, since 2001, the inflation differential has been relatively small (Figure 10). The latest forecasts from the International Monetary Fund (“IMF”) suggest that the differential observed historically will reverse over the next two years and then reduce to approximately zero after 2010. This suggests that yields on US government debt are a good proxy for the nominal risk-free rate in Bahrain and the appropriate reference benchmark for the international investor investing in Bahrain. TRA therefore considers that the nominal risk-free rate yield on nominal US government debt can be used as a proxy measure for the risk-free rate used to estimate the cost of capital in the base-case scenario.

Figure 10 Real and nominal exchange rates (Bahraini dinar versus US dollar)



Note: The real exchange rate is defined as the nominal exchange rate multiplied by the ratio between the price indices in Bahrain and the USA.

Source: IMF (2009), “World Economic Outlook Database”, April; Datastream and TRA calculations.

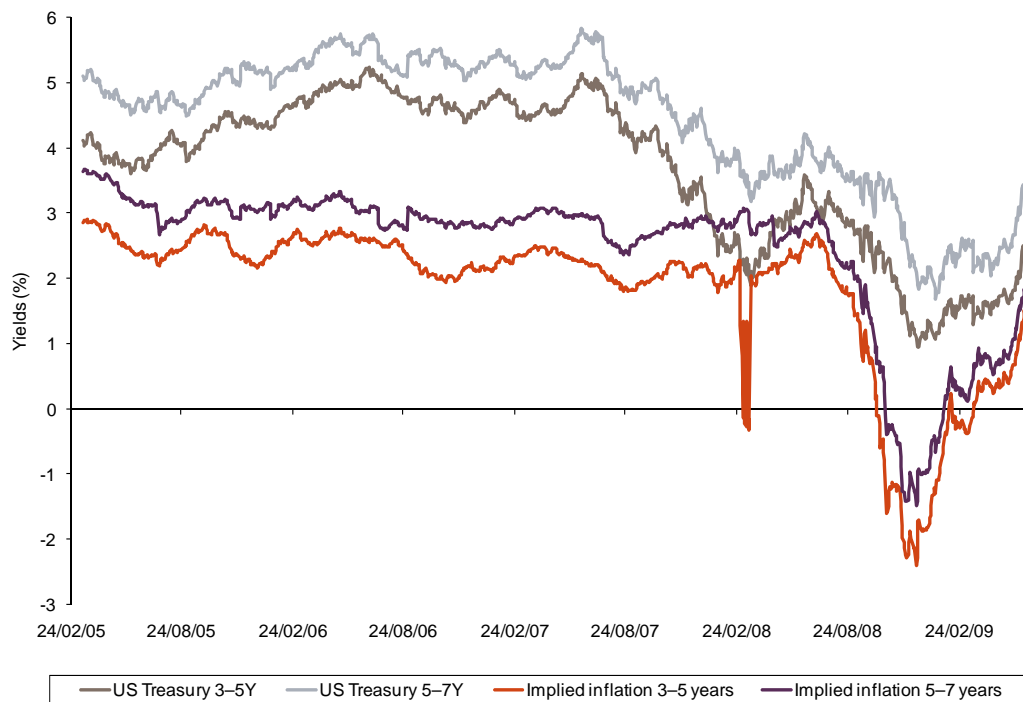
108. The assumptions underlying the parity conditions described above may not always hold, particularly in the short run, for several reasons. For example, in less developed countries, there could be significant transaction costs associated with cross-border transactions or there might be imperfect capital mobility. Domestic and foreign assets might also not be substitutable owing to country risk premiums.
109. Investors would also require compensation for economic, political, institutional and financial risks associated with Bahrain, if applicable. The discussion thus far has assumed that there is no risk premium associated with domestic assets (ie, there is no risk premium that investors might require for investing in Bahrain compared with

the US benchmark). If the yield on US Treasury bonds is assumed to be the proxy for the international risk-free rate, an international investor might require a country risk premium to invest in Bahrain rather than the USA. Hence, in the presence of additional country risks, the Bahraini rates of return would be higher than in the USA.¹⁹ This issue is addressed in the section on the country risk premium.

Estimation from US government securities

110. The risk-free rate can be proxied by the yield to maturity on US Treasury bonds. Figure 11 shows the evolution of the yield to maturity on benchmark indices of US Treasury bonds of 3–5- and 5–7-year maturities, along with the implied rate of inflation, estimated as the difference between yields on nominal and index-linked US Treasury bonds. The nominal yield on US Treasury bonds gradually increased between 2005 and 2007, subsequently decreasing significantly after the onset of the financial turmoil around July 2007. The differential between yields on nominal and real bonds currently implies that inflation will be close to 1% over a five-year time horizon.

Figure 11 Yields on nominal US Treasury bonds and implied inflation (%)



Note: Based on Merrill Lynch US Treasury Index with maturities of 3–5 years and 5–7 years. Implied inflation calculated using Fisher's formula.
Source: Datastream, TRA calculations.

111. Table 2 summarises the average yields across different time periods and maturities.

¹⁹ The relative impact of any persistent difference in expected inflation rates and the presence of a risk premium might be expected to determine the actual differences in nominal interest rates between Bahrain and the USA. These two effects could act in opposite directions and hence may, to some extent, cancel each other out.

Table 2 Average nominal yields on US Treasury bonds (%)

Averaging period	3–5-year maturity	5–7-year maturity
Spot	2.3	3.2
1-month	2.2	3.2
3-month	1.8	2.6
1-year	2.0	2.9
3-year	3.4	4.2
5-year	3.6	4.4

Note: The spot yields are reported as at June 24th 2009.
Source: Datastream, TRA calculations.

112. Over the past three years, yields have been following a downward trend, and spot yields for the relevant part of the maturity curve are now 3.2% or lower. Such a reduction may in part be a result of lower inflation expectations. This trend suggests that estimates of the forward-looking risk-free rate based on longer-term averages do not provide relevant, forward-looking information. Therefore TRA considers that, in the US Treasury Bond market, spot yields are currently the best indicator of the risk-free rate.
113. Overall, for the reasons set out above, TRA is of the view that the appropriate range for the risk-free rate under the base case is 3.2–3.7% based on US government spot yields of 5–7-year maturity. This is a conservative estimate which includes an uplift of 50 basis points (bp) to the upper end of the range in recognition of the current uncertainty in financial markets.

Proposed ranges for the risk-free rate

114. TRA proposes to use a range for the nominal risk-free rate of 3.2–3.7%, based on yields on US Treasury bonds. This range reflects headroom over spot rates to allow for uncertainty in financial markets. The question of whether it is appropriate to add a country risk premium to reflect the additional risk that an investor might face in investing in Bahrain rather than the USA is discussed in the next section.
115. Under the alternative scenario considered by TRA, a range of 3.5–5.8% is proposed, based on average yields for long-term Ijara Sukuks over a range of time periods. The wider range compared with the range based on US Treasury bonds is a reflection of the additional uncertainty caused by using data based on less frequently traded securities.

Question 2: Do you agree with the risk-free rates proposed by TRA under the base-case and alternative scenarios? Please elaborate.

Country risk premium

116. Investors may be exposed to additional risk as a result of investing in Bahrain rather than in other countries such as the USA. To the extent that this risk is systematic and non-diversifiable, investors would expect additional compensation for exposure to that risk.
117. In addition to country risk, there may be currency risk. Currency risk may arise where the cash flows to an investor are denominated in a currency different to that in which the investor intends ultimately to use the proceeds of investment to pay for their consumption of goods and services.
118. The magnitude of the country risk premium for investing in Bahrain can be proxied by sovereign credit risk, which can be estimated with reference to the yields on debt issued by governments with similar sovereign credit ratings to Bahrain. An estimate of the country risk premium may be added to the risk-free rate for the calculation of the cost of capital in the base-case scenario. However, a country risk premium is not warranted for the alternative scenario as the yields used to estimate the risk-free rate used in that case would already be expected to include such a premium.
119. The remainder of the section is structured as follows:
- the concept of country risk and the effect on investors' required returns are discussed;
 - currency risk is considered next, together with an examination of whether an associated premium is applicable to the current assessment;
 - country risk premiums are assessed on the basis of sovereign debt spreads;
 - TRA's proposed estimate of the country risk premium is presented.

Country risk

120. Investments may be exposed to the risk of the country in which they generate cash flows. This risk may be systematic—related to the returns on the global market—or idiosyncratic. From the perspective of a globally diversified investor, any compensation for additional risk would be contingent on whether the risk is systematic or diversifiable.
121. To the extent that country risk is idiosyncratic, it could be diversified by holding a global portfolio of assets; hence, globally diversified investors would not be expected to be compensated for this risk, on average, and hence would require no premium for country risk. In practice, the country risk might not be diversifiable and would need to be compensated for in the cost of capital for the following reasons:
- imperfect international capital flows and investors' propensity to exhibit a preference for domestic securities—the home-bias puzzle;²⁰
 - increasing correlation between national economies and equity markets, implying that a greater proportion of the overall risk is non-diversifiable;

²⁰ French, K. and Poterba, J. (1991), "Investor diversification and international equity markets", *American Economic Review*, **81**, 222–26.

- a requirement on the regulated company to pay the full amount of the risk premium investors' demand as compensation for the probability of loss from default.²¹
122. The home-bias phenomenon might be due to barriers to international capital flows, the effects of national boundaries, or preferences for geographically proximate investments.²²
123. Closer 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. Hence, investors may now require compensation for a greater element of country risk. Furthermore, there is evidence to suggest that correlation between national equity markets increases at times of crisis.²³
124. Therefore, if investors require compensation for this risk, it should form part of the allowed returns.

Currency risk

125. The currency risk faced by an investor in assets denominated in Bahraini dinar is that the value of the investment will change as a result of unanticipated movements in the nominal exchange rate. As the Bahraini dinar has in effect been pegged to the US dollar at a constant rate of 0.376 dinars to the dollar since 1980,²⁴ the nominal exchange rate might be expected to remain constant over the duration of this Determination. Therefore, currency risk is unlikely to be a major risk for investment and does not provide justification for an additional premium for currency risk.
126. One indication of the actual currency risk might be the difference between yields on different debt securities issued by the Government of the Kingdom of Bahrain with equal maturities but denominated in Bahraini dinars and US dollars. The difference between the yield on short-term Bahraini dinar-denominated Al-Salam securities, adjusted for the maturity premium based on US Treasuries,²⁵ and the yield on long-term US dollar-denominated Ijara Sukuks can be used to estimate the currency risk. The evidence suggests that, on average over the past five years, the differential in yields has been very close to zero, supporting the expectation that the currency risk perceived by investors for investing in Bahrain is close to zero.
127. Overall, given that the nominal exchange rate peg between the Bahraini dinar and the US dollar is expected to remain stable, and that the average differential in yields between Bahraini government securities denominated in dinars and dollars has

²¹ With a positive probability of default, the actual amount the company expects to pay will be lower than the full amount promised to investors, as the companies' payments to creditors would be lowered after a default event.

²² Coval, J. and Moskowitz, T. (1999), "Home Bias at Home: Local Equity Preference in Domestic Portfolios", *Journal of Finance*, **54**:6, December.

²³ Ball, C. and Torous, W. (2000), "Stochastic Correlation Across International Stock Markets", *Journal of Empirical Finance*, **7**:3–4, 373–88, November.

²⁴ Central Bank of Bahrain "Exchange rate policy", <http://www.bma.gov.bh/cmsrule/index.jsp?action=article&ID=1323>, accessed on June 5th 2009.

²⁵ The maturity premium reflects the additional compensation required to compensate for holding longer-maturity securities, and was estimated by taking the differences between the yields on US Treasury bonds of 3–5- and 5–7-year maturities and those on short-term Treasury bills of maturities between 0 and 9 months. This analysis assumes that the term structures of interest rates are the same in Bahrain and the USA.

been close to zero, TRA considers that there is no justification for a currency risk premium.

Estimation of the country risk

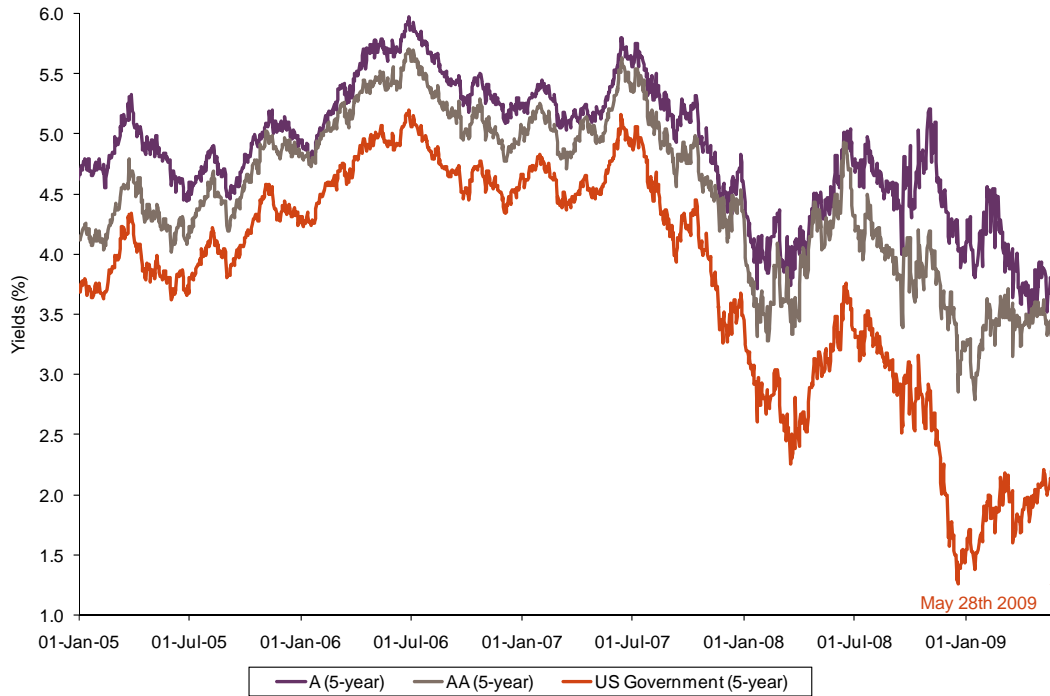
128. The country risk premium could be proxied by sovereign credit risk, which can be estimated by measuring the premium for yields on US dollar-denominated debt issued by the Government of the Kingdom of Bahrain over debt issued by the US government.
129. The difference between the yields on long-term US dollar-denominated Ijara Sukuks (3–10-year maturities) and US government bond indices of comparable maturities indicates a spread of around 115bp on average over the past year.²⁶ However, the calculation might not provide a robust estimate of the country risk premium since the lack of active secondary market trading for Ijara Sukuks means that the yields on these securities are not frequently updated to reflect changes in country risk, or in the risk-free rate.
130. In the absence of a significant quantity of actively traded long-term debt issued by the Government of the Kingdom of Bahrain, the yields to maturity on US dollar-denominated sovereign debt issued by countries with comparable credit ratings to Bahrain can be used as proxies for the country risk that an investor faces.²⁷
131. Bahrain currently has a sovereign long-term foreign currency credit rating of A.²⁸ Figure 12 displays the yields to maturity on indices for nominal US dollar-denominated Treasury bonds and sovereign US dollar-denominated benchmarks with varying credit ratings. Since August 2007, yields on US Treasury Bonds have declined significantly, while yields on the AA and A rated sovereign debt benchmarks have been broadly stable (Figure 12).

²⁶ The difference was estimated using US government bonds with maturities between one and ten years.

²⁷ Another alternative would be to examine the credit spreads on A rated US dollar-denominated corporate debt compared with AAA rated bonds as a proxy for the country risk premium. However, data from the corporate bond markets is likely to be less relevant where adequate data exists on comparable sovereign debt.

²⁸ Standard & Poor's (2008), "Bahrain (Kingdom of)", December 17th.

Figure 12 Yields on foreign sovereign debt denominated in US dollars and the US Treasury bond benchmark (%)

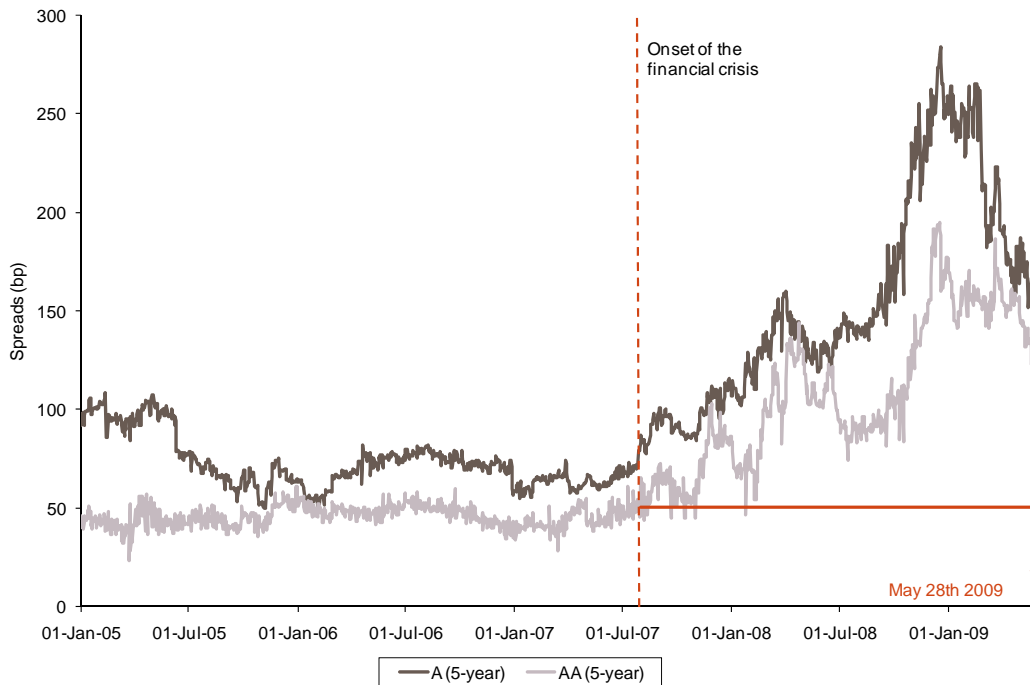


Note: Bloomberg Fair Value (“BFV”) indices are used in this analysis. These represent yields on sovereign debt issued in US dollars.

Source: Bloomberg, TRA calculations.

132. Figure 13 displays the spreads of the sovereign debt indices against the US benchmark, calculated from the same data used in Figure 12. Before the financial crisis, the spreads on the single A rated index traded at approximately 50bp. Following the onset of the financial crisis, spreads first increased significantly and then declined sharply. However, it should be noted that Figure 12 suggests that the primary driver of this volatility has been a reduction in yields on US Treasury bonds rather than an increase in yields on A rated sovereign debt.

Figure 13 Spreads of foreign sovereign debt denominated in US dollars over the US Treasury bond benchmark (bp)



Note: BFV indices are used in this analysis. These represent yields on sovereign debt issued in US dollars. Implied spreads are calculated as the differences between yields on the BFV indices and the US benchmarks of the corresponding maturities.
 Source: Bloomberg, TRA calculations.

Proposed country risk premium

- 133. Considering that sovereign debt spreads based on single A rated government debt currently suggest that a country risk premium of up to 150bp might be required for an investment in Bahrain compared with an equivalent investment in the USA, TRA proposes to add a country risk premium of 150bp to the required returns under the base-case scenario of an internationally diversified investor.
- 134. As the risk-free rate under the alternative scenario of a less diversified investor is estimated from the yields on debt issued by the Government of the Kingdom of Bahrain, it would be expected to contain a premium for country risk; hence, no additional premium is required in the alternative scenario.

Question 3: Do you agree with the country risk premium proposed by TRA? Please elaborate.

Equity risk premium

135. The equity risk premium (ERP) is a key parameter in the cost of equity. It represents the expected return by an investor over and above the risk-free rate for investing into a portfolio of equities that represents the equity market as a whole. Assuming that investors hold internationally diversified investment portfolios, there is a single world ERP.
136. The robust estimation of the ERP specifically for Bahrain is not possible due to the lack of sufficiently long-run time-series data for the Bahraini equity market. Nevertheless, a comparative analysis of the Bahraini and international equity markets might suggest whether, in principle, one might expect a material difference between the world and the Bahraini ERPs.
137. Several sources of evidence and methods of estimation are available to inform an estimate of the ERP for mature equity markets, including:
- long-run averages of realised equity returns in excess of the risk-free rate;
 - dividend or earnings-growth rate models;
 - surveys of investor expectations.
138. As estimation methods forecast the average ERP over a given time horizon, a choice needs to be made between using arithmetic or geometric averages.
139. Estimation methods based on long-run average realised excess returns also require consideration of the effects of the recent financial turmoil and the extent to which the average ERP over the forecast horizon is likely to have changed recently, and might be above or below the long-run average. This is important to ensure that capital markets can be accessed by regulated companies.
140. The remainder of the section is structured as follows:
- having defined ERP, the characteristics of Bahraini and international equity markets are compared to see whether there are any material differences that are likely to affect the ERP;
 - issues associated with the empirical estimation of the ERP are discussed and the estimates of the world ERP prepared, which are then compared against regulatory precedents;
 - the effects of financial turmoil on the ERP are considered;
 - the relative illiquidity of the Bahraini equity market is discussed;
 - finally the proposed range for the ERP is presented.

Definition of the ERP

141. The ERP represents the additional expected remuneration above the risk-free rate that investors require to invest in a broad market portfolio of equities. For investment decisions, the forward-looking ERP and cost of equity are relevant, and these can be estimated from historical returns or forward-looking models. The actual forward-looking ERP is unobservable, but can be estimated by modelling expected returns.
142. Under the assumption that international capital markets are integrated, there is a single global ERP. Investors can benefit from global diversification if they hold the global market portfolio. However, to the extent that international capital flow is impaired by transaction costs or other barriers and investors do not invest in the full global market portfolio because of home bias, investors in different national equity

markets might require different ERPs. These variations are present across developed markets.

143. Variations in ERP across countries could be caused by a variety of factors. For example, different weightings of industrial sectors across national stock indices might result in different ERP estimates. In less developed stock markets, where a small number of companies account for a relatively large proportion of total market capitalisations, the effect of such a deviation in risk composition may be more pronounced than for the global average, and this could affect the ERP upward or downward. That said, such deviations are difficult to estimate with any degree of robustness in the absence of long-term data on returns.
144. Given the available data, TRA is of the view that the world ERP is the best proxy for investments in Bahrain.

Comparison of Bahraini and international equity markets

145. If there is less than perfect international capital flow and there is a degree of segmentation in national equity markets, investors may require different ERPs according to the country in which they are investing. This would require estimation of an ERP specific to Bahrain. However, there is a lack of robust estimates for a Bahrain-specific ERP that are comparable in robustness to the estimates for some other markets. Dimson, Marsh and Staunton (“DMS”), a widely used source of data on historical ERP estimates, does not report ERP estimates for either Bahrain or other Middle Eastern countries.²⁹
146. Direct estimation of the ERP for Bahrain based on excess returns to the Bahrain All-share index over the risk-free rate is unlikely to be robust for the following reasons.
- the number of years of data is limited. The Bahrain Stock Exchange began operations in 1989 and the Bahrain All-share Index has existed since 2004 only.
 - as discussed in section 4, there is a lack of indicators to estimate robustly the historical risk-free rate for Bahrain that must be subtracted from equity returns to estimate the ERP.
 - the Bahrain All-share index is relatively illiquid compared with either the Standard & Poor’s (“S&P”) 500 or FTSE All-world indices.
147. The relative illiquidity of the Bahrain All-share index is demonstrated by Table 3, which compares daily share turnover ratios for the Bahrain All-share index, S&P 500 and FTSE All-world indices.

Table 3 Average daily share turnover ratios

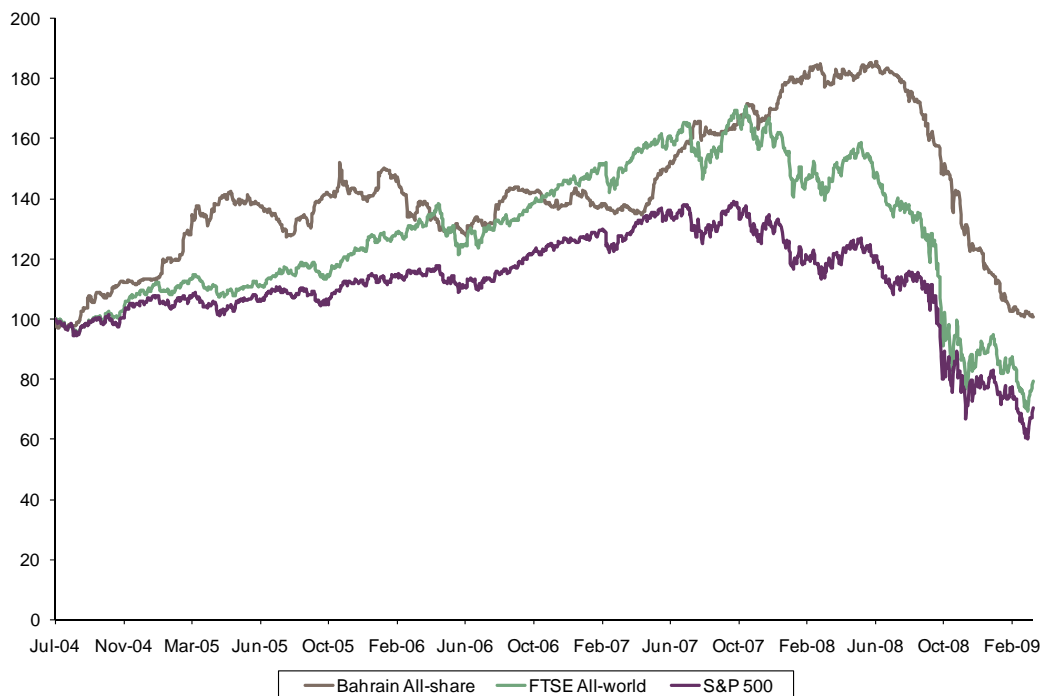
Averaging period	Bahrain All-share	FTSE All-world	S&P 500
2-year	0.43	4.74	4.10
5-year	n/a	n/a	4.07

Note: Daily turnover ratios are defined as the average of the ratio between the value of shares traded per day and total market capitalisation.
Source: Bloomberg, TRA calculations.

²⁹ Dimson, E., Marsh, P. and Staunton, M. (2009), “Global Investment Returns Sourcebook 2009”, London Business School/Credit Suisse.

148. The approach adopted in this Determination is to compare the Bahraini equity market with international equity markets to identify whether there are any material differences in the patterns of returns and volatility, and whether there is any compelling evidence to suggest that the Bahraini ERP differs materially from the world ERP.
149. Figure 14 presents the Bahrain All-share, S&P 500 and FTSE All-world indices (re-based) over the past five years. The Bahrain All-share index closely follows both the S&P 500 and FTSE All-world indices, suggesting that realised returns may have been similar over multi-year time horizons.

Figure 14 Equity indices over the past five years



Note: Equity indices have been rebased to 100 in July 2004.
Source: Bloomberg.

150. Table 4 presents estimates of the annualised volatility of the Bahrain All-share, S&P 500 and FTSE All-world indices measured using monthly returns over 2- and 5-year periods. When measured monthly, the volatility of the Bahrain All-share index is similar to that of the S&P 500 and FTSE All-world indices. The differences observed in the case of weekly returns are likely to be caused by the low liquidity of the Bahrain Stock Exchange compared with the stock exchanges on which the US and world indices are based, hence little weight is placed on weekly returns in this section.³⁰

³⁰ Furthermore, the low liquidity of the Bahrain Stock Exchange index might be one reason for the less than perfect correlation between returns on the Bahraini index and those on international stock indices.

Table 4 Annualised volatility of returns (%)

	Bahrain All-share	FTSE All-world	S&P 500
Weekly			
2-year	12.8	20.9	20.4
5-year	13.1	29.1	28.4
Monthly			
2-year	19.1	19.1	21.9
5-year	14.6	16.3	16.9

Note: Annualised volatility is estimated as the annualised standard deviation of weekly and monthly returns on equity indices.

Source: Bloomberg, TRA calculations.

151. Given the evidence presented above, there does not appear to have been a material difference between the returns or volatility of the Bahraini, US and world equity markets on a monthly basis over the past five years. If anything, the data suggests that the Bahraini equity market exhibits lower volatility, and hence might be associated with lower risk. However, owing to the limited number of years of data and the uncertainty inherent in estimates of the ERP, it is not possible to reach a firm conclusion about the ERP for Bahrain from this data.
152. TRA therefore considers that the best estimate of the ERP for Bahrain would be the world ERP. The issue of liquidity is not a factor priced by the CAPM and is therefore addressed separately.

Estimation of the ERP

153. The ERP can be estimated from long-run averages of historical data, or implied from current market data. The ERP implied by current market data may be more representative of the forward-looking ERP. However, this technique produces volatile results that are sensitive to assumptions about the risk-free rate and long-run growth rates of dividends or earnings.
154. TRA considers that robust ERP estimates from independent sources based on long-run averages of historical data constitute a more appropriate basis for estimating a stable long-run ERP for use in a regulatory determination of the cost of capital.
155. Historical data on equity returns in excess of the risk-free rate is available for a number of mature equity markets. As such, the choice of equity market to use as a benchmark is also an important determinant of the estimated ERP. Given that there is wide variation between historical excess equity returns across geographic markets, TRA considers that a robust approach to estimating the world ERP is to use an average across these markets.
156. The estimated ERP also varies according to whether bonds or bills are used to estimate the risk-free rate. Given that yield curves tend to be upward-sloping, measures against bills of relatively short maturity tend to be higher than those against long-term bonds. An important consideration is consistency with the maturity used for the risk-free rate. Given the time horizon adopted for the risk-free rate, this Determination considers measures of the ERP against longer-term bonds.
157. Estimates of the ERP using historical data can be based on geometric or arithmetic averages. Geometric averages are lower than arithmetic averages and produce what can be seen as an unbiased forecast over a very long time horizon. Arithmetic

averages produce unbiased forecasts for one-year time horizons, according to academic research—a weighted average of the two could be appropriate for a forecast time horizon of two years, with the majority of the weight being placed on arithmetic averages.³¹

158. The latest geometric average of historical equity returns in excess of the risk-free rate for the international equity markets that comprise the world portfolio is 3.4% (see Table 5). This may be viewed as a reasonable estimate of the world ERP over a long time horizon. For the purpose of a forecast over a two-year time horizon, TRA considers the arithmetic average of 4.6% to be more appropriate, assuming that the ERP required by investors is currently similar to its long-term average level.

Table 5 Worldwide equity risk premiums relative to bonds, 1900–2008 (%)

Country	Geometric mean	Arithmetic mean	Standard error	Standard deviation
World	3.4	4.6	1.5	15.6

Note: The world ERP estimates represent averages of the estimates for 17 national equity markets.
Source: Dimson, E., Marsh, P. and Staunton, M. (2009), "Global Investment Returns Sourcebook 2009", London Business School/Credit Suisse.

159. Estimates of the ERP based on historical data are subject to some degree of uncertainty. This uncertainty is reflected in the relatively large standard errors on estimates of the ERP seen in Table 5. The standard error of the estimate for the world ERP is 1.5%, which suggests that a range of 1% between the low and high estimates of the ERP is required to reflect the uncertainty of this estimate. Therefore, TRA considers that a range of 4.1–5.1% would be an appropriate estimate for the world ERP.

Regulatory precedents for the ERP

160. As there is conceptually a single, world ERP applicable to all companies and sectors, it is useful to consider the ERP used by a range of international regulators as a cross-check. The selection of regulatory benchmarks presented in Table 5 indicates a range from 3.0 to 6.0%. The range of 4.1–5.1% for the world ERP is therefore consistent with regulatory precedent.

³¹ The formula for the weight to be placed on the arithmetic average is $k=1 - H/T$, where H is the number of years in the forecast horizon and T is the number of years in the historical average. Therefore, in the case of Bahrain, the weight on the arithmetic average might be approximately $0.981 = 1 - 2/108$. For more details, see Jacquier, E., Kane, A. and Marcus, A. (2005), "Optimal Estimation of the Risk Premium for the Long Run and Asset Allocation: A Case of Compounded Estimation Risk", *Journal of Financial Econometrics*, 3:1, 37–55.

Table 6 Regulatory benchmarks on ERP estimates (%)

Country	Regulator	Company	ERP estimate
New Zealand	Commerce Commission of New Zealand (2009)	All regulated companies	5.5 ¹
France	ARCEP (2008)	France Telecom	5.0
UK	Ofcom (2009)	BT Openreach	4.5–5.0
UK	Ofcom (2009)	Rest of BT	4.5–5.0
Ireland	ComReg (2008)	Eircom	4.8–6.0
UK	Competition Commission (2008)	BAA (Stansted)	3.0–5.0
UK	Postcomm (2006)	Royal Mail	3.5–5.0
Netherlands	OPTA (2006)	KPN	6.0
UK	Ofcom (2005)	BT copper access	4.0–5.0
New Zealand	Commerce Commission of New Zealand (2005)	Telecom New Zealand Ltd	5.5 ¹
Netherlands	OPTA (2003)	KPN	6.0

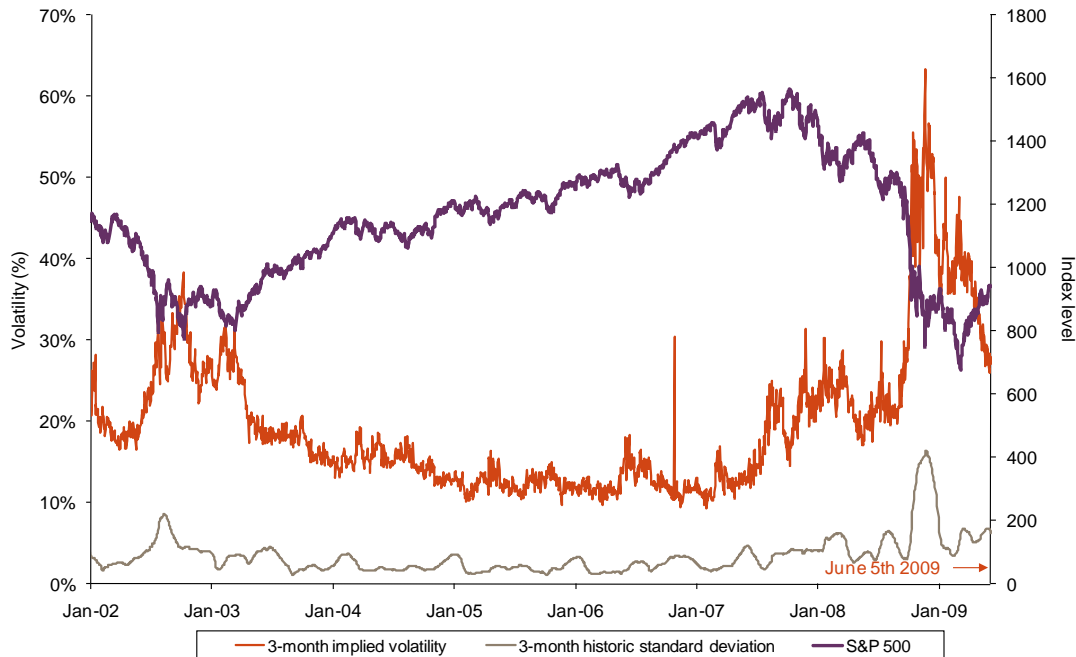
Note: 1. The Commerce Commission of New Zealand applies the simplified Brennan-Lally CAPM to estimate the cost of equity. As such, the equity risk premium of 7.0% must be adjusted down by the risk-free rate multiplied by the rate of personal income tax, resulting in an ERP of approximately 5.5%, assuming a risk-free rate of approximately 4.5% and a personal income tax rate of 33%.
Source: Regulatory documents.

The effects of the recent financial turmoil

161. When using long time periods to derive more precise estimates of the historical ERP, the greater statistical precision of averages over long time periods has to be balanced against the consideration that, over the short term, the ERP may deviate from its long-term average level, and therefore historical data may not be an accurate estimate of the current ERP. As such, TRA proposes to use an estimate based on an average over a longer time period, but adjusted to reflect current market evidence. This reflects a conservative approach.
162. One source of market data that can be used to infer the current ERP and the likelihood of it being above or below its long-run average over the next few years is the volatility implied by the prices of call options on a broad equity index. These prices reflect, among other factors, the price that investors are willing to pay for insurance against equity risk, and hence would be expected to be positively correlated with the ERP. This relationship between implied volatility ("IV") and the ERP has been empirically verified.³² Figure 15 shows the level of IV on the S&P 500 index.

³² See, for example, Campbell, J.Y., Lo, A. and MacKinley, C. (1997), *The Econometrics of Financial Markets*, Princeton University Press; Scruggs, J.T. (1998), "Resolving the Puzzling Intertemporal Relation Between the Market Risk Premium and the Conditional Market Variance: A Two Factor Approach", *Journal of Finance*, 53:2; Bliss, R. and Panigirtzoglou, N. (2004). "Option-implied Risk Aversion Estimates", *The Journal of Finance*, 59, 407–43.

Figure 15 S&P 500 implied and historical volatilities



Source: Datastream, TRA calculations.

163. After the onset of the financial crisis in August 2007, the level of IV on the S&P 500 increased significantly from its long-term level of approximately 15–20% and then decreased sharply at the end of 2008. However, at approximately 30% it currently remains above its long-term level. This suggests that the forward-looking ERP may have increased since August 2007 and may be higher at present than its long-term average, as suggested by an analysis of historical returns.

164. Although the ERP is likely to have increased relative to its long-term average, statistical ERP estimates based on data for short time horizons are inherently uncertain. Therefore, a precise estimation of the magnitude of potentially increased returns required by investors is not possible. In order to reflect the evidence of the potential increase in required returns in equity markets, TRA proposes an uplift of 50bp to the long-run historical arithmetic average world ERP of 4.6%, yielding a point estimate of 5.1% for the forward-looking ERP within a 4.6–5.6% range. This reflects the conservative approach adopted by TRA to the estimation of the allowed rate of return.

Liquidity premium

165. The evidence presented suggests that the Bahraini market is characterised by relatively low liquidity. Therefore, it might be reasonable to assume that both local and international investors would require compensation for being exposed to liquidity risk. This risk includes the possibility of large bid–ask spreads and trading costs, which would reduce expected returns. Hence, although there is no explicit theoretical basis for a liquidity premium under the CAPM framework, an additional liquidity premium might need to be applied to the ERP.

166. Empirical studies have provided some evidence that supports the proposition that liquidity is a factor that investors price into required returns on equity. An early

- exposition of the hypothesis that expected return is an increasing function of the bid–ask spread was provided by Amihud and Mendelson (1986).³³
167. Compensation for differences in liquidity across firms within a single equity market has been found to account for a significant component of returns in developed equity markets.³⁴ Recently, this empirical analysis has been extended to differences in liquidity between equity markets, where positive relationships between liquidity and equity returns have been measured.³⁵
 168. The extent to which return premiums represent compensation for liquidity rather than for other factors not priced by the CAPM (such as market capitalisation and market to book value ratios) is unclear.³⁶ Nevertheless, as shown by Table 3, one measure of liquidity—the equity turnover ratio—indicates that the Bahrain Stock Exchange is significantly less liquid than the US stock market. This suggests that the ERP estimated for more developed stock markets may underestimate the returns required by an investor in the Bahrain All-share index.
 169. A potential source of evidence on the magnitude of the liquidity premium is given in Acharya and Pedersen (2003), which shows that a security's required return depends on both its expected illiquidity and the covariances of its own return and illiquidity with market return and market illiquidity.³⁷ The study constructed 25 value-weighted portfolios for all common shares listed on the New York Stock Exchange (“NYSE”) and American Stock Exchange (“AMEX”) over the period 1964–99, and estimated a variant of the CAPM that controlled for differences in liquidity. The difference in excess returns between the least and most liquid portfolios was approximately 60bp.
 170. Acharya and Pedersen estimated a measure of the liquidity premium for the least liquid US stocks compared with the most liquid. This study therefore does not provide a direct estimate of the liquidity premium that an investor in a company listed on the Bahrain Stock Exchange might expect compared with one listed on a more developed equity index. In particular, the liquidity premium for large companies in local stock markets might be smaller than that for the least liquid stocks in mature stock markets. However, it does suggest an order of magnitude for the premium that might be expected.
 171. Given the evidence that additional premiums are required to compensate for investments in illiquid securities, and that the Bahrain Stock Exchange is less liquid than more developed equity markets, TRA considers that for the purposes of calculating the cost of capital in this Determination, a premium of 50bp is appropriate to allow for the additional illiquidity of the Bahrain Stock Exchange compared with the equity markets used to estimate the ERP.

³³ Amihud, Y. and Mendelson, H. (1986), “Asset pricing and the bid-ask spread”, *Journal of Financial Economics*, **17**, 223–49.

³⁴ Gibson, R. and Mougeot, N. (2004), “The pricing of systematic liquidity risk: Empirical evidence from the US stock market”, *Journal of Banking & Finance*, **28**, 157–78.

³⁵ Baekart, G., Harvey, C.R. and Lundblad, C. (2007), “Liquidity and Expected Returns: Lessons from Emerging Markets”, *The Review of Financial Studies*, **20**:6, 1783–831.

³⁶ Rouwenhorst, G. (1999), “Local Return Factors and Turnover in Emerging Stock Markets”, *Journal of Finance*, **54**:4, August.

³⁷ Acharya, V. and Pedersen, L. (2003), “Asset Pricing with Liquidity Risk”, *Journal of Financial Economics*, **77**:2, 375-410.

Proposed estimate of the ERP

172. Based on the analysis set out above, TRA considers that an appropriate range for the ERP is 5.1–6.1%. This is based on an estimated range of 4.1–5.1% for the world ERP, a 50bp premium for the effects of financial turmoil, and a 50bp premium for the relative illiquidity of the Bahraini equity market compared with more mature equity markets. The additional premiums applied to the base ERP estimates reflect the conservative approach adopted by TRA to the estimation of the required returns.

Question 4: Do you agree with the ERP proposed by TRA? Please elaborate.

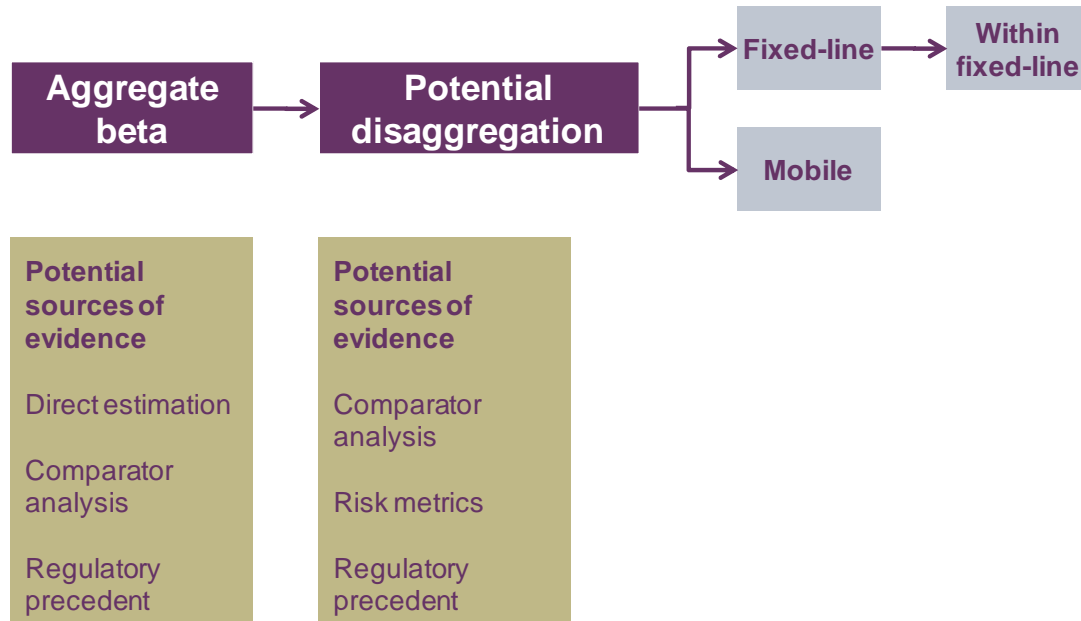
Equity beta

173. The equity beta reflects the exposure to systematic risk of a company's equity relative to the overall equity market risk. A range of evidence can be used to estimate equity betas, including direct estimates of betas for companies under consideration and indirect estimates based on comparator companies.
174. In principle, beta estimation can be done for regulated telecommunications services in aggregate, and potentially also for disaggregated business activities. In practice, the latter poses significant empirical challenges in order to arrive at robust estimates. This section explores methods for estimating beta, and discusses potential risk differentials across different businesses in the telecommunications market.
175. The remainder of the section is structured as follows:
- the analytical framework for estimating beta at the aggregate and disaggregate levels is outlined before presenting direct estimates of the equity beta and estimates from comparator companies;
 - regulatory precedents for asset betas are then presented;
 - the potential for systematic risk differentials between different business areas in the Bahraini market context is examined;
 - lastly, ranges for the beta for regulated telecommunications services in Bahrain are proposed.

Analytical framework for estimating beta

176. The beta measures the sensitivity of an investment's return to the market return. The equity beta of the overall equity market is equal to one, and, by construction, the market capitalisation weighted average of the equity betas for the constituents of the market must also equal one. Therefore, the equity beta for an individual company can be interpreted as the amount of systematic or non-diversifiable risk that the company contributes to the market portfolio.
177. The analytical framework used for estimating equity beta in this Determination is depicted in Figure 16.

Figure 16 Analytical framework for estimating equity beta



Source: TRA.

178. The first step is to estimate a beta for all regulated services in aggregate—ie, at the company level. Three sources of evidence are considered:

- direct estimation of the equity betas of regulated telecommunications companies operating in Bahrain: Batelco and Zain;
- analysis of a wider sample of betas for telecommunications companies comparable to Batelco and Zain;
- regulatory precedents for estimates of betas in the telecommunications sector.

179. Once the beta has been estimated at the aggregate level, the extent to which different business areas might have different exposures to systematic risk needs to be considered. Where any differences are found, these need to be quantified where possible, and supported by robust evidence that allows the delineation of potentially different levels of systematic risk for different telecommunications services with sufficient certainty. TRA has considered the potential for disaggregation at three levels:

- between fixed-line and mobile;
- within fixed-line;
- for new property developments compared with existing infrastructure.

180. The sources of evidence available to assess risk differentials between different business areas include:

- analysis of betas for companies judged to be “pure-play” comparators to different business areas;
- analysis of risk metrics based on accounting or operational data for different business areas;
- regulatory precedents for the disaggregation of beta.

181. Equity betas are a function of both the systematic risk of the business and the financial risk deriving from a company’s choice of capital structure. Therefore, each

comparator equity beta must be un-levered according to the appropriate leverage ratio to ensure like-for-like comparison. The asset betas must then be re-levered using the forward-looking leverage ratio estimated for the company or market of interest, which produces an estimate of the forward-looking equity beta.

Equity beta estimation: direct estimates

182. Direct estimates of the asset betas for Zain and Batelco are presented in Table 7. These have been obtained using regression analysis measuring the correlation of equity returns for these companies with returns on either the local equity markets where the companies are listed or the world equity market.
183. The asset betas presented in the table are derived from Bayesian-adjusted estimates of equity betas, which are calculated as: $2/3 \times \text{raw beta estimate} + 1/3 \times 1$. This adjustment controls for the tendency of statistical analysis to overestimate betas higher than one and underestimate betas lower than one.³⁸ As equity betas for network companies are often lower than one, this adjustment will tend to produce larger and hence more conservative beta estimates.
184. The betas are based on weekly returns over two- and five-year time horizons, and monthly returns over a five-year horizon. There is no consensus regarding the frequency of data to use in such analysis. On the one hand, from a theoretical perspective, betas measured using more frequent data are likely to be more affected by statistical biases such as autocorrelation than those measured using less frequent data. This is because of the impact of factors such as thin and non-synchronous trading. On the other hand, betas measured using more frequent data tend to be less uncertain (which would be reflected by narrower confidence intervals). This is because the use of shorter frequencies leads to more observations for the same estimation period.
185. Because of the potential for illiquid stock markets to affect the results, no beta is estimated using daily data, in order to minimise the risk that the estimates are affected by statistical biases and noise.

Table 7 Asset betas: direct estimates (adjusted¹)

	Local ²			FTSE All-world		
	2-year weekly	5-year weekly	5-year monthly	2-year weekly	5-year weekly	5-year monthly
Zain	0.91	0.72	0.63	0.39	0.39	0.66
Batelco	0.64	1.03	0.96	0.36	0.37	0.48

Notes: Asset betas are based on the equity beta and gearing estimates presented in the tables in Appendix 4. Asset beta is defined as equity beta multiplied by one minus gearing plus debt beta multiplied by gearing, where debt beta is assumed to be equal to zero. ¹ Calculated using the Bayesian adjustment: $2/3 \times \text{raw beta} + 1/3$. Raw betas represent estimated coefficients from a regression where returns on the equity are regressed on returns on either the local or the world index (see Tables A5 to A7 in Appendix 4). ² The stock exchange index of the market where a company is listed, for example, Bahrain Stock Exchange index and Kuwait Stock Exchange index are the local indices in the case of Batelco and Zain respectively. Source: Bloomberg, TRA calculations.

186. Table 7 indicates that when measured against the FTSE All-world index betas are consistently lower than when measured against the relevant local indices. This suggests that investors active in the local market may not always hold investment

³⁸ Blume, M.E. (1968), "On the Assessment of Risk", *Journal of Finance*, **43**, March.

- portfolios that are internationally diversified, and that betas measured against local indices might be influenced by home bias. Alternatively, it could mean that these companies have very low systematic risk.
187. A domestic investor with an investment portfolio that is relatively undiversified across international markets might expect to require compensation for exposure to the systematic risk of a local stock market index. Comparison of betas estimated against local market indices over five- and two-year time horizons suggests that Zain's systematic risk may have increased, while that of Batelco has decreased over time. As betas are measured at the group level, it is possible that the beta for Zain may have increased as a result of the acquisition of an 85% stake in the African mobile operator, Celtel, in 2005.³⁹
 188. Overall, the direct estimates suggest a range of 0.65–1.00 for the asset beta relevant to a domestic investor, though it should be noted that these estimates suffer from limitations (see below). These estimates are based on the assumption that the local investor does not diversify optimally across markets. Thus, from the theoretical point of view, using these estimates might overstate the required rates of return.
 189. Direct estimation of Batelco's equity beta against the Bahrain All-share index is not likely to give a robust estimate of the company's systematic risk exposure. Batelco's market capitalisation is around 13% of the overall market capitalisation of the Bahrain Stock Exchange.⁴⁰ Hence, the returns on the Bahrain All-share index can be significantly influenced by those on Batelco. By virtue of the way the index is constructed, an estimation of beta against this index is likely to be close to one. This suggests that estimates of beta against the FTSE All-world index would be preferable from both a theoretical and empirical point of view.
 190. Estimates of beta against both local and international indices may also be distorted because Batelco's equity is infrequently traded.⁴¹ As such, its equity returns are likely to provide a relatively poor signal of expected changes in company value compared with equity returns for stocks quoted on more liquid exchanges in the USA or Europe. Given that beta estimation is based on statistical analysis, the estimate becomes less reliable when less frequent data is used. The extent to which investors demand an additional risk premium for the relative illiquidity of Batelco's equity was considered in the equity risk premium section.
 191. These data issues are also problematic for estimating Zain's equity beta, although to a lesser extent than for Batelco, given more frequent trading of Zain's equity (as measured by the share turnover ratio). The impact of these issues is also reduced when betas are estimated against international equity indices. However, Zain beta estimated at the group level may not be representative as the geographic scale and scope of Zain activities has dramatically changed over the last five years.
 192. An investor with an internationally diversified portfolio would consider company risk relative to an international market index. Table 7 suggests that, on this basis, betas estimated from weekly data have been relatively stable over the past five years, and that a range of 0.40–0.70 would be relevant for an international investor.

³⁹ Zain corporate website: <http://www.zain.com/muse/obj/lang.default/portal.view/content/Aboutus/Overview/Milestones>

⁴⁰ Bloomberg.

⁴¹ Over the past year the average share turnover ratio for Batelco—the total value of Batelco equity traded per day as a percentage of Batelco's market capitalisation—is less than 1%.

193. The direct estimation of beta therefore suggests that ranges of 0.40–0.70 and 0.65–1.00 may be appropriate estimates of the asset beta for an international and a domestic investor respectively.

Equity beta estimation: comparator analysis

194. An alternative source of evidence is an analysis of comparator companies. By using information on a wider sample of companies, this approach could mitigate the concerns about the robustness of direct estimates.

195. Cluster analysis was used to select the comparator companies. Peer comparators were identified through a two-step approach. The first step involved the identification of markets comparable to Bahrain according to selected characteristics of telecommunications markets.

- **Total population** allows the identification of markets of similar size. The size of the market might be important for several reasons, including its impact on the number of operators that may be supported and the potential for economies of scale.
- The proportion of **urban population** might be an indicator of the cost structure of the market. For example, the high proportion of urban population in Bahrain might be expected to lower the cost per subscriber of operating a telecommunications network compared with less urbanised countries.
- **GDP per head** indicates the level of income per capita, and might therefore be seen as an indicator of the overall wealth of the country, and hence the potential willingness to pay and demand for telecommunications services.
- **Fixed-line telephony penetration** might indicate the degree of development of fixed-line telephony in the market, while **mobile telephony penetration** would indicate the importance of mobile telephony in the market. Implicitly, the combination of these two metrics would capture the mix of fixed and mobile telephony in the market.
- The **broadband penetration rate** provides a measure of the status of the broadband market and the potential for its growth.

196. These criteria have been used to identify markets with characteristics similar to those observed in Bahrain.⁴² The analysis identifies a cluster of markets (see Table 8).

Table 8 **Comparator markets**

	Country
Cluster	Qatar, Kuwait, Slovenia, Greece, Portugal, Cyprus, Estonia, Slovak Republic, Romania, Poland, Latvia, Hungary, Croatia, Lithuania, Czech Republic, Bulgaria, United Arab Emirates.

Source: TRA.

197. The second step of the analysis involved identifying which of the listed companies from the comparable markets are most comparable to Batelco and Zain. The companies were allocated to two clusters (a Batelco and a Zain cluster) depending

⁴² These countries were selected from the dendrogram presented in Appendix 3 (Figure A1).

on their level of dissimilarity to Batelco or Zain—estimated using the three-year average values for the company characteristics outlined below.⁴³

- The **proportion of revenue from mobile activities** helps to identify whether a company’s primary activity is the provision of mobile telecommunications services. This enables the identification of companies with a similar business mix to Batelco and Zain.
- **Enterprise value (“EV”)** represents the market value of the company, and allows identification of companies of similar size to Batelco and Zain.
- The **ratio of capital expenditure (“CAPEX”) to EV** is a measure of the intensity of a company’s capital investment programme. CAPEX might be regarded as an important additional source of risk since it can substantially reduce net cash flows in the short term.
- The **ratio of EV to EBITDA** (“earnings before interest, tax, depreciation and amortisation”) identifies companies with similar levels of profitability. Companies with higher profitability might be expected to be able to absorb market shocks more easily.

198. Using these criteria, two potential clusters were identified (see Table 9).

Table 9 **Comparator markets and telecommunications operators**

	Company
Cluster 1 (Zain)	TEO LT AB, National Mobile Telecommunication Company KSC, Qatar Telecom Q-Tel QSC, Etihad Etisalat Company
Cluster 2 (Batelco)	Tele2 AB, Hellenic Telecomm Organize SA, Magyar Telekom Telecommunications Plc, Hrvatske Telekom, Telekomunikacija Polska SA, Telekom Austria AG, Portugal Telecom SA, Eesti Telecom, Elisa OYJ, Telefonica O2 Czech Republic AS

Source: TRA.

199. Table 10 presents the results of beta estimation from the comparator analysis based on clustering of companies.⁴⁴

⁴³ The dendrogram that shows the level of dissimilarity of companies used in the analysis is presented in Appendix 3 (Figure A2).

⁴⁴ Table A9 in Appendix 4 provides a detailed review of comparator asset betas.

Table 10 Asset betas: comparator companies (adjusted¹)

	Local ²			FTSE All-world		
	2-year weekly	5-year weekly	5-year monthly	2-year weekly	5-year weekly	5-year monthly
Zain's comparators						
Average	0.75	0.72	0.59	0.51	0.49	0.58
Batelco's comparators						
Average	0.65	0.65	0.59	0.58	0.59	0.58
Average (overall)	0.68	0.67	0.59	0.56	0.56	0.58

Notes: Asset betas are based on the equity beta and gearing estimates presented in Tables A5 to A8 in Appendix 4. Asset beta is defined as equity beta multiplied by one minus gearing plus debt beta multiplied by gearing, where debt beta is assumed to be equal to zero. ¹ Calculated using the Bayesian adjustment: (two-thirds)*raw beta + (one-third). Raw betas represent estimated coefficients from a regression where returns on the equity are regressed on returns on either the local or the world index (see Tables A5 to A7 in Appendix 4). ² The stock exchange index of the market where a company is listed, for example, Bahrain Stock Exchange index and Kuwait Stock Exchange index are the local indices in the case of Batelco and Zain respectively. Source: Bloomberg, TRA calculations.

200. A domestic investor with an investment portfolio that is relatively undiversified across international markets may require compensation for exposure to the systematic risk of a local stock market index. Overall, the averages across comparator estimates suggest a range of 0.60–0.70 for the asset beta relevant to a domestic investor.
201. In contrast, an investor with an internationally diversified portfolio would consider company risk relative to an international market index. Similarly to the direct estimates of betas for Batelco and Zain, betas for comparator companies estimated against the FTSE All-world index are lower than betas estimated against local equity indices. This suggests that investors benefit from international diversification and consequently might be expected to target lower required returns. The averages across comparator estimates in Table 10 suggest that a range of 0.55–0.60 would be relevant for an international investor.

Regulatory precedents

202. Recent European regulatory precedents on the cost of capital could also provide a potentially useful reference point for the asset beta for telecommunications companies. However, a degree of caution needs to be exercised when interpreting this evidence since it is likely to include an element of judgement by regulators rather than being based on primary market data. Table 11 summarises a selection of regulatory precedents for fixed-line operators. They range from 0.45 to 0.80.

Table 11 Selected precedents for fixed-line beta

Regulator and year of determination	Country	Company	Asset beta
Ofcom (2009)	UK	BT Openreach	0.55 ¹
Ofcom (2009)	UK	BT Group	0.68 ¹
ComReg (2008)	Ireland	Eircom	0.45–0.70
ARCEP (2008)	France	France Telecom	0.60 ¹
OPTA (2006)	Netherlands	KPN	0.66
FICORA (2006)	Finland	Fixed-line operators	0.65–0.80
BIPT (2006)	Belgium	Belgacom	0.72
Commerce Commission of New Zealand (2005)	New Zealand	Telecom New Zealand	0.50–0.80
Ofcom (2005)	UK	BT copper access	0.56–0.59 ¹
Ofcom (2005)	UK	Rest of BT Group	0.80 ¹

Note: ¹ Asset betas were implied from the reported equity betas, gearing and an assumption of a zero debt beta.

Sources: Ofcom (2009), "A New Pricing Framework for Openreach", May 22nd; ComReg (2008), "Eircom's Cost of Capital: Response to Consultation and Decision Notice", May 22nd; ARCEP (2008), Decision numbers 2008-0162 and 2008-0163 ; NERA (2006), "The cost of capital for KPN's wholesale activities", a final report for OPTA, February 21st; FICORA (2006), "Assessment principles for the pricing of fixed network interconnection", June 28th; BIPT (2006), "Décision du Conseil de l'IBPT du 22 Novembre 2006 Concernant le Coût du Capital à Utiliser Dans les offres de Référence de Belgacom", November 22nd; Commerce Commission of New Zealand (2005), "Draft Determination on the Application for Pricing Review for Designated Interconnection Services", April 11th; Ofcom (2005), "Ofcom's approach to risk in the assessment of the cost of capital", August 18th.

203. Betas evolve over time as the systematic risk of a company or industry changes relative to the overall equity market. For the 2005 Determination, TRA assumed an asset beta of 1.05. However, most recent regulatory determinations in other telecommunications markets suggest that betas are now lower.
204. In some cases, regulatory decisions on the cost of capital for mobile telecommunications have used higher estimates for asset beta than the range reported in Table 11 for fixed-line operators. For example, FICORA (2008) assumed an asset beta of 1.1–1.3 for mobile operators in Finland, and PTS (2008) assumed 1.2 for operators in Sweden.⁴⁵ However, more recent decisions have lowered the asset beta for mobile relative to fixed-line. ARCEP (2008) set equal equity betas for mobile and fixed-line by lowering the equity beta for mobile to 1.0 compared with 1.2 in the previous determination. In combination with gearing of 30% assumed by ARCEP, this implies an asset beta of 0.7.⁴⁶
205. Overall, regulatory precedents suggest a broader and somewhat higher range for asset betas of regulated telecommunications services compared with other sources of evidence. Although there are examples of regulators assuming higher asset betas for mobile compared with fixed-line operators, based on direct estimates and comparator analysis there is no evidence to support a robust conclusion that such a differential in asset betas would be appropriate, as discussed below.

⁴⁵ Ficora (2008), "Ficora's assessment principles for the pricing of mobile termination", July 3rd; PTS (2008), 'slutlig riskfri ränta för mobil WACC', May 6th.

⁴⁶ ARCEP (2008), Decision number 2008-0162 and decision number 2008-0163.

Disaggregate equity beta

206. Different projects and business activities of a company might exhibit different risk characteristics. For regulated telecommunications services in Bahrain, these differences could occur along the following dimensions:

- fixed-line/mobile telecommunications;
- within fixed-line telecommunications;
- risk differentials for new property developments.

207. As a project- or business-specific allowed rate of return may provide more economically efficient investment incentives, it is important to assess whether the level of risk might be materially different for various activities of a company, and hence whether there might be justification for adopting a split cost of capital.

Fixed/mobile risk differentials

208. One source of evidence might be to estimate risk differentials based on betas for comparator companies to mobile and fixed-line activities. However, there are very few, if any, “pure” fixed-line operators in practice, restricting the comparison to one between principally mobile and integrated operators. In the context of the Bahraini telecommunications market, mobile and integrated activities could be proxied by the comparators to Zain and Batelco respectively.

209. Table 12 reports the results of a statistical test of the difference between the average betas for the two samples of comparator companies, and suggests that there is not a statistically significant difference in the asset betas for integrated and mobile operators.

Table 12 Student’s t-test for differences between integrated and mobile asset betas

Hypothesis tested	t-statistic	Probability associated with t-statistic	Results
Hypothesis for 1: the average asset beta for a sample based on Zain’s comparators is equal to the average asset beta for a sample based on Batelco’s comparators (2-year, weekly, local index)	0.81	48%	Cannot reject the hypothesis at the 95% confidence level
Hypothesis 2: the average asset beta for a sample based on Zain’s comparators is equal to the average asset beta for a sample based on Batelco’s comparators (2-year, weekly, FTSE All-world)	-0.74	51%	Cannot reject the hypothesis at the 95% confidence level

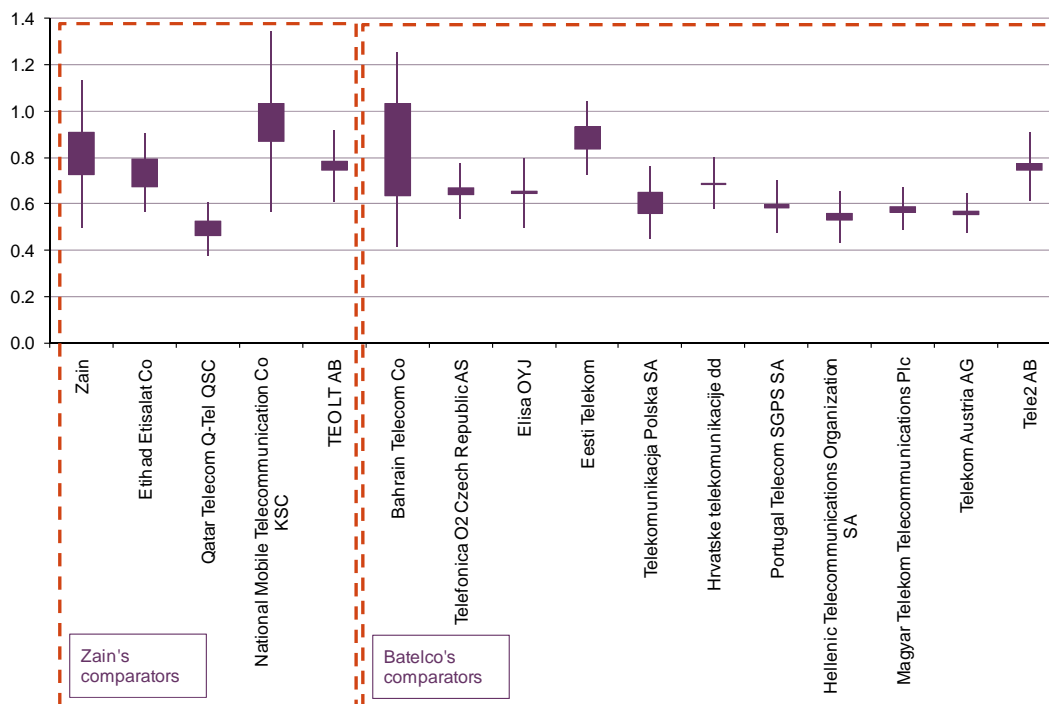
Note: These t-test results are two-tiered and do not assume equal variance for the two samples. The rule for whether to reject the hypothesis at 95% confidence level is as follows: if the probability associated with the t-statistic is less than 5%, the hypothesis is rejected, otherwise it cannot be rejected. T-tests for asset betas estimated according to the five-year window (both weekly and monthly) give similar results.
Source: TRA.

210. Furthermore, the test in Table 12 implicitly assumes that there is no underlying uncertainty about the asset betas for the companies in the two samples. In practice, at least two sources of uncertainty are not captured by this test:

- asset beta estimates vary according to whether they are measured over a two- or five-year time horizon—this uncertainty is depicted by the size of the solid bars in Figure 17;
- as asset beta estimates are the result of statistical analysis, there is a degree of uncertainty around the central estimates—as represented by the lines above and below the solid bars in Figure 17.

211. Zain’s comparators are grouped on the left of Figure 17 and Batelco’s comparators are on the right. Consideration of the point estimates together with the two sources of uncertainty around these estimates suggests that, based on the sample relevant for Bahrain, there is no statistically significant difference between the asset betas for mobile and integrated operators.

Figure 17 Asset beta ranges and estimation errors



Note: Equity beta estimates are based on local indices. The solid bars represent the ranges between the two- and five-year weekly estimates. The lines measure two standard errors above and below the bars. Source: Bloomberg, TRA calculations.

212. To the extent that betas for comparator companies do not suggest statistically significant differences, bottom-up analysis of segmental data on business characteristics might be able to capture the differences in actual risks between fixed and mobile activities. Examples of potential, measurable bottom-up risk metrics include:

- revenue, cost and profit volatility (including demand risk);
- operational gearing (fixed to variable costs);
- CAPEX intensity and depreciation (including technology risk);
- growth rates (market maturity).

213. However, even if various metrics of risk differentials could be shown to be statistically significant, it is difficult to translate them robustly into WACC

differentials. Furthermore, even if one activity can be shown to be clearly more risky, this may represent idiosyncratic rather than non-diversifiable risk, and hence would not be priced in the CAPM. If risk differentials are implemented incorrectly there is a risk that they will distort rather than improve cost of capital estimates and hence incentives. For example, if one business activity is incorrectly judged to have less exposure to systematic risk than another activity, and the beta and WACC are lowered accordingly, the allowed return for this activity will be below the actual cost of capital, and hence discourage investment in this activity.

214. The third source of evidence which might suggest risk differentials between fixed and mobile activities is regulatory precedent. Past empirical research has indicated that there may be some risk differentials between fixed and mobile markets. For example, in the UK, when revising the charges for the provision of wholesale voice call termination in 2005, Ofcom determined that the equity beta for mobile operators was above the beta for the fixed-line business, although there are a number of issues related to these estimates.⁴⁷
215. More recently, Ofcom has noted that “one of the key trends affecting the consumer experience of communications services is convergence”.⁴⁸ From the consumer perspective, convergence might imply greater substitutability between services provided over fixed-line and mobile networks. Furthermore, as mobile and fixed-line telecommunications services increasingly compete with each other, fixed-line operators are looking to more risky areas for additional revenue and are adopting new commercial policies.
216. Regulatory determinations suggest that, in some cases, regulators have set higher asset betas for mobile than for fixed-line activities. However, the most recent determinations in 2008 by French regulator, ARCEP, set the same equity beta for both fixed and mobile activities, effectively setting the same cost of equity for the two activities and lowering the equity beta applicable to mobile operators by 0.2 compared with the previous determination.⁴⁹
217. Although a number of regulators have adopted separate asset betas for fixed-line and mobile activities, TRA considers that there is no clear consensus on this issue and, critically, that there is no robust evidence relevant to the cost of capital determination in Bahrain to support introducing such a differential. The top-down analysis of betas for comparator companies suggests that it is unlikely that a statistically significant difference exists. Even if the necessary financial and operational data to estimate risk differentials on a bottom-up basis for different business activities was available, such data would need to establish a clear relationship between the level of risk of different business units and returns to investments in equity market indices or economic growth more broadly to indicate systematic risk. Based on the above, TRA does not propose to apply separate asset betas to fixed and mobile activities.

Risk differentials within fixed-line activities

218. Another way to disaggregate the beta of the fixed-line operations of telecommunications companies is between access, core and retail operations

⁴⁷ Ofcom (2005), “Wholesale Mobile Call Termination”, Statement, June, p. 123.

⁴⁸ Ofcom (2008), “The Consumer Experience 2008: Telecommunications, Internet and Digital Broadcasting”, November 24th.

⁴⁹ ARCEP (2008), Decision numbers 2008-0162 and 2008-0163.

(described below, alongside their business characteristics), often in line with the split in the regulatory accounts.

- **Local access network** includes the customer-dedicated network components running from the local exchanges to the end-user premises (houses and businesses). It enables the company's retail division to deliver telecommunications products to end-users. Products provided under the local access network could include unbundled local loops, wholesale terminating segments of leased lines, and wholesale broadband access.
- **Core network** comprises all network components, with the exception of those used in the local access network. It enables a company's customers to communicate with customers of the same or another operator, or to access services provided by another operator directly. Products provided under the core network could include wholesale call origination/termination, wholesale transit/interconnection services (national and international), and wholesale trunk segments of leased lines.
- **Retail business** is made up of all the activities involved in the sale of services to end-users (businesses and individuals). Retail products can be broadly classified as "volume-sensitive" (eg, fixed local, national and international calls, calls to mobile, calls to the Internet, public payphones and directory enquiries), and "non-volume-sensitive" (eg, retail access and, to a lesser extent, retail broadband and leased lines). Other services include operator assistance, premium-rate services, managed answering services, and VPN/IVPN.

219. The difficulty of finding pure-play comparators for different business areas within fixed-line activities is even greater than finding comparators for fixed-line overall. This difficulty arises because of the lack of examples of separate parts of fixed-line businesses being operated by distinct companies with publicly traded equity.
220. There is also very limited regulatory precedent for separating out access networks from fixed-line activities more generally. In the UK, Ofcom has set a lower asset beta for Openreach, which owns the copper-access network, compared with the rest of BT Group.⁵⁰ However, given the differences between the UK and Bahraini markets, TRA places relatively little weight on this evidence.⁵¹
221. As in the case of fixed-line compared with mobile activities, TRA does not have access to the data that would allow a robust, bottom-up estimation of risk differentials between different fixed-line activities. Therefore, TRA does not propose to apply separate asset betas to different fixed-line activities.

Risk differentials for new property developments

222. Investments in infrastructure associated with extending networks to the new property developments in Bahrain (such as the Amwaj Island) may, in principle, be exposed to a different level of risk than the infrastructure that already exists to serve the rest of Bahrain. For example, the rate at which the developments become occupied by potential telecommunications customers might make the cash flows from these developments more risky.
223. However, this does not necessarily imply a systematic risk differential between investments in these areas and the existing network infrastructure. Also, the

⁵⁰ Ofcom (2008), "A New Pricing Framework for Openreach – second consultation", December 5th.

⁵¹ The UK does not form one of the comparator markets to Bahrain identified in Table 8.

additional costs (if any) of servicing such areas would be appropriately taken into account in the level of investment and ongoing costs rather than the cost of capital.

224. The purpose of this Determination is to set the cost of capital based on existing levels of capital employed and CAPEX forecasts. As such, TRA does not propose to apply a separate asset beta for new property developments.

Proposed approach to equity beta

225. Based on the above analysis, TRA proposes to set the equity beta for regulated telecommunications services in aggregate, with no disaggregation between separate business areas.
226. From the perspective of an international investor, TRA considers that a range of 0.55–0.70 would be appropriate. This puts approximately equal weight on direct estimates (which range from 0.40 to 0.70) and estimates from comparator companies (which range from 0.55 to 0.60).
227. For a domestic investor, a range of 0.65–0.80 is proposed. This puts slightly less weight on direct estimates (which range from 0.65 to 1.00) compared with estimates from comparator companies (which range from 0.60 to 0.70), owing to the concerns about the statistical reliability of estimates of Batelco's equity beta against the Bahrain All-share index.
228. These ranges are based on evidence from both direct estimates and comparator betas regressed against international and local equity indices for the international and domestic investor respectively. The domestic investor is likely to face a higher beta as a result of holding a less diversified portfolio of investments. Although there is no theoretical basis for justifying limited diversification, this Determination takes these estimates into account.'

Question 5: Do you agree with the equity betas proposed by TRA? Please elaborate.

Cost of capital estimates

229. This section combines the results for individual parameters from all previous sections in order to estimate the overall cost of capital for regulated telecommunications activities in Bahrain.⁵²
230. The estimates of each individual cost of capital parameter are characterised by a degree of uncertainty, at least partly due to the recent financial turmoil. This uncertainty needs to be accounted for when determining the point estimate in order to ensure that the estimated rate of return allows a telecommunications company operating in Bahrain to raise necessary financing. There are at least two sources of uncertainty:
- uncertainty surrounding the current value of the parameter being estimated;
 - uncertainty surrounding the potential evolution of the value of a given parameter in the future.
231. Table 13 reflects this uncertainty by presenting a range for the cost of capital for a notional telecommunications company operating in Bahrain under the base case from the perspective of an internationally diversified investor. The low and high ends of the ranges for the individual parameters are combined to give a range for the overall nominal cost of capital. For illustrative purposes, the midpoint of the overall range is also presented.

Table 13 Summary of the cost of capital parameters—base-case scenario

Parameter	Low	Midpoint	High
Nominal risk-free rate (%)	3.20		3.70
Country risk premium (%)	1.50		1.50
ERP (%)	5.10		6.10
Asset beta	0.55		0.70
Equity beta	0.55		0.70
Cost of equity (%)	7.51		9.47
WACC (nominal, %)	7.51	8.45	9.47

Source: TRA.

232. To test the sensitivity of these results to the perspective of an internationally diversified investor, Table 14 presents ranges for the cost of capital under the alternative scenario estimated from the perspective of a local, potentially less diversified investor, and using local market data.

⁵² The results represent a vanilla WACC (post-tax cost of equity, pre-tax cost of debt). However, as there is no corporation tax in Bahrain, this is equal to the pre-tax WACC.

Table 14 Summary of the cost of capital parameters—alternative scenario

Parameter	Low	Midpoint	High
Nominal risk-free rate (%)	3.50		5.80
Country risk premium (%) ¹	0.00		0.00
ERP (%)	5.10		6.10
Asset beta	0.65		0.80
Equity beta	0.65		0.80
Cost of equity (%)	6.82		10.68
WACC (nominal, %)	6.82	8.71	10.68

Note: ¹ The country risk premium is implicitly included in the risk-free rate.
Source: TRA.

233. The midpoints of the estimated ranges are approximately the same and the ranges are very similar under both the base and alternative scenarios, which validates the results. These ranges are also consistent with regulatory determinations on the cost of capital for telecommunications services in other countries (see Tables A2 and A3).
234. As discussed in the introduction, the methodology used to estimate the cost of capital has been revised to bring the analysis more into line with the best practice in cost of capital estimation and to reflect up-to-date market data. The main effects of these revisions are reflected in ERP and equity beta estimates. The fall in interest rates is another driver for the decrease in estimates of the cost of capital.
235. The midpoints of the ranges under both the base-case (8.45%) as well as the alternative scenarios (8.71%) represent a decrease from the cost of capital Determination in 2005 (12.2%). For the purpose of this Determination, TRA proposes a cost of capital of 9.0% to apply to regulated telecommunications services in Bahrain. This point estimate is above the mid-points of the above ranges to reflect the overall objective to adopt a cautious approach to the estimation of the cost of capital estimation.

Question 6: Do you agree with the point selection within the range? Please elaborate.

Appendix 1: Cost of debt

236. Although this Determination is based on the estimation of the cost of capital at zero gearing, it is useful to consider the sensitivity of the overall cost of capital to this assumption, if any. Estimation of the WACC with positive gearing requires an estimation of the cost of debt. As Batelco and Zain do not have conventional corporate bonds outstanding, a potential proxy for the debt premium is the rate paid on bank borrowing.
237. Batelco has a syndicated loan facility which charges interest at a rate of LIBOR plus 25bp. Although LIBOR is normally close to the yields on government securities of a comparable maturity, as discussed in the risk-free rate section, there is likely to be a difference between the two.⁵³ Therefore, TRA considers 50bp to be a conservative estimate of the debt premium over the risk-free rate.
238. Adding this spread to the nominal risk-free rate (3.2% to 3.7%) and country risk premium (1.5%) gives a range for the forward-looking cost of debt of 5.2–5.7%.
239. The equity beta also needs to be recalculated when the gearing assumption changes. Table A1 shows how the cost of equity and the WACC for an international investor change under an assumption of 20% gearing.

Table A1 Gearing sensitivity analysis

Parameter	Low	Midpoint	High
Nominal risk-free rate (%)	3.20		3.70
Country risk premium (%)	1.50		1.50
ERP (%)	5.10		6.10
Asset beta	0.55		0.70
Gearing (%)	20.00		20.00
Equity beta	0.69		0.88
Cost of equity (%)	8.21		10.54
Debt margin (%)	0.50		0.50
Cost of debt (%)	5.20		5.70
WACC (nominal, %)	7.61	8.55	9.57

Source: TRA.

240. The cost of capital under 20% gearing is between 7.61% and 9.57%. This is very similar to the range for the cost of capital under zero gearing, reflecting the offsetting effects of a higher cost of equity and a lower proportion of relatively expensive equity financing. The slight increase in the cost of capital is partly the result of assuming a zero debt beta.

⁵³ Zain did not disclose the borrowing rate for MTC-Vodafone Bahrain separately from other business segments within the Zain Group.

Appendix 2: Regulatory precedents for the cost of capital

Table A2 Selected precedents for the cost of capital for fixed-line telecommunications (nominal, vanilla)

Regulator and year of determination	Country	Company	WACC (%)
Ofcom (2009)	UK	BT Openreach	8.0 (implied)
Ofcom (2009)	UK	Rest of BT Group	8.7 (implied)
ARCEP (2008)	France ¹	France Telecom	7.8 (implied)
ComReg (2008)	Ireland	eircom	9.3 ² (implied)
BIPT (2006)	Belgium	Belgacom	8.3 (implied)
OPTA (2006)	Netherlands	KPN	8.3 (implied)
FICORA (2006)	Finland	Finnish fixed-line operators	6.2–7.9 (implied)
Ofcom (2005)	UK	BT Copper access	7.6 (implied)
Ofcom (2005)	UK	Rest of BT Group	8.5 (implied)
TRA (2005)	Bahrain	Batelco	12.2
TRA (2003)	Bahrain	Batelco	8.40–11.71

Note: Vanilla WACC refers to the weighted average of pre-tax cost of debt and post-tax cost of equity. Vanilla WACC was implied using information provided in regulatory documents. ¹ ARCEP estimated the same equity beta for the fixed-line and mobile activities of France Telecom, leading to the same cost of equity across the two activities. The cost of debt differs slightly across the two activities and higher gearing and a zero debt beta for the fixed-line segment drives the difference between the reported nominal WACC across the fixed-line and mobile activities. ² ComReg selected a point estimate above the midpoint of the range. Source: Ofcom (2009), “A New Pricing Framework for Openreach”, May 22nd; ARCEP (2008), Decision numbers 2008-0162 and 2008-0163; ComReg (2008), “Eircom’s Cost of Capital: Response to Consultation and Decision Notice”, May 22nd; BIPT (2006), “Décision du Conseil de l’IBPT du 22 Novembre 2006 Concernant le Coût du Capital à Utiliser Dans les offres de Référence de Belgacom”, November 22nd; NERA (2006), “The cost of capital for KPN’s wholesale activities”, a final report for OPTA, February 21st; FICORA (2006), “Assessment principles for the pricing of fixed network interconnection”, June 28th; Ofcom (2005), “Ofcom’s approach to risk in the assessment of the cost of capital”, August 18th; TRA (2005), “Batelco’s cost of capital—A determination issued by the telecommunications regulatory authority, November 20th; TRA (2003), “Batelco’s cost of capital—A determination issued by the telecommunications regulatory authority”, August 9th.

Table A3 Selected precedents for the cost of capital for mobile (nominal, vanilla)

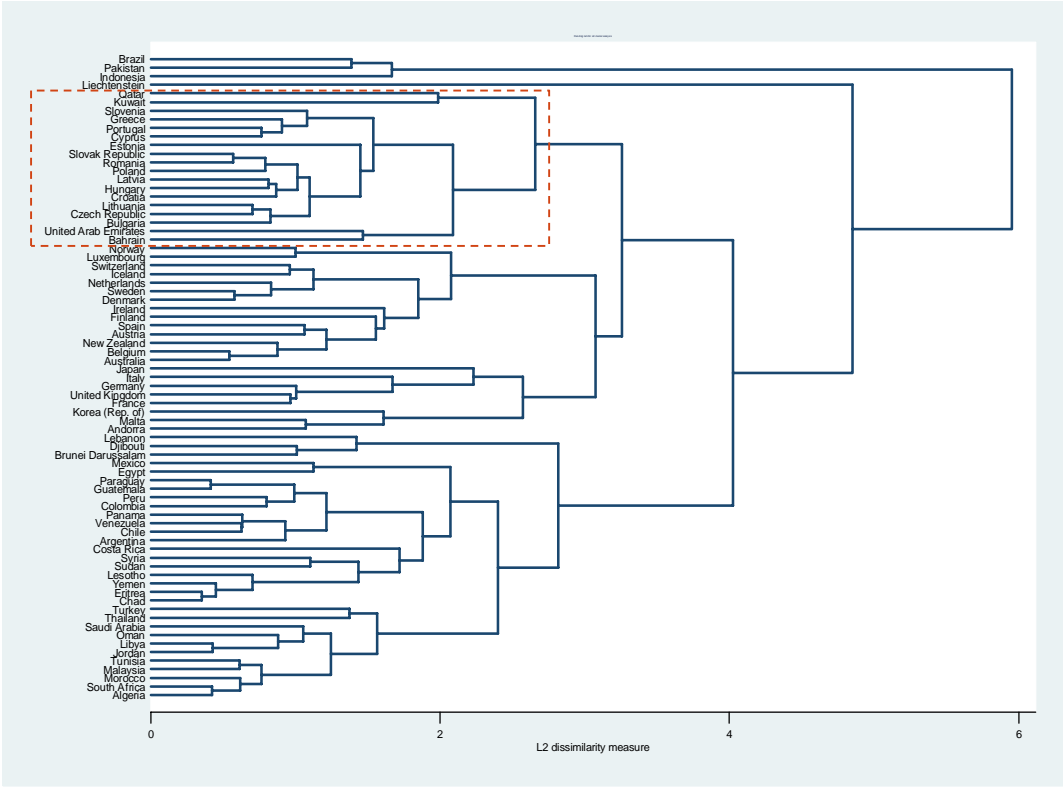
Regulator and year of determination	Country	Company	WACC (%)
FICORA (2008)	Finland	Mobile operators	8.9–11.0 (implied)
ARCEP (2008)	France ¹	France Telecom	8.1 (implied)
PTS (2008)	Sweden	Telenor, H3G, Tele2, TeliaSonera	9.7–10.0 (implied)
Ofcom (2007)	UK	O2, T-Mobile, Vodafone, Hutchison 3G UK, Orange	9.2–11.8 (implied)
CMT (2007)	Spain	Vodafone	7.7 (implied)
OPTA (2006)	Netherlands	KPN	8.3 (implied)
FICORA (2006)	Finland	Mobile operators	8.3–10.4 (implied)
TRA (2005)	Bahrain	Batelco	12.2
TRA (2003)	Bahrain	Batelco	11.77

Note: Vanilla WACC refers to the weighted average of pre-tax cost of debt and post-tax cost of equity. Vanilla WACC was implied using information provided in regulatory documents. ¹ ARCEP estimated the same equity beta for the fixed-line and mobile activities of France Telecom leading to the same cost of equity across the two activities. The cost of debt differs slightly across the two activities, and higher gearing and a zero debt beta for the fixed-line segment drives the difference between the reported nominal WACC across the fixed-line and mobile activities.

Source: FICORA (2008), "FICORA assessment principles for the pricing of mobile termination", July 3rd; ARCEP (2008), Decision numbers 2008-0162 and 2008-0163; PTS (2008), "Slutlig riskfri ränta för mobil WACC", May 6th; Ofcom (2007), "Mobile call termination statement", March 27th; Commission Del Mercado De Las Telecomunicaciones (2007), Decision numbers AEM 2007/699; AEM 2007/343, and AEM 2007/648; NERA (2006), "The cost of capital for KPN's wholesale activities", a final report for OPTA, February 21st; FICORA (2006), "FICORA's principles for assessing mobile termination pricing", December 7th; Commerce Commission of New Zealand (2005), "Draft Determination on the Application for Pricing Review for Designated Interconnection Services", April 11th; TRA (2005), "Batelco's cost of capital—A determination issued by the telecommunications regulatory authority, November 20th; TRA (2003), "Batelco's cost of capital—A determination issued by the telecommunications regulatory authority, August 9th.

Appendix 3: Equity beta cluster analysis dendrograms

Figure A1 Dendrogram: level of dissimilarity between Bahrain and world telecommunications markets



Source: Bloomberg and TRA calculations.

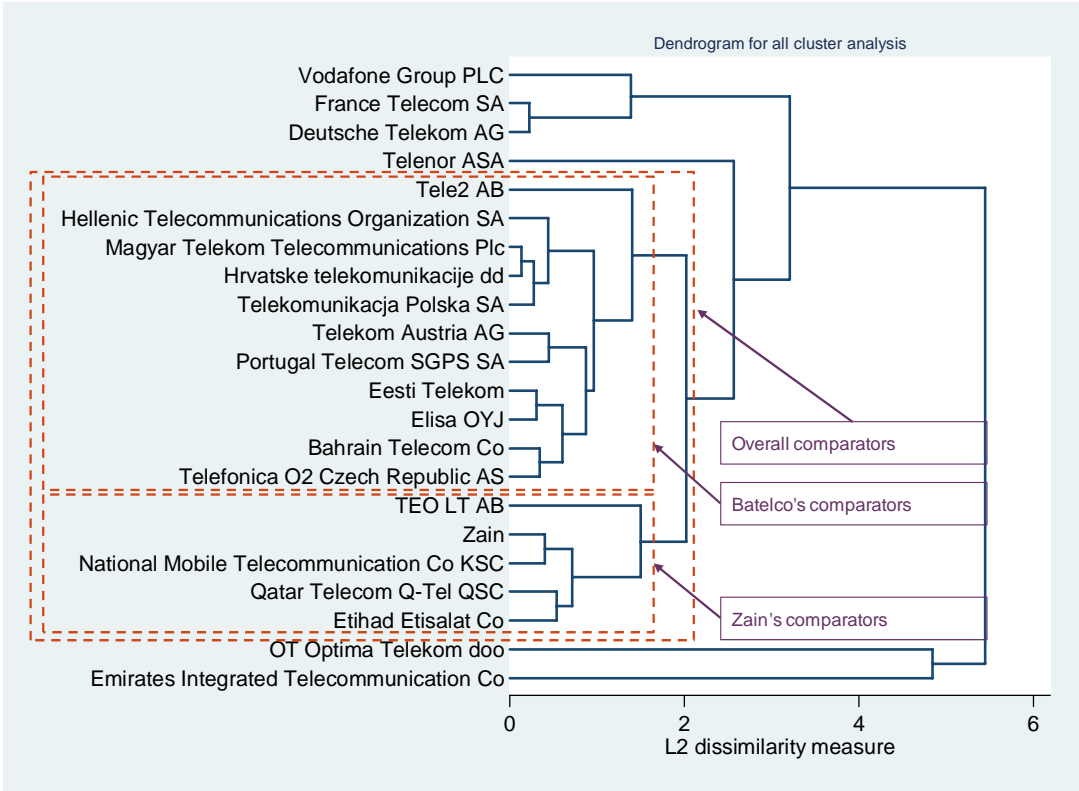
Table A4 Telecommunications operators in comparator markets

Country	Telecommunications operators
Qatar	Qatar Telecom Q-Tel QSC , Vodafone Qatar
Kuwait	National Mobile Telecommunications Company , Zain
Slovenia	Telekom Slovenija, Zaslon Telecom, TUŠ TELEKOM, Kron Telekom, Vodafone, Mobile Telecom
Greece	Hellenic Telecommunications Organization , Cosmote, On Telecommunications S.A., Vodafone, Columbia Telecom S.A., Telecom Italia (mobile)
Portugal	Portugal Telecom , TMN, Vodafone, Merine Telecom, AR Telecom
Cyprus	CyTA, OTEnet, PrimeTel, MTBC Telecom Limited, Alambra Telecom, Cytamobile-Vodafone, Scancom Cyprus/Areeba, Kuzey Kibris Turkcell (KKTCell)
Estonia	Estonian Telephone Company, CSC Telecom, Norby Telecom, Tele2 Eesti AS, Elisa , Eesti Telekom , Elion, Global Telecom
Slovak Republic	Slovak Telecom (ST), WiMAX Telecom, T-Mobile Slovensko, Orange
Romania	RomTelecom, UPC Romania, Atlas Telecommunication
Poland	Telekomunikacja Polska (TPSA) , Nordisk Mobiltelefon AB, Tele 2, Orange, Polska Telefonía Cyfrowa Sp. z.o.o, Telekomunikacja Kolejowa
Latvia	Latt telecom, CSC Telecom, SIGIS Telecom, Sonore Grupa, Latvijas Mobila Telefona, Tele2, TRIATEL
Hungary	Magyar Telekom , Pannon Telekom, T-Mobile, Vodafone, DND Telecom, Dual Telecom, DK-Telecom, Cobra Telecom
Croatia	T-Hrvatski Telekom , H1 Telekom, Optima Telekom, Iskon, Tele 2, VIPnet
Lithuania	Lietuvos Telekomas (TEO) , Omin Tel, Tele 2
Czech Republic	Telefónica O2 Czech Republic , Alfa Telecom, Telekom Austria Czech Republic , T-Mobile, Vodafone Czech Republic
Bulgaria	Bulgarian Telecommunication Company (BTC), Globul Telecom, Viva Tel, Bulgaria Telecom, M-Ten, Trans Telecom, Max Telecom
United Arab Emirates	Etihad Etisalat Company , Axiom Telecom, Warid Telecom International, Emirates Integrated Telecommunication Company
Bahrain	Bahrain Telecom Company, Zain

Notes: The first company in each list of telecommunications operators is the incumbent in the respective market. Companies highlighted in bold are considered as close comparators (see Table 9). Includes companies with at least one full year of published financial accounts.

Source: TRA.

Figure A2 Dendrogram: level of dissimilarity between Batelco, Zain and telecommunications companies operating in comparable markets



Source: Bloomberg and TRA calculations.

Appendix 4: Equity beta estimates and gearing for comparator telecommunications companies

Table A5 Equity betas for comparator companies (2-year, weekly)

	Local ¹			S&P 500 index			FTSE All-world		
	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴
Etiihad Etisalat Co	0.81	0.87	0.09	0.53	0.69	0.14	0.59	0.73	0.13
Qatar Telecom Q-Tel QSC	0.66	0.77	0.07	0.39	0.59	0.13	0.41	0.61	0.12
National Mobile Telecommunication Co KSC	1.20	1.13	0.22	0.23	0.49	0.16	0.34	0.56	0.15
TEO LT AB	0.67	0.78	0.08	0.31	0.54	0.09	0.35	0.57	0.09
TelefónicaO2 Czech Republic AS	0.46	0.64	0.06	0.41	0.61	0.09	0.45	0.63	0.08
Elisa OYJ	0.69	0.79	0.11	0.66	0.77	0.11	0.67	0.78	0.11
Eesti Telekom	0.90	0.93	0.07	0.25	0.50	0.10	0.37	0.58	0.10
Telekomunikacja Polska SA	0.49	0.66	0.07	0.29	0.53	0.09	0.27	0.51	0.09
Hrvatske Telekomunikacije dd	0.54	0.69	0.06	0.38	0.59	0.10	0.44	0.63	0.09
Portugal Telecom SGPS SA	0.82	0.88	0.10	0.49	0.66	0.10	0.57	0.72	0.10
Hellenic Telecommunications Organization SA	0.58	0.72	0.08	0.65	0.77	0.10	0.72	0.81	0.10
Magyar Telekom Telecommunications plc	0.68	0.79	0.06	0.46	0.64	0.10	0.51	0.68	0.09
Telekom Austria AG	0.76	0.84	0.07	0.72	0.82	0.13	0.81	0.88	0.12
Tele2 AB	0.82	0.88	0.09	0.81	0.87	0.11	0.88	0.92	0.10
Batelco	0.46	0.64	0.11	0.00	0.34	0.06	0.04	0.36	0.06
Zain	1.46	1.31	0.21	0.36	0.57	0.16	0.35	0.56	0.16

Notes: ¹ Local index refers to the stock exchange index of the market where a company is listed, for example, the Bahrain Stock Exchange Index and Kuwait Stock Exchange Index are local indices in the case of Batelco and Zain respectively. ² Based on raw equity beta which represents an estimated coefficient from a regression where returns on equity are regressed on returns on either a local or world index. ³ Calculated using the Bayesian adjustment: $(2/3) \times \text{raw beta} + (1/3)$. ⁴ Obtained directly from beta estimation procedure (ordinary least squares).

Source: Bloomberg, TRA calculations.

Table A6 Equity betas for comparator companies (5-year, weekly)

	Local ¹			S&P 500 index			FTSE All-world		
	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴
Etihad Etisalat Co	1.04	1.03	0.06	0.50	0.67	0.16	0.56	0.70	0.15
Qatar Telecom Q-Tel QSC	0.52	0.68	0.05	0.28	0.52	0.10	0.31	0.54	0.10
National Mobile Telecommunication Co KSC	0.93	0.95	0.12	0.21	0.48	0.11	0.29	0.53	0.11
TEO LT AB	0.62	0.75	0.06	0.29	0.53	0.07	0.33	0.55	0.07
Telefonica O2 Czech Republic AS	0.51	0.67	0.04	0.43	0.62	0.07	0.48	0.65	0.07
Elisa OYJ	0.71	0.81	0.07	0.71	0.81	0.08	0.71	0.80	0.08
Eesti Telekom	0.75	0.84	0.04	0.27	0.51	0.07	0.37	0.58	0.06
Telekomunikacja Polska SA	0.66	0.77	0.05	0.41	0.60	0.08	0.41	0.61	0.08
Hrvatske Telekomunikacije dd	0.54	0.69	0.06	0.38	0.59	0.10	0.44	0.63	0.09
Portugal Telecom SGPS SA	0.85	0.90	0.06	0.47	0.65	0.07	0.54	0.69	0.07
Hellenic Telecommunications Organization SA	0.64	0.76	0.05	0.68	0.78	0.08	0.73	0.82	0.08
Magyar Telekom Telecommunications plc	0.63	0.76	0.05	0.48	0.65	0.08	0.54	0.69	0.08
Telekom Austria AG	0.73	0.82	0.05	0.69	0.80	0.09	0.76	0.84	0.09
Tele2 AB	0.87	0.91	0.07	0.83	0.89	0.09	0.87	0.92	0.08
Batelco	1.05	1.03	0.11	0.03	0.35	0.08	0.05	0.37	0.08
Zain	1.07	1.05	0.12	0.38	0.58	0.12	0.35	0.57	0.11

Notes: ¹ Local index refers to the stock exchange index of the market where a company is listed, for example, the Bahrain Stock Exchange Index and Kuwait Stock Exchange Index are local indices in the case of Batelco and Zain respectively. ² Based on raw equity beta which represents an estimated coefficient from a regression where returns on equity are regressed on returns on either a local or world index. ³ Calculated using the Bayesian adjustment: $(2/3) \times \text{raw beta} + (1/3)$. ⁴ Obtained directly from beta estimation procedure (ordinary least squares).

Source: Bloomberg, TRA calculations.

Table A7 Equity betas for comparator companies (5-year, monthly)

	Local ¹			S&P 500 index			FTSE All-world		
	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴	Raw ²	Adj ³	S.E. ⁴
Etihad Etisalat Co	0.90	0.93	0.13	0.31	0.54	0.42	0.39	0.59	0.36
Qatar Telecom Q-Tel QSC	0.39	0.60	0.08	0.55	0.70	0.24	0.51	0.67	0.20
National Mobile Telecommunication Co KSC	0.39	0.60	0.18	0.87	0.91	0.25	0.70	0.80	0.22
TEO LT AB	0.56	0.71	0.08	0.54	0.69	0.19	0.49	0.66	0.17
Telefonica O2 Czech Republic AS	0.45	0.63	0.09	0.43	0.62	0.17	0.38	0.59	0.15
Elisa OYJ	0.53	0.68	0.15	0.77	0.84	0.20	0.64	0.76	0.18
Eesti Telekom	0.63	0.75	0.07	0.67	0.78	0.19	0.61	0.74	0.16
Telekomunikacja Polska SA	0.56	0.70	0.11	0.51	0.67	0.21	0.42	0.61	0.18
Hrvatske Telekomunikacije dd	0.28	0.52	0.10	0.15	0.44	0.25	0.21	0.47	0.21
Portugal Telecom SGPS SA	0.76	0.84	0.11	0.43	0.62	0.18	0.46	0.64	0.15
Hellenic Telecommunications Organization SA	0.52	0.68	0.09	1.01	1.00	0.16	0.81	0.87	0.14
Magyar Telekom Telecommunications plc	0.59	0.73	0.09	0.57	0.71	0.19	0.56	0.70	0.16
Telekom Austria AG	0.57	0.71	0.11	0.88	0.92	0.21	0.69	0.79	0.18
Tele2 AB	0.82	0.88	0.17	0.99	0.99	0.21	0.89	0.93	0.17
Batelco	0.94	0.96	0.17	0.20	0.47	0.21	0.22	0.48	0.18
Zain	0.87	0.91	0.19	1.25	1.16	0.30	0.93	0.95	0.27

Notes: ¹ Local index refers to the stock exchange index of the market where a company is listed, for example, the Bahrain Stock Exchange Index and Kuwait Stock Exchange Index are local indices in the case of Batelco and Zain respectively. ² Based on raw equity beta which represents an estimated coefficient from a regression where returns on equity are regressed on returns on either a local or world index. ³ Calculated using the Bayesian adjustment: $(2/3) \times \text{raw beta} + (1/3)$. ⁴ Obtained directly from beta estimation procedure (ordinary least squares).

Source: Bloomberg, TRA calculations.

Table A8 Gearing level for comparator companies (%)

Company	Country	Gearing
Etihad Etisalat Co	United Arab Emirates	23
Qatar Telecom Q-Tel QSC	Qatar	32
National Mobile Telecommunication Co KSC	Kuwait	9
TEO LT AB	Lithuania	0
Telefonica O2 Czech Republic AS	Czech Republic	0
Elisa OYJ	Estonia	19
Eesti Telekom	Estonia	0
Telekomunikacja Polska SA	Poland	16
Hrvatske Telekomunikacije dd	Croatia	0
Portugal Telecom SGPS SA	Portugal	34
Hellenic Telecommunications Organization SA	Greece	27
Magyar Telekom Telecommunications plc	Hungary	25
Telekom Austria AG	Austria	33
Tele2 AB	Poland	15
Batelco	Bahrain	0
Zain	Kuwait	31

Notes: Gearing is estimated as the average ratio of net debt over enterprise value for the period 2006-2008 inclusive.

Source: Bloomberg, TRA calculations.

Table A9 Asset betas for comparator companies

	Local ¹						FTSE All-World					
	2-year weekly		5-year weekly		5-year monthly		2-year weekly		5-year weekly		5-year monthly	
	Raw ²	Adj ³	Raw	Adj	Raw	Adj	Raw	Adj	Raw	Adj	Raw	Adj
Zain's comparators												
Etihad Etisalat Co	0.62	0.67	0.80	0.79	0.69	0.72	0.46	0.56	0.43	0.54	0.30	0.46
Qatar Telecom Q-Tel QSC	0.45	0.52	0.35	0.46	0.27	0.40	0.28	0.41	0.21	0.37	0.34	0.45
National Mobile Telecommunication Co KSC	1.10	1.03	0.85	0.87	0.36	0.54	0.31	0.51	0.27	0.48	0.64	0.73
TEO LT AB	0.67	0.78	0.62	0.75	0.56	0.71	0.35	0.57	0.33	0.55	0.49	0.66
Average	0.77	0.78	0.67	0.72	0.50	0.60	0.33	0.49	0.30	0.47	0.48	0.59
Batelco's comparators												
Telefonica O2 Czech Republic AS	0.46	0.64	0.51	0.67	0.45	0.63	0.45	0.63	0.48	0.65	0.38	0.59
Elisa OYJ	0.56	0.64	0.57	0.65	0.43	0.55	0.55	0.63	0.57	0.65	0.52	0.61
Eesti Telekom	0.90	0.93	0.75	0.84	0.63	0.75	0.37	0.58	0.37	0.58	0.61	0.74
Telekomunikacja Polska SA	0.41	0.56	0.55	0.65	0.47	0.59	0.23	0.43	0.34	0.51	0.35	0.51
Hrvatske telekomunikacije dd	0.54	0.69	0.54	0.69	0.28	0.52	0.44	0.63	0.44	0.63	0.21	0.47
Portugal Telecom SGPS SA	0.54	0.58	0.56	0.60	0.50	0.56	0.38	0.47	0.35	0.46	0.30	0.42
Hellenic Telecommunications Organization SA	0.42	0.53	0.47	0.56	0.38	0.50	0.53	0.60	0.54	0.60	0.59	0.64
Magyar Telekom Telecommunications Plc	0.51	0.59	0.47	0.56	0.44	0.54	0.38	0.51	0.40	0.52	0.41	0.53
Telekom Austria AG	0.51	0.57	0.49	0.55	0.39	0.48	0.55	0.59	0.51	0.57	0.47	0.54
Tele2 AB	0.70	0.75	0.74	0.77	0.70	0.75	0.75	0.78	0.74	0.77	0.75	0.79
Average	0.55	0.65	0.61	0.69	0.51	0.62	0.42	0.56	0.44	0.57	0.44	0.57
Average (overall)	0.62	0.69	0.63	0.70	0.50	0.62	0.39	0.54	0.39	0.54	0.45	0.58

Notes: Asset betas are based on the equity beta and gearing estimates presented in Tables A5 to A8 in Appendix 4. Asset beta is defined as equity beta multiplied by one minus gearing plus debt beta multiplied by gearing, where debt beta is assumed to be equal zero. ¹Local index refers to the stock exchange index of the market where a company is listed, for example, Bahrain Stock Exchange Index and Kuwait Stock Exchange Index are local indices in the case of Batelco and Zain respectively. ²Based on the raw equity beta which represents an estimated coefficient from a regression where returns on the equity are regressed on returns on either the local or the world index. ³Adjusted beta is calculated using the Bayesian adjustment: (2/3)*raw beta + (1/3).

Source: Bloomberg, TRA calculations.

Appendix 5: Consolidated list of questions

Question 1	Do you agree with the capital structure proposed by TRA? Please elaborate.	23
Question 2	Do you agree with the risk-free rates proposed by TRA under the base-case and alternative scenarios? Please elaborate.	33
Question 3	Do you agree with the country risk premium proposed by TRA? Please elaborate.	38
Question 4	Do you agree with the ERP proposed by TRA? Please elaborate.	48
Question 5	Do you agree with the equity betas proposed by TRA? Please elaborate.	61
Question 6	Do you agree with the point selection within the range? Please elaborate.	63