THE HASHEMITE KINGDOM OF JORDAN

TELECOMMUNICATIONS REGULATORY COMMISSION

Explanatory Memorandum to the Regulatory Decision on the WACC for Jordanian Telecom Operators

22 February 2017

TABLE OF CONTENTS

Chapter I: INTRODUCTION

This Explanatory Memorandum summarises and evaluates the comments of the various members of the telecommunications industry in Jordan to the *Notice requesting comments on the calculated Weighted Average Cost of Capital* published by the TRC on 1 September 2016.

Formal responses to the *Public Consultation Paper* were received from Jordan Telecom Company (Orange Fixed), Petra Jordanian Mobile Telecommunication Company (Orange Mobile), and Jordan Mobile Telephone Services Company (Zain). Umniah did not provide any response to the consultation and TRC takes no responsibility for parties failing to provide comments.

In addition to the initial response to the *Public Consultation Paper*, Orange Fixed and Orange Mobile also provided comments on the initial comments, with reference to Zain's initial response.

Finally, TRC conducted a workshop with all operators on 23 November 2016, presenting its approach to estimating the WACC for Jordanian telecom operators and providing its initial response to the operators' comments. TRC has also considered additional comments from stakeholders following the workshop.

All comments from operators during this workshop have been taken into account within this *Explanatory Memorandum*.

Chapter II of this *Explanatory Memorandum* provides an overview of the comments received by all operators, accompanied by the TRC's reasoned responses to those comments, broken down by reference to the:

- Approach on cost of debt;
- Total Market Return;
- Country Risk Premium;
- Beta;
- Gearing;
- Cost of Debt estimate; and
- Selection of mid-point of the final WACC range.

Chapter II: OVERVIEW OF COMMENTS BY THE INDUSTRY

Approach on Cost of Debt

> **Q1:   Do stakeholders agree with estimating the cost of debt based on the weighted average of embedded and new debt costs? Please justify your response.**

Stakeholder Responses

Zain agrees with the weighted average approach in principle, but notes that the TRC should track movements in future interest rates, and if interest rates change materially, it should adjust the cost of new debt. Zain notes that there are substantial economic and political uncertainties that could result in an increase in the cost of debt in Jordan, including the interest rates set by the US Federal Reserve and regional instability that could feed through to the CRP.

Orange Fixed and **Orange Mobile** agree with the weighted average approach to estimating the cost of debt. In their response to Zain's comments, Orange Fixed and Orange Mobile agree with Zain's comment regarding material changes in future interest rates.

During the workshop, Orange requested further clarification on why TRC has chosen to set the regulatory period at five years instead of a shorter period of three years. Orange argued that setting prices for a long period of time results in operators facing greater risk from factors such as changes in interest rates.

Response of the TRC

Although the TRC agrees with Zain that there are certain uncertainties as to the future path of interest rates, these risks are no more significant than at previous reviews. Moreover, any changes in interest rates are only likely to materially affect the cost of new debt raised during the regulatory period. Changes in the cost of debt during the regulatory period will be taken into account in the embedded cost of debt allowance at the next price review. The TRC's *Notice* calculated the weight on the cost of new debt to be 36%, which implies that the effect of changes in interest rates on the overall cost of debt is limited.

The remainder of the cost of debt allowance is covered by the cost of embedded debt, which depends on operators' existing financing costs, and for fixed-rate debt, this will be unaffected by future changes in interest rates. The TRC therefore does not wish to put in place a formal procedure for allowing changes in the cost of debt based on movements in future interest rates.

In addition, with a longer regulatory period, there is greater incentive for operators to outperform against the regulatory allowance. This is because any outperformance versus the TRC's cost of debt allowance will be retained by the operator during the regulatory period, and therefore the longer the period, the greater the potential outperformance.

The TRC has considered operators' comments that a long regulatory period of five years may expose operators to the risk of changing interest rates. Consequently, the TRC has decided to set the WACC for a period of four years from 2017 to 2020, which provides an appropriate balance of providing incentives to outperform against the allowance whilst not exposing operators to too much risk of underperformance.

Setting the WACC for four years, the TRC expects less new debt to be issued over the period relative to the amount in its *Notice*. Given the four year period, TRC estimates a weight on the cost of new debt of 29% and a weight on the cost of embedded debt of 71%.

Notwithstanding this decision, the TRC will monitor future changes in interest rates and reflect these changes in future price review decisions regarding the WACC.

Total Market Return

Q2: Do stakeholders agree with adopting a long-run historical approach to estimating the TMR and risk-free rate?

Zain agrees that taking a long-run historical approach to estimating the TMR and risk-free rate is standard practice.

Orange Fixed and **Orange Mobile** agree with adopting a long-run historical approach, but disagree with using the TMR formulation of the CAPM, which calculates the ERP as the difference between the estimates of the TMR and the risk-free rate.

Instead, they recommend the use of a Jordan-specific total ERP as computed by Damodaran (which includes the country risk premium), based on the following formula:

$$Cost\ of\ equity = RFR + \beta * Total\ ERP_{Jordan}$$

On this basis, they estimate an ERP for Jordan of 12.38%, as compared the TRC's estimate of the ERP (without CRP) of 5.8% and the CRP of 3.6%.

Response of the TRC

The TRC notes that all stakeholders agree with using a long-run historical approach to estimating the risk-free rate, TMR, and equity risk premium.

Orange Fixed and Orange Mobile dispute whether the ERP should be calculated with developed market data with addition of a Jordanian country risk premium (CRP) or by estimating a Jordanian ERP directly. The TRC's preferred approach is captured by the following formula:

$$Cost\ of\ Equity = RFR + \beta * (TMR - RFR) + Jordanian\ CRP$$

By contrast, Orange's approach is captured as follows:

$$Cost\ of\ Equity = RFR + \beta * ERP_{Jordan}\ (incl.\ CRP)$$

The difference between the TRC's approach and Orange's approach is that the TRC starts by estimating the TMR for a developed market first to calculate the developed market equity risk premium. The TRC then adds on a separate Jordanian country risk premium. By contrast, the Orange approach calculates the equity risk premium for Jordan directly, without decomposing it between the equity risk premium for a developed market and a country risk premium. Both approaches recognise the existence of a country risk premium, but differ on the method by which it is reflected in the cost of equity.

Firstly, TRC notes that its approach of estimating the TMR for a developed market first is consistent with the 2008 regulatory principles, which state that the ERP must be based on data from Dimson, Marsh and Staunton.[1] This data source only reports the TMR and ERP for developed markets, and so the TRC regulatory principles imply the starting point for the TMR must be a developed market. Orange's approach is not consistent with the TRC regulatory principles, since Orange favours estimating the ERP in Jordan directly.

Secondly, the TRC considers there are significant benefits in treating the Jordanian country risk premium as a separate parameter within the cost of equity calculation. By separating this parameter, stakeholders will have a more transparent view of how the TRC treats country risk. Orange's approach does not allow for this transparency, since the equity risk premium would include both the mature market risk premium and the Jordanian country risk premium. Under this approach, stakeholders may have less certainty as to how the TRC will account for country risk in future regulatory decisions.

Moreover, the TRC's approach ensures that the risk-free rate parameter is calculated consistently with the ERP since they are estimated together in arriving at the overall TMR. In the *Notice* document, Figure 3.1 highlighted that the risk-free rate and ERP tend to exhibit negative correlation, and therefore the risk-free rate and ERP must be estimated using consistent time periods. If different time periods and data sources were used, the overall cost of equity may be over or under-estimated because it would not take account of the negative correlation between the two parameters within each time period. Since the TRC has found the DMS database to be the most robust source of long-run data for calculating the developed market risk-free rate, it has also chosen to use the same database for the developed market ERP. This ensures both parameters are calculated consistently over the same time period.

Orange's alternative suggestion to use the Damodaran database to calculate the ERP would not result in consistency with the risk-free rate parameter, since it proposes to use long-run historical data to estimate the risk-free rate, whilst using short-run historical data to estimate the equity risk premium for Jordan. This inconsistency in time periods over which the two parameters are estimated does not capture the inverse correlation between the two parameters and is likely to lead to an overestimate of the cost of equity. Orange does not justify the use of its alternative approach in the light of the evidence on the inverse co-movement between ERP and risk-free rate.

The TRC also notes that the analyst cited by Orange, Professor Damodaran, supports the formula used by the TRC above. Damodaran states that the cost of equity for a firm in an emerging market can be written as:[2]

---

[1] TRC (28 January 2008): "Regulatory Decision on the principles to be used in the calculation of licensees' regulated cost of capital", Board of Commissioners Decision No (5-4/2008).

[2] Damodaran, A (14 July 2016): "Country Risk: Determinants, Measures and Implications – The 2016 Edition", p79-82. Note: The λ in the equation relates to the exposure of each company's returns to country risk. A λ greater than 1 implies greater than average exposure to country risk and vice versa for below 1. Although Damodaran lists factors that affect λ, including where revenues are derived from, he concludes that on balance, it is a difficult parameter to estimate, and in practice, it can be assumed as equal to 1.

$$Expected\ Return = RFR + \beta\ (Mature\ Market\ Equity\ Risk\ Premium) + \lambda\ (CRP)$$

The formulation above is equivalent to the TRC's since it treats the CRP separately from the mature market ERP.

Based on this reasoning and the financial theory presented, the TRC maintains its view that the TMR formulation of the CAPM is appropriate. In line with stakeholder responses, the TRC will also maintain the use of long-run historical averages for estimating the TMR and RFR.

Q3: Do stakeholders agree with the adoption of the arithmetic mean to calculate the total market return and risk-free rate?

Stakeholder Responses

Zain, **Orange Fixed**, and **Orange Mobile** all agree with the use of the arithmetic mean to calculate the TMR and risk-free rate using averages of time series data.

Zain adds that the TMR and RFR are unlikely to be affected by short-term fluctuations towards the end of the time series, given the use of long-run data. As a result, the arithmetic mean is unlikely to suffer from distortions.

During the workshop, **Umniah** requested the TRC to provide clarification about the international regulatory precedent on using the arithmetic mean.

Response of the TRC

TRC notes that although there are some regulators who use the arithmetic mean, others use a weighted average of the geometric mean and the arithmetic mean.[3] The TRC regulatory principles from 2008 provide TRC with the option to use either approach.[4]

Based on the reasoning presented in the *Notice* and stakeholders' positive response, the TRC maintains its view the TMR and RFR should be estimated using the arithmetic mean of historical returns.

---

[3] For example, the UK telecoms regulator Ofcom prefers to use the arithmetic mean (Source: Ofcom (12 June 2015): "Business Connectivity Market Review – Annexes", p151), whilst the Dutch telecoms regulator prefers to use an average of the arithmetic and geometric mean (Source: Brattle (1 July 2015): "The WACC for KPN and FttH", p15).

[4] TRC (28 January 2008): "Regulatory Decision on the Principles to be used in the Calculation of Licensees' Regulated Cost of Capital", section 2.2.2, p4.

Country Risk Premium

Q4: Do stakeholders agree about the use of CDS spreads to estimate the country risk premium?

Stakeholder Responses

Zain accepts the TRC's proposal to use CDS spreads for estimating the CRP.

Orange Fixed and **Orange Mobile** agree that CDS spreads should be used, but they do not believe the CRP estimate should be equal to just the CDS spread. Instead they propose to multiply the CDS spread by a factor that reflects the relative equity market volatility (i.e. the ratio of the standard deviation in the country's equity market and the standard deviation in the country's bond market), in line with the approach taken by Damodaran. Orange's approach is captured by the following formula:

Jordan CRP = Jordan CDS Spread * (Jordan Equity Market Volatility / Jordan Bond Market Volatility)

In other words, Orange's approach implies that the total country risk premium for an emerging market is captured by both the CDS spread and how much more volatile the country's equity market is relative to its bond market. Based on this alternative approach, Orange calculates a CRP of 6.82%.

In its response following the workshop, Orange Fixed reiterated its preference for the above approach since Damodaran states "*You can estimate an adjusted country risk premium by multiplying the default spread by the relative equity market volatility for that market*".[5]

Response of the TRC

The CRP aims to capture additional risk that investors face when investing in assets in an emerging market relative to assets in mature markets. The TRC acknowledges that the academic literature offers various methods for calculating the CRP, but Orange is incorrect to suggest that its proposed approach is best supported by the academic literature. Orange's evidence was based on one approach described by Damodaran[6] where it estimated the country risk premium as follows:

Country risk premium = Country default spread $* \left(\dfrac{\sigma_{equity}}{\sigma_{country\ bond}} \right)$

Where,

---

[5]   http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

[6]   A. Damodaran (2002), "Investment valuation: Tools and Techniques for Determining the Value of Any Asset", University Edition.

σ_{equity} is the volatility of the equity market in a country and

$\sigma_{country\ bond}$ is the volatility of the country bond used to estimate the spread.

The only difference to the TRC's approach is this volatility adjustment factor.

The TRC has examined the approach described by Orange but rejects it for the following reasons:

- This approach is one of three approaches set out by Damodaran. Although Damodaran suggests this approach as the more appropriate one for the immediate future, he also states that the bond default spread is the more appropriate country risk premium when examined over a long period of time *"Thus, the equity risk premium will converge on the country bond spread as we look at longer term expected returns"*.[7] Orange Fixed reviews Damodaran's approach in a selective manner and ignores that Damodaran does not support making the relative equity market volatility adjustment when estimating the country risk premium over the long-run. Since the TRC is setting a forward-looking cost of capital over a long regulatory period, the long term CRP is more appropriate.

- Second, our wider review of the academic literature, and the approaches taken by professional analysts, also supports a methodology that estimates a CRP based on country default spreads. We highlight a selection of relevant evidence as follows:

    - The approach we have recommended is widely quoted by international analysts and is commonly referred to as the "Goldman Model" for estimating emerging market risk.

    - There is considerable empirical support for the use of the political country risk premium as measured by the difference in CDS spreads as the appropriate country risk premium measure. Erb, Harvey and Viskanta (1995) show that emerging markets returns are related to the country ratings, and given that the country ratings are significant determinants of the country CDS spreads, this is evidence that the country spread may be capturing a risk factor that is priced. Supporting this argument, a prior Financial Strategy Group publication by Abuaf, Chu, Czapla, Lawley, and Thadani (1997) shows that US dollar returns on emerging market investments are primarily a function of US equity returns and the corresponding emerging country US dollar-denominated bond returns (i.e. spreads).

---

[7] *"We believe that the larger country risk premiums that emerge from the last approach [i.e. one cited by ASP] are the most realistic for the immediate future, but that country risk premiums will decline over time...One way to adjust country risk premium over time is to being with the premium that emerges from the melded approach and to adjust this premium down toward either the country bond default spread or the country premium estimated from equity standard deviations...the differences between standard deviations in equity and bond prices narrow over longer periods, and the resulting relative volatility will generally be smaller"*- Damodaran (2002), p.169, par.3.

  "Thus, to estimate the equity risk premium to use for a ten-year cash flows, we would use the standard deviations in equity and bond prices over ten years, and the resulting relative volatility will generally be smaller."

  Damodaran. http://www1.worldbank.org/finance/assets/images/Equity_Risk_Premiums.pdf

- In our review of international regulatory precedent on WACC decisions detailed below we note that no country uses a WACC estimate based on the approach set out by Orange. Instead, in most countries the risk free rate is estimated based on country default swap spreads alone, with no relative equity market volatility adjustment. This procedure is equivalent to the TRC's proposed approach.

Table 1.1
**International Regulatory Precedent on CRP**

Country	Regulator	Adjustment for Relative Equity Mkt Volatility	Methodology
Bahrain	Telecommunications Regulatory Authority	No	Spread on US-denominated bonds with the same rating as Bahrain
Italy	AEEGSI	No	1-year average of Italian govt bond yields
Portugal	ERSE	No	Explicit CRP based on difference between Portuguese and stable country govt bond yields
Spain	Govt ministry	No	No CAPM methodology, but rate of return includes spread on Spanish corporate bonds
Ireland	CER	No	Explicit crisis risk premium based on difference between Irish and stable country corporate bond yields

Source: International regulator WACC determinations

- Making this adjustment to the Jordanian CRP would require reliable data for Jordan equity market volatility. The chart below displays the ratio of daily market turnover divided by total market capitalisation for the US S&P 500 and the Amman SE General Index over the period 2011 to 2016.[8] This liquidity metric captures the degree to which stocks within the index are traded daily, and therefore measures the liquidity of the index. With an average score of 47 per cent over this period, the Amman SE is very illiquid compared to the S&P 500, for which the average is 193 per cent. This implies that price changes for the Amman SE General Index are not as likely to capture fair market value of equities compared to the US S&P 500. Any measure of volatility based on this index will not be a fair estimate of the risks that investors face. We therefore conclude that the relative equity market volatility, as defined above, cannot be used in estimating the CRP for Jordan.

---

[8] This measure is known as the turnover rate is a commonly used liquidity measure in financial markets. See for example, Sarr, A and Lybek, T: "Measuring Liquidity in Financial Markets", IMG Working Paper WP/02/232, p12.

Figure 1.1

**US vs Jordan Equity Market Volatility**
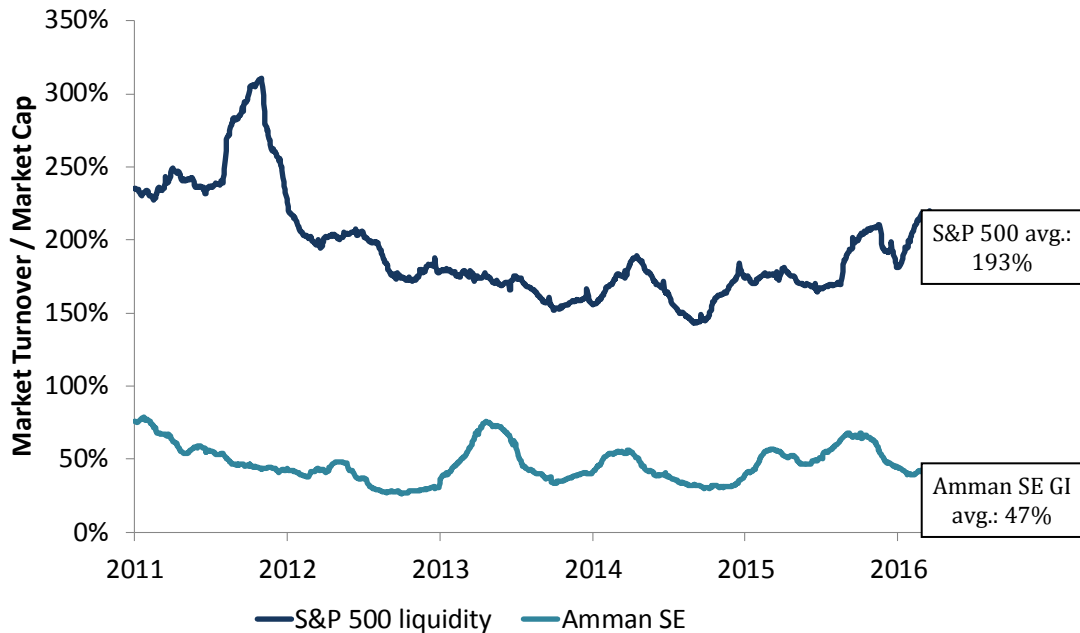
Source: Bloomberg, NERA analysis.

- Finally, we note that in order to make the relative equity market volatility adjustment, Orange has applied Damodaran's average multiplier for emerging markets of 1.34. However, this approach fails to consider the fact that the multiplier may vary across emerging markets and that the simple average may not be applicable to Jordan. Within Damodaran's database[9], the multiplier varies from 0.48 (for the Philippines) to 4.04 (for India) and Figure 1.2 highlights the variance in relative volatility of stocks compared to bonds across a number of emerging market economies. By taking the simple average, Orange assumes that Jordan is similar to the average of the emerging markets, even though Jordan's country risk may be very different to that of the average.

---

[9]   See http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html.

Figure 1.2
Variance in Relative Volatility of Stocks vs Bonds across Countries
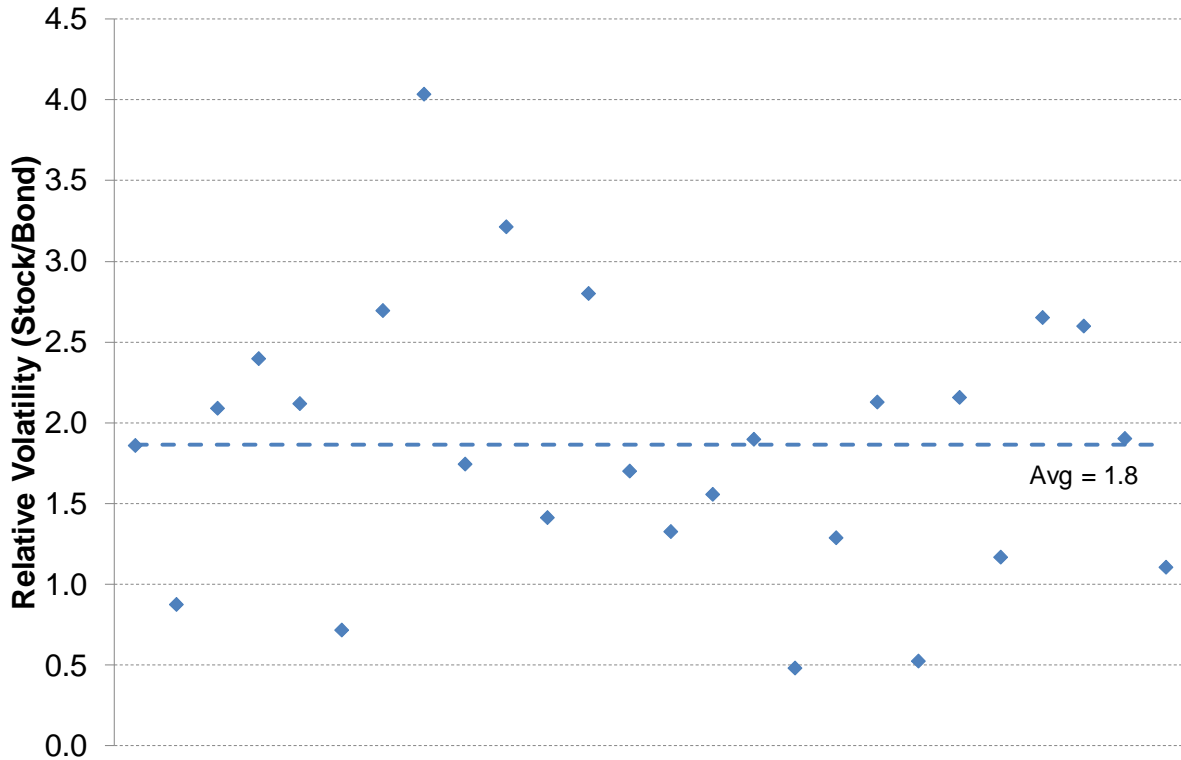
Source: Damodaran (June 2015); Note that the average in the figure above is different from Orange's average since it relates to June 2015 data instead of Orange's 2016 data. We have shown 2015 data because Damodaran has not published country-level data for 2016.

The above reasons mean that the relative equity market volatility adjustment that Orange prefers cannot be applied in a robust manner using Jordanian data. The lack of fair market pricing of equities and the absence of other sources of data means there is a high probability that Orange's approach does not lead to an accurate estimate of the CRP.

Given the lack of strong empirical evidence to apply the equity market volatility adjustment and the consistency of the TRC approach with the academic literature and regulatory precedent, the TRC maintains its view that the CDS spreads are a good proxy for the CRP, without further adjustments.

Q5: Do stakeholders agree with taking a long-run average of CDS spreads to estimate the country risk premium?

Stakeholder Responses

All three responses express stakeholders' concern with using the long-run average of CDS spreads, arguing that it underestimates the CRP.

Zain suggests that instead of using a six-year arithmetic average, the TRC should use the exponential moving average (EMA) over the same period. EMA gives more weight to more recent data, which Zain considers appropriate given the upwards trend in the CRP over the period under consideration. This results in an average CDS spread of 4.6%.

Orange Fixed and **Orange Mobile** argue that a three-year averaging period is preferred as it is long enough to be robust to very short-term variations, but short enough to capture recent financial trends. The three-year average CDS spread (without any additional factor) is 4.7%.

In their response to Zain's comments, they state that Zain's proposal follows the same aim as their own proposal, namely to capture the recent trend in the Jordanian CRP. While maintaining their own proposal, they also welcome Zain's proposal to use the EMA.

Response of the TRC

The TRC considers the recent increase in the CDS spread to be, at least in part, a consequence of temporary political and business cycle events, such as security spillovers from regional conflict and lower investment levels:[10]

- **Credit Rating Agencies**: Moody's downgraded Jordan in June 2013 to B1 and S&P in May 2013 to BB- due to spillover effects from conflict in Syria and Iraq, and increase in sovereign debt from 70% of GDP in 2011 to 89% in 2014.[11] This led to an increase in CDS spreads.

- **GDP Outlook**: The World Bank expects GDP growth to increase in the coming years from 2.4% in 2014, to 3.0% in 2016 and 3.3% in 2017. Any increase in GDP growth is likely to lower the country risk premium since it increases the ability of counterparties to settle payments.

The above factors suggest that the country risk premium in Jordan may start to improve over the four-year period in which the WACC is being set. However, the TRC acknowledges there may be merit in the arguments made by stakeholders, in that a six-year averaging period may not capture recent financial trends in Jordan. The TRC's motivation for treating the CRP separately from the developed market total market return was in part that the CRP can exhibit greater volatility and should therefore be considered separately. There is some probability that the factors that have to led to the recent increase in CDS spreads may persist, and therefore the TRC's approach to calculating the CRP must factor in this probability.

---

[10] See for example World Bank Jordan country overview: http://www.worldbank.org/en/country/jordan/overview

[11] Moody's (26 June 2013): "Moody's downgrades Jordan's government bond rating to B1; outlook stable".

As a result, the TRC has decided to adopt a five-year average of the CDS spread, which is 3.9%. A shorter averaging period provides a balance of taking account of the probability that recent changes in risk continue in Jordan as well as the probability of return to stability in line with World Bank GDP forecasts.

In conclusion, while the TRC maintains its view that the CRP should be estimated using an average CDS spread without further adjustments, it has changed its view on the averaging period in line with stakeholders' argument that more weight should be given to more recent periods. The final estimate of the CRP is 3.9%, based on the five-year average of the CDS spread.

Beta

> **Q6: Do stakeholders agree with the proposed estimation technique for the beta, particularly on data frequency, estimation window, reference index and levering?**

Stakeholder Responses

Zain agrees with the data frequency, estimation window, and reference index used for estimating JTG's beta range. The mobile operator requests more clarity regarding the levering formula used. Zain agrees with the actual asset beta range presented by the TRC based on the evidence presented, but has asked the TRC to publish the list of 13 European comparators used to calculate the upper bound of the range.

Orange Fixed and **Orange Mobile** agree with using the Miller formula for levering the beta. They do not agree with the two-year estimation window, which they argue should be consistent with the observation period for all other parameters (three years in their view). They do not agree with the asset beta estimate for JTG (0.5) as calculated by the TRC. Based on their own calculations, they obtain an estimate of 0.75 for JTG's asset beta.

Regarding data frequency, **Orange Fixed** states that "an average of daily and weekly betas is generally used". Orange Mobile does not state this view and agrees with the daily data frequency proposed by the TRC.

In their response to Zain's comments, **Orange Fixed** and **Orange Mobile** agree with Zain's request for more clarity regarding the levering formula and the set of comparators used. Orange Fixed also noted that it did not understand TRC's estimation of the beta for Jordan Telecom Group and TRC has not described the data it has used.

Response of the TRC

Regarding the European comparators used to estimate the upper bound of the range (0.56), the TRC has published the list in Appendix 1 of this decision.

In response to Zain's comment on the levering formula, the TRC notes that there is a typo in the Miller formula as presented on pages 14 and 15 in the *Notice requesting comments on the calculated Weighted Average Cost of Capital* from 1 September 2016. The correct Miller formula is:

$$\beta_e = \beta_a * (1 + D/E) \text{ [an equivalent formulation would be } \beta_e = \beta_a / (1 - D/(D+E))]$$

This does not affect the WACC estimate presented in the *Notice*, as the correct formula was used for the calculations.

Regarding the estimation window, the TRC has considered Orange's request to use a three-year window instead of a two-year window. The TRC disagrees with Orange's assertion that the use of a three-year estimation window is more likely to ensure consistency. Since Orange agrees with TRC's use of a long-run average to estimate the risk-free rate and also five-year average for the cost of embedded debt, a three-year estimation window for the beta is no more consistent than TRC's two-year window.

More importantly, a two-year window offers a good balance between reflecting the current systematic risk and providing a statistically robust estimate. A two-year window is also consistent with the approach to beta estimation taken by a number of European regulators, including Ofcom in the UK and ACM in the Netherlands.[12] Because of the theoretical benefits of using a two-year estimation window based on statistical robustness and consistency with international regulatory precedent, we have continued to use a two-year estimation window.

Orange presents a different result for the asset beta of JTG, namely Orange calculates an asset beta of 0.75 compared to the TRC's calculation of 0.5. From the data they present in the appendix to their responses, this seems to be due to two differences in approach compared to the TRC's approach.

- First, Orange calculates equity returns based only on JTG's share price returns rather than based on the total return index which includes dividends. The TRC maintains that the latter is appropriate for beta estimation, as an investor's return consists of both the profits paid out (i.e. dividends) and capital gains (i.e. changes in stock prices). Both return components are subject to systematic risk and should hence be included for the purpose of estimating the beta.

- Second, Orange appears to use a different reference index, namely the Amman Stock Exchange Free Float Index. The TRC uses the Amman Stock Exchange General Index, which is the broadest index available for Jordan, including the 100 most liquid stocks from all sectors of the economy, with caps placed on individual stocks to prevent the index being dominated by individual securities.[13] By contrast, the Amman Free Float Index that Orange uses includes an adjustment to remove the impact of large shareholdings in Jordanian listed companies.[14] The TRC does not see any reason to adjust for large shareholdings because an investor in the Jordanian market will look to diversify its portfolio using the overall market in Jordan, which includes large shareholdings. By excluding the impact of large shareholdings, the beta does not capture the systematic risk compared to a representative Jordanian market portfolio. Therefore, TRC does not agree with Orange's use of the Free Float Index.

---

[12] Ofcom (26 June 2014): "Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30 – Annexes", p179. The Brattle Group (1 July 2015): "The WACC for KPN and FttH – Prepared for ACM", p13.

[13] http://www.ase.com.jo/en/main-indices

[14] Source: http://www.ase.com.jo/en/methodology.

Lastly, the TRC does not wish to change its approach to using daily data frequency as suggested by Orange Fixed, as it has not been provided with compelling arguments in support of this suggestion. As explained in the *Notice*, the TRC prefers daily data as they provide more statistically robust estimates as a result of higher data frequency. In addition, international regulatory precedent is in favour of using daily data (e.g. Ofcom in the UK and ACM in the Netherlands).[15]

In conclusion, the TRC will maintain its approach regarding the data frequency, the estimation window, the reference index, and the levering formula used to estimate JTG's asset beta. The range of 0.50 – 0.56 proposed in the *Notice* will be the final range for the asset beta of Orange Fixed.

Q7: Do stakeholders agree with the view that the beta for fixed and mobile operators should be equal, with the exception of the revenue share impact? Please justify your response.

Stakeholder Responses

Zain agrees on this point on the basis of the data and arguments presented, but would like to see more evidence in support of the TRC's position.

Orange Mobile and **Orange Fixed** agree that the beta for fixed and mobile operators should be equal (whereas they disagree on the impact of the revenue share, see Q8).

Response of the TRC

The TRC's reasoning for setting the same asset beta for fixed and mobile markets (excluding the impact of the revenue share) is based on increasing convergence between the two markets. Mobile used to be seen as a luxury product with high income elasticity of demand, implying that changes in the market would result in significant changes in demand for mobile, and consequently mobile operators' returns. However, as mobile products have become more ubiquitous, the demand for fixed and mobile has converged and they are now treated as complementary products by most customers. This convergence has been reinforced by improvements in mobile network speeds and reliability, as well as convergence in the price paid for each type of service. As a result, the demand for both types of products exhibits similar income elasticity and similar systematic risk exposure to the market.

Orange Fixed notes that the USO it faces results in greater risk in a competitive market. However, a number of the international comparators TRC has used to calculate the beta also face a USO in their home country (for example BT in the UK). Therefore, the use of these international comparators to estimate the beta accounts for any risk resulting from the USO.

---

[15] Ibid.

The convergence in risk between fixed and mobile is supported by Figure 1 below, which shows the broadband household penetration in Jordan compared to the mobile population penetration. Across both markets, penetration appears to have stabilised over the last two to three years, suggesting the markets are nearing maturity. The trends in the Jordanian market suggests that demand for mobile and fixed are not as income sensitive as it was previously, even as country risk and economic conditions have fluctuated (see Q5 above). This reinforces the TRC's conclusion that the systematic risk across the two sectors does not vary, aside from the impact of the revenue share.

Figure 1
Jordan Broadband vs Mobile Penetration
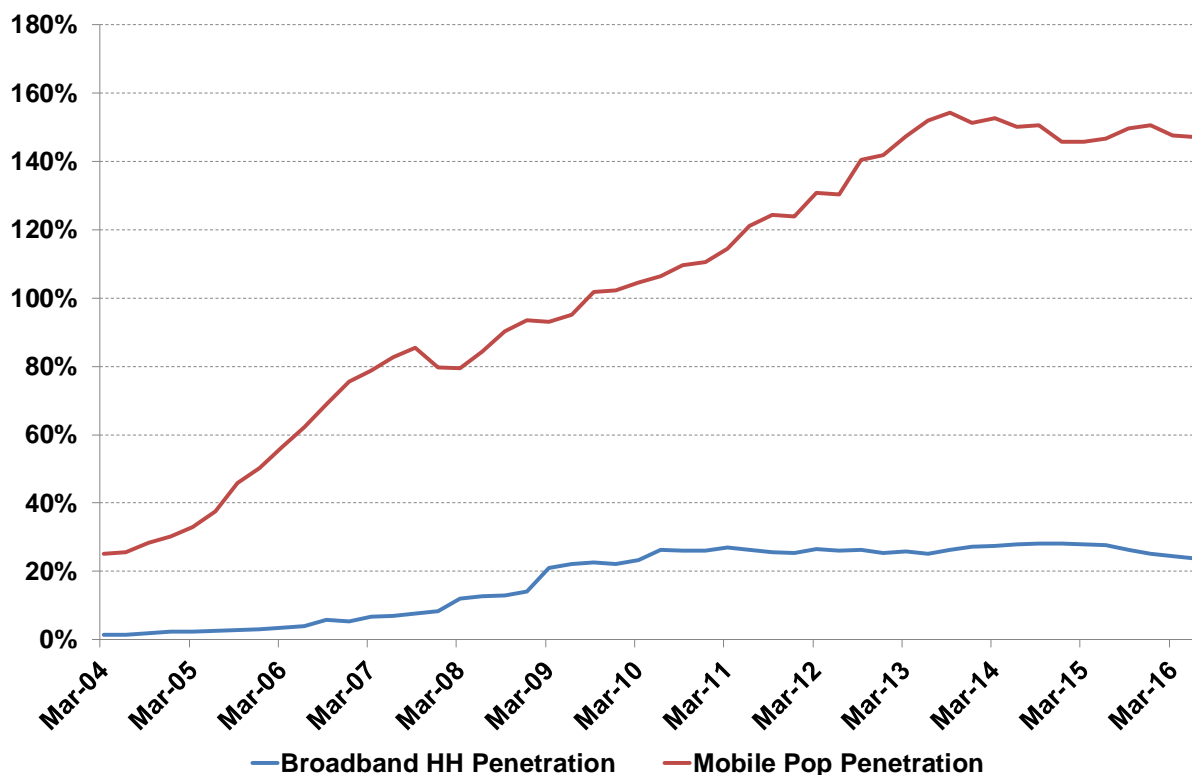
Source: Telegeography; Note: The absolute levels of penetration for broadband and mobile cannot be directly compared in the figure above because they are measured relative to different bases (broadband relative to households and mobile relative to population).

The TRC maintains its view that the asset beta for fixed and mobile operators should be equal, with the exception of the revenue share impact.

As requested by Zain, additional evidence on why we consider the betas for fixed and mobile to be equal (in the absence of the revenue share) is presented in Appendix 3.

Q8: Do stakeholders agree with the proposed revenue share adjustment for mobile operators?

Stakeholder Responses

Zain state that they are unable to assess the merit of this approach without further details on the proposed formula and the data used.

Orange Mobile and **Orange Fixed** do not agree with the proposed revenue share adjustment.

During the workshop, **Umniah** argued that the revenue share adjustment has been applied mechanistically without recognising how operators might respond in reality. In reality, Umniah argued operators increase prices and manage their risk through this action.

Response of the TRC

In section 5.7 of the *Notice,* the TRC has provided its reasoning regarding the impact of the revenue share. In response to Zain's requests for additional details, the TRC provides its input data and calculations in Appendix 2 of this decision. The Appendix shows the effect on Jordanian telecom operators' profits of a market volume shock under two scenarios:

- No revenue share: Under this scenario, the operators' profits are based on its revenues, fixed costs, variable costs and a corporation tax rate applied on profits. The effect of the volume shock is to reduce revenues and variable costs, which results in lower post-tax profits.

- With revenue share: Under this scenario, the operators' profits are based on revenues, fixed and variable costs, a revenue share of 10% and a corporation tax rate. Again, the effect of the volume shock is to lower revenues and variable costs, which results in lower post-tax profits.

By comparing the relative impact of the volume shock on profits with and without the revenue share, the TRC determines how much more do profits co-vary with the market (as proxied by the volume shock) when the revenue share is taken into account. As Appendix 2 shows, the revenue share results in profits falling by 60% more with the revenue share relative to without, and hence the revenue share increases systematic risk by this proportion. Hence, the TRC has applied this proportional adjustment to the asset beta for the fixed market to derive the asset beta for the mobile market.

Given the reasoning provided, the TRC does not see a reason to change its approach to accounting for the impact of the revenue share on mobile operators' systematic risk. Orange does not present substantive arguments for its view that the adjustment should not be made.

In response to Umniah's argument that the operators can manage the risk of the revenue share by passing through the risk to customers, TRC notes that an independent investor in this market would consider how much their return would vary because of the existence of the revenue share. Since the revenue share always applies, even if profits are negative, the co-variance of the operators' profits with market shocks increases. Therefore, investors should in theory require a higher return to compensate them for this risk. In addition, even if operators are able to respond to the revenue share by increasing prices, this will still have an impact on the market. The increase in prices will result in a change in customer demand, so overall revenues may still fall. Therefore, the revenue share will still have an additional impact on profits even if operators respond by increasing prices. Consequently, this should be taken into account when setting the allowed rate of return.

In conclusion, the TRC maintains the proposed revenue share adjustment based on the reasoning presented in the *Notice* and the details provided in Appendix 2 of this decision. The final asset beta range for mobile operators is 0.80-0.89.

Q9: Do stakeholders agree with the view that the beta for efficient operators should not be different from that of the actual Jordanian operators?

Stakeholder Responses

Zain, **Orange Fixed**, and **Orange Mobile** agree with this view.

Response of the TRC

Given the reasoning presented in the Notice and stakeholders' positive response, the TRC maintains its view that the beta for efficient operators should not be different from that of the actual Jordanian operators.

Gearing

> **Q10: Do stakeholders agree with the approach of estimating the efficient level of gearing based on the gearing of international comparators? Please justify your response.**

Stakeholder Responses

Zain does not agree that it is possible to establish the efficient level of gearing. Zain describes several financial theories on capital structure including the irrelevance theory, the trade-off theory, the pecking order theory and the market timing theory, and notes that each of these theories could lead to a different efficient capital structure. Zain therefore argues that the TRC should avoid defining an efficient capital structure.

Zain also notes that the TRC's international comparators represent a poor comparator set since they are made up of a very small sample. It highlights that the standard deviation of the comparators' gearing results in the mean potentially being up to 10 percentage points higher or lower at the 95% confidence interval. Zain argues that the variance in gearing levels within the comparator set means that there is no single level of efficient gearing, and the TRC should not presume there is.

Zain further argues that the comparators in the fixed and mobile peer groups cannot be assigned as fully fixed or fully mobile. Most of the comparators pursue a mix of activities and therefore they cannot be designated as suitable comparators for fixed or mobile. Finally, Zain requests the TRC to clarify the relationship between the level of gearing and credit rating presented in Tables 6.1 and 6.2 of the *Notice*.

Orange Fixed and **Orange Mobile** both agree with the approach of estimating the efficient level of gearing based on international comparators, but note that comparators from the MENA region may be more appropriate.

In their response to Zain's comments, they maintain that they agree with the TRC's approach of setting an efficient gearing level. In particular, they state that the beta of benchmarked operators is contingent on their gearing, so it makes sense to use the average gearing of these operators as the gearing level for the WACC. They add that this approach does not imply that there is only one efficient gearing level or that operators should move towards the gearing level chosen. They also state that this approach is in line with European regulatory precedent.

During the workshop, **Umniah** argued that the actual capital structure of operators is relevant for setting the WACC.

Response of the TRC

The TRC acknowledges Zain's review of the different theories of determining capital structure and that each of these theories could lead to a different level of the efficient capital structure. By setting an 'efficient' level of gearing, the TRC did not wish to suggest to operators they change their gearing to the TRC's view of the efficient level. Rather, TRC used international comparators to determine the level of gearing that allows operators to continue to finance themselves sustainably in international capital markets. By benchmarking against these international comparators, TRC can determine the gearing that allows telecoms operators to conduct business operations and continue to raise new capital. Given the WACC calculation requires a gearing input, the TRC continues to believe the use of international comparator evidence is the most appropriate data to set the gearing for both fixed and mobile activities.

Zain highlights that the TRC's sample of comparators is small and that the removal of a single comparator can result in the average gearing falling or increasing by 10 percentage points. However, the impact of changing the gearing by even 10 percentage points has a very limited impact on the final WACC (real, pre-tax) of around 0.1%. This is because an increase in gearing has two offsetting effects on the WACC:

- More weight placed on the cost of debt: since the cost of debt is lower than the cost of equity, the greater weight placed on the cost of debt results in the WACC falling.

- Cost of equity increases: the higher the gearing, the greater risk faced by equity investors, since they receive their earnings after debt investors. This increases the cost of equity, resulting in an increase in the WACC.

As a result of these two offsetting effects, relatively large changes in the gearing have limited impact on the WACC. Therefore, even though Zain's analysis suggests the TRC's gearing estimate may not be precisely accurate, any potential inaccuracy based on the comparators chosen is unlikely to have a material impact on the WACC that the TRC sets.

Zain also argues that the comparators chosen by the TRC cannot be fully assigned as mobile or fixed since almost all of them derive earnings from both types of activity. However, the average of both sets of comparators chosen by the TRC is very similar, and the analysis suggests that the gearing of mobile and fixed operators does not vary materially. This is supported by our analysis in Appendix 3, where we find that the risks faced by mobile and fixed operators have converged in recent years. Given similar risks, one would expect the gearing of mobile and fixed operators to be similar. Moreover, since the final WACC estimate is relatively insensitive to the gearing assumption, the TRC does not wish to change its comparator set for each activity.

Zain has requested the TRC to provide additional explanation of the relationship between the level of gearing and credit rating presented in Tables 6.1 and 6.2. The credit rating is included to show that the gearing level of the international comparators allows them to maintain an investment-grade credit rating. The implication is that these comparators are able to raise new capital sustainably and provide a strong reference point for an efficient capital structure.

The TRC agrees with Orange that, ideally, the use of comparators from the MENA region to calculate the gearing would be preferable. However, the TRC was not able to identify suitable comparators from the MENA region for which gearing data was available. Since Orange has not suggested alternative comparators from the MENA region, TRC has continued to use the international comparators.

TRC also notes that the capital structure of Jordanian operators cannot be observed clearly because some of the debt is raised at the parent company level. The TRC's task is not to set the WACC for each operator separately, but to set an efficient WACC for a standalone Jordanian operator, which means debt indices are a more appropriate data set.

Based on our review of the comparators chosen and evaluation of the relationship between gearing and the WACC, the TRC does not wish to change its approach of estimating the gearing based on international comparators.

Q11: Do stakeholders agree with adopting a 2-year average to estimate the gearing? Please justify your response.

Stakeholder Responses

Zain believes that the TRC has failed to provide sufficient justification for using a two-year average gearing, and therefore it cannot provide any comment on it.

Orange Fixed and **Orange Mobile** both disagree with the adoption of a two-year averaging period. They argue that a consistent time period should be adopted for all parameters since they are correlated with each other. In their response to Zain's comments, they agree that the TRC has not provided sufficient justification for the chosen length of the observation period.

Response of the TRC

The TRC selected a two-year averaging period for the gearing in order to maintain consistency with the estimation window for the beta estimate. A two-year window provides a reasonable balance between selecting the most recent data for measuring company decisions on capital structure and having sufficient data to provide a statistically robust estimate.

The TRC disagrees with Orange that all parameters must be estimated using the same estimation window. Although some of the parameters within the cost of capital are correlated with each other, notably the risk-free rate and ERP, others are not correlated in any systematic manner. Financial theory has not found any evidence that the risk-free rate is correlated with betas or gearing in particular sectors, and therefore there is no reason to estimate them over the same time period. Instead, the TRC focused on the estimation window that provides the most relevant data for estimating forward-looking parameters for the purpose of TRC's regulation. In the case of gearing, a two-year window appears to offer the best balance of robustness and recent market data.

Finally, the TRC has noted above that the final WACC is relatively insensitive to the gearing assumption, and therefore any change in the gearing estimation window is unlikely to have a material impact on the WACC.

Cost of Debt

> **Q12: Do stakeholders agree with the use of debt indices to calculate the efficient cost of debt instead of using the operators' actual debt costs? Please justify your response.**

Stakeholder Responses

Zain agrees with the TRC's choice of index to calculate the cost of debt, but argues that this should not be defined as the 'efficient' level. Zain believes that there is no single efficient level, and that operators cannot be incentivised to pursue this level through economic regulation.

Orange Fixed and **Orange Mobile** express their support for this position in their response to Zain's comments.

During the workshop, **Umniah** argued that the TRC's cost of debt allowance is too high because operators such as Orange and Umniah can issue debt at a much lower cost than the TRC's estimate. The cost of debt for Umniah is based on the Jordanian operations, so it should be considered as an appropriate cost of debt for a Jordanian operator.

Response of the TRC

By setting an 'efficient' cost of debt, the TRC did not wish to suggest to operators that there is a single 'efficient' level. Instead, the TRC used debt indices to determine the cost that operators can issue debt at when financing themselves sustainably in international capital markets. By benchmarking against these international debt indices, TRC can determine the cost of debt at which operators can continue to conduct business sustainably without facing difficulties in financing their investments.

Although Zain notes that operators cannot be incentivised to pursue the 'efficient' cost of debt through the TRC's economic regulation, the TRC notes that by setting a fixed cost of debt, operators can achieve additional economic profits within the regulatory period by issuing debt at a cost below the TRC's assumption. In this sense, operators have an incentive to raise new debt at the lowest cost possible.

In response to Umniah's comment, TRC notes that even if Umniah raises debt for its Jordanian business separately, lenders will take account of the implicit guarantee of its parent company. Therefore, the cost of debt for Umniah will be lower to reflect the impact of the implicit backing of the parent group, and is not appropriate for setting the WACC from a regulatory perspective.

Q13: Do stakeholders agree with the approach used in calculating the cost of embedded debt?

Stakeholder Responses

Zain disagrees with the TRC's calculation of the CRP and argues the exponential moving average approach described in its response to Q5 should be adopted for estimating the CRP as part of the cost of debt. Zain believes this calculation would lead to a cost of embedded debt of 7.0%.

In their response to Zain's comments, **Orange Fixed** and **Orange Mobile** agree with Zain's view that the CRP should be adjusted.

Response of the TRC

TRC has provided its response to Zain's comments on the CRP in Q5. This revised CRP has been reflected in the cost of embedded debt and is shown in the revised WACC calculation in Chapter III.

Q14: Do stakeholders agree with the approach used in calculating the cost of new debt?

Stakeholder Responses

As for the cost of embedded debt, **Zain** believes that the CRP should be based on an exponential moving approach for the cost of new debt. Zain believes this would lead to a cost of new debt of 8.9%.

In their response to Zain's comments, **Orange Fixed** and **Orange Mobile** agree with Zain's view that the CRP should be adjusted.

During the workshop, **Umniah** noted that the cost of debt is not expected to increase over the next five years, as the trend has been a decline in recent years.

Response of the TRC

TRC has provided its response to Zain's comments on the CRP in Q5. This revised CRP has been reflected in the cost of new debt and is shown in the revised WACC calculation in Chapter III.

TRC has taken account of Umniah's comment that the cost of debt is not expected to increase over the next five years. TRC has reviewed the latest data following the publication of its consultation paper, which shows that the debt spread on the US telecoms index has continued

to decline, as shown in Figure 2. To take account of the latest trend in the data, TRC has decided to adopt a 6-month average of the debt spread instead of the 1-year average previously used in the consultation paper. This results in a decline in the debt spread from 1.8% to 1.65%.

Figure 2
US Telecoms BBB Index Debt Spread vs Treasury Bond
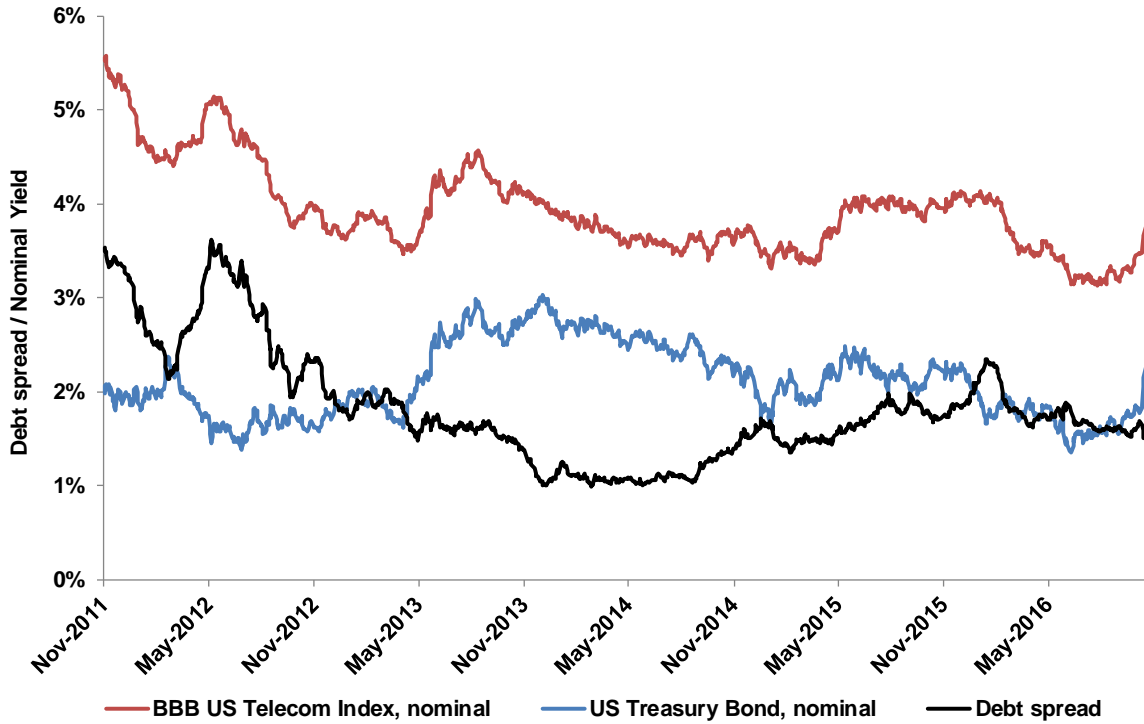
Source: Bloomberg, Factset

In conclusion, TRC has decided to use a shorter averaging period for the debt spread to calculate the cost of new debt. The TRC has adopted a 6-month average debt spread of 1.65%, take account of the latest trend in debt spreads.

Q15: Do stakeholders agree with the calculation of the weights on the cost of new and embedded debt?

Stakeholder Responses

Zain accepts the methodology for calculating the weight of embedded and new debt.

Orange Fixed does not agree with the TRC's proposed weighting methodology. Orange Fixed notes that in emerging markets such as Jordan, operators may be undertaking substantial new investment in their networks. A weighting system based on existing asset lives does not

capture the amount of new debt that will need to be issued to finance new assets. Orange Fixed notes a TRC statement that acknowledges Jordanian operators may undertake significant investment in FttH and 5G networks over the coming years. Orange Fixed highlights that investment in the FttH network has already commenced, and provides strong evidence that operators may need to raise new debt. Orange Fixed assumes a weight on new debt of 60% for its WACC calculation, although it does not provide its calculation of this weight.

During the workshop, **Umniah** argued that less weight should be placed on the cost of new debt because mobile operators have no expectation of issuing new debt over the next five years. Investments in mobile networks have in large part already been undertaken, and any additional investment will be financed through operating cash flows.

> ## *Response of the TRC*

The TRC agrees with Orange Fixed that the weighting on new debt should increase if there is strong evidence to suggest that operators will increase their investment in networks during the upcoming regulatory period. Under this scenario, one can expect operators to raise significant new debt and the overall cost of debt should place more weight on the cost of new debt. Conversely, Umniah's comment would imply that less weight should be placed on the cost of new debt for mobile operators because there is little need to issue new debt over the upcoming regulatory period.

However, TRC is setting the WACC for an efficient capital structure. If operators choose not to refinance their existing debt or raise more new debt relative to historical issuances, it will result in a change in the capital structure away from the efficient level. This is a company-specific decision and does not necessarily mean that a hypothetical investor in this market would choose not to refinance its existing debt. Therefore, the weightings on new and embedded debt must be consistent with the efficient gearing level.

In the TRC's response to Q1 above, the TRC has chosen to set the WACC for four years. Since the weightings on the cost of new debt and embedded debt are based on the length of the regulatory period relative to the average asset life, the reduction in the period over which the WACC is set means more weight is placed on the cost of embedded debt. This is because less new debt is likely to be raised over a four year period than a five year period. The TRC has therefore adjusted the weights on the cost of new debt and embedded debt to reflect the four-year period over which the WACC is set.

Based on the four year period over which the WACC is set, the TRC places a 29% weight on the cost of new debt and 71% on the cost of embedded debt.

The TRC notes that any additional debt that is raised during the next regulatory period will be reflected in the embedded cost of debt allowance and weighting at the TRC's next price review.

WACC Estimate

> *Q16: Do stakeholders agree with the use of the mid-point of the WACC range as the final estimate? Please justify your response.*

Stakeholder Responses

Zain disagrees with the TRC's adoption of the mid-point of the WACC range. Zain considers the mid-point to be an arbitrary choice and no more accurate than any other point in the range. Zain believes that the risk of estimating too high a WACC is less than the risk of too low a WACC because the competitive market process will correct the outcome of too high a WACC whereas only the TRC can correct too low a WACC. Zain therefore considers that the TRC should select the top end of the WACC range to set the final estimate.

Orange Fixed and **Orange Mobile** agree with the use of the mid-point of the WACC range.

Response of the TRC

The TRC acknowledges that there is uncertainty surrounding its estimates of some of the WACC parameters. Zain's reasoning for setting a WACC at the top end of the range is that the effect of setting the WACC too low has a greater detrimental impact than setting the WACC too high. Because of this asymmetric effect, Zain believes TRC should be conservative in selecting the point estimate from the range.

The TRC does not agree with Zain that the risk of setting the WACC too low is materially different from setting it too high. Although the mobile market may be competitive in the long-run, barriers to competitive entry may exist in the short-run. This may be particularly true in certain sub-regions within Jordan, where one operator may have a dominant market share. As a result of these short-run barriers to entry, if the TRC sets the WACC too high, the existing operators' economic profits may not be eroded away in the short-run (although they are likely to be in the long-run), resulting in a societal welfare loss.

In addition, if the TRC sets the WACC too high, external investors considering entry into the market may receive the incorrect signals and may overinvest in the Jordanian market, resulting in inefficient use of capital. By setting the WACC at the mid-point, TRC believes it will provide appropriate incentives for operators not to overinvest (or underinvest) in the Jordanian sector.

We also note that international telecoms regulators have typically set the WACC at the mid-point of the range due to similar arguments presented above.[16]

---

[16] See for example, Ofcom (26 June 2014): "Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30 – Annexes", p179. The Brattle Group (1 July 2015): "The WACC for KPN and FttH – Prepared for ACM", p13.

Moreover, TRC considers that its estimates for a number of the parameters within the cost of capital are already conservative, and there is no additional need to select the top end of the WACC range. For example, the TRC's adoption of long-run averages in setting the risk-free rate for a developed market, when current government bond yields are at historical lows represents a conservative view that interest rates in the US may soon return towards long-run levels. In addition, the use of the most recent data on the CRP, based on the TRC's modified approach of using a 3-year average, is conservative in the sense that it allows for the scenario that Jordanian country risk does not soon fall back to its long-run level.

Based on the TRC's conservative approach of selecting estimates for each parameter, the TRC maintains the adoption of the mid-point of the WACC range.

Appendix 1: Asset Betas of European Comparators

The upper bound of the asset beta range set by the TRC is based on the 2-year asset betas of a set of 11* European comparators, which are presented in Table A1 below. We have also presented a sensitivity based on 5-year asset betas, which provides a lower average asset beta of 0.43, implying that the 2-year average is a conservative estimate.

Table A1
Asset Beta Estimates for Fixed Operators in Europe

Fixed Operator	2Y Asset Beta	5Y Asset Beta
BT	0.74	0.70
TalkTalk	0.61	0.54
Sky	0.58	0.54
Colt	0.29	0.40
Telefonica	0.56	0.45
Deutsche Telekom	0.50	0.34
Belgacom	0.59	0.40
Telecom Italia	0.42	0.29
Orange	0.58	0.39
Iliad	0.73	0.42
Swisscom	0.50	0.31
Average	**0.56**	**0.43**

Source: Bloomberg.

*The TRC notes that the Notice stated that the number of operators was 13, whereas the correct number is 11.

Appendix 2: Beta Revenue Share Adjustment

Zain has requested clarification on the TRC's formulae and data for calculating the beta multiplier that accounts for the impact of the revenue share on mobile operators' systematic risk. Both the input data and the calculations are presented in Table A2 below.

The beta multiplier is insensitive to the size of the volume shock assumption (row E) and increases with the revenue share (row F).

Table A2
Beta Multiplier for Impact of Revenue Share – Data and Calculations

	Variable	Input / Calculation	Notes
A	Revenue	100	Assumption – results insensitive to starting assumption
B	Variable costs	34	Average variable cost share of the 3 mobile operators FY2014
C	Fixed costs	45	Average fixed cost share of the 3 mobile operators FY 2014
D	Profit Tax	24%	Jordanian corporation tax rate for mobile is 24%
E	Volume Shock	-20%	Assumption – results insensitive to starting assumption
F	Revenue share	10%	10% revenue share introduced in Jordan on 11 July 2013
	Impact on profit		
	Without revenue share		
G	Profit before shock	16.2	**(A-B-C)*(1-D)**
H	Profit after shock	6.2	**(A*(1+E)-B*(1+E)-C)*(1-D)**
I	% change	-61.9%	**H/G-1**
	With revenue share		
J	Profit before shock	8.6	**((1-F)*A-B-C)*(1-D)**
K	Profit after shock	0.1	**((1-F)*A*(1+E)-B*(1+E)-C)*(1-D)**
L	% change	-98.7%	**K/J-1**
	Multiplier for mobile beta		
M	**Multiplier (Ratio of % changes)**	**1.60**	**L/I**
		Lower bound	Upper bound
N	Fixed beta range	0.5	0.56
O	**Mobile beta range (=M*N)**	**0.80**	**0.89**

Appendix 3: Fixed vs Mobile Risk Convergence

In Q7 of the TRC's *Notice*, stakeholders were asked whether they agreed with the TRC's view that the beta of Jordanian fixed and mobile operators would be the same in the absence of the mobile revenue share. Zain requested the TRC to provide further evidence to support this assertion. In this appendix, the TRC sets out some literature on the convergence in risks between mobile and fixed line products.

In recent years, the mass penetration of mobile products and services based on all relevant metrics including by number of subscriptions, revenues and traffic, suggests that mobile is no longer perceived an "optional extra" or a "luxury good", which may have been its status when it was first introduced.

The accompanying erosion of mobile price premia relative to fixed line services, a convenience factor associated with the portability / personalisation of mobile products, and technological advances in mobile network speed and quality have all led to lower differentiation between fixed and mobile networks. Recent studies have analysed whether fixed line and mobile services should be considered substitutes, competing for market share with fixed services, or whether they are in fact complementary, belonging to the same market with complementary customer demand.

The literature on "*Fixed-Mobile Substitution (FMS)*" proposes that mobile and fixed network products can be viewed as substitutes, implying that mobile voice (and broadband) can be a compelling competitor to the fixed line voice and broadband service, competing on price while offering similar quality of service.[17] This view suggests that there is a degree of similarity and interchangeability between fixed and mobile services, which would imply that there is convergence of the income elasticity of demand for the products.

The literature on "*Fixed-Mobile Convergence (FMC)*" proposes an alternative view whereby fixed and mobile network services are viewed as complementary products, offered together (in bundles) on integrated and enhanced fixed and/or mobile networks. The Body of European Regulators for Electronic Communications (BEREC)[18] for example, defines convergence as "the technological improvements by which a number of networks arise with enhanced capabilities to provide multiple services", but at the network level, it defined convergence as "being able to offer a customer mobile and fixed (or fixed like) services seamlessly by integrating fixed and mobile network". BEREC argues this has been driven by:[19]

---

[17] For a review of the literature on fixed vs mobile substitution, see e.g. Barth and Heimeshoff (2012), How large is the Magnitude of Fixed – Mobile Call substitution? Empirical Evidence from 16 European Countries, accessed here: http://www.dice.hhu.de/fileadmin/redaktion/Fakultaeten/Wirtschaftswissenschaftliche_Fakultaet/DICE/Discussion_Paper/049_Barth_Heimeshoff.pdf; and Bae, Choi and Hahn (2014), Fixed and mobile broadband: Are they substitutes or complements? Accessed here: ftp://ftp.repec.org/opt/ReDIF/RePEc/yon/wpaper/2014rwp-68.pdf

[18] http://berec.europa.eu/doc/berec/bor/bor11_54_FMS.pdf

[19] Ibid.

- the development of new services available on fixed and mobile networks;

- new technologies improving the performance of mobile networks;

- new devices adapted to both fixed and mobile usage;

- new commercial offers and usage habits; and

- lower mobile termination rates.

All of the above points towards a trend of lower differentiation between fixed and mobile networks.

In sum, both views above suggest that the mobile network product is neither perceived as, nor does it behave like, the luxury type product that will have been its status at the onset, but that it rather competes (perhaps on equal footing) with the fixed line product. The TRC interprets this evidence to suggest a degree of convergence in the income elasticity of demand for fixed and mobile services.

The implication of this convergence in service offering is that operators within the two markets face similar risks based on their customers. As customer demand convergences in terms of its responsiveness to market shocks, investors in both fixed line and mobile operators face similar risks and therefore require similar returns. Consequently, the TRC considers that the recent literature supports setting the same beta for fixed and mobile, in the absence of the mobile revenue share.