
Office of Utilities Regulation

Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers

Determination Notice



OFFICE OF UTILITIES REGULATION

December 9, 2010

DOCUMENT TITLE AND APPROVAL PAGE

DOCUMENT NUMBER: TEL2009005_DET001

1. DOCUMENT TITLE: Determination Notice for Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers.

2. PURPOSE OF DOCUMENT

This document contains the main decisions of the Office of Utilities Regulation (OUR) regarding the estimation of a weighted average cost of capital for telecommunications carriers.

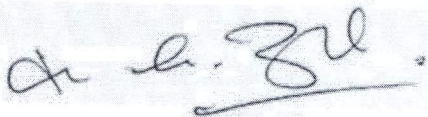
ANTECEDENT DOCUMENTS

Document Number	Description	Date
TEL 2008/05: Con/01	Consultation Document on Estimate of the Weighted Average cost of Capital for Cable and Wireless Jamaica.	May 9, 2008
TEL 2009/05: Con/01	Second Consultation Document on Estimate of the Weighted Average cost of Capital for Telecommunications Carriers in Jamaica.	August 31, 2009

3. APPROVAL

This document is approved by the Office of Utilities Regulation and the decisions therein become effective December 9, 2010

On behalf of the Office:



.....
Ahmad Zia Mian
Director General

December 9, 2010

Executive Summary

INTRODUCTION

The process of estimating the cost of capital commenced on May 9, 2008 when the OUR issued its first Consultation Document titled *Estimate of the Weighted Average Cost of Capital for Cable and Wireless Jamaica*. The cost of capital will be used by the Office as an input into any future Price Cap that may be imposed on LIME's fixed line services. It will also be used in calculating LIME's interconnection rates in its new reference interconnection offer (RIO 6). The OUR in recognition of the fact that a weighted average cost of capital (WACC) would also be needed as an input into the long-run incremental cost (LRIC) model which it plans to develop, decided to widen the scope of the WACC consultation and estimate a cost of capital for telecommunications carriers in general. In this regard, the OUR issued its second consultation document titled *Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers in Jamaica*.

Responses to Consultation

Responses to the second Consultative Document were received from:

- i. Digicel Jamaica,
- iii. LIME (NERA on behalf of LIME).

Purpose of Document

This Determination Notice summarises the Office's views on the estimate of the WACC for telecommunications networks and deals with any issues raised by respondents to the Consultation Document and gives the Office's considered judgement on these issues.

This document presents the study of the cost of capital for telecommunications Carriers in Jamaica. The estimated cost of capital will be used by the Office as an input into the next Price-Cap for LIME, the determination of interconnection charges between carriers, and any other tariffs that may need to be established by the Office.

Legislative Framework

In accordance with Section 29 (4) and (5) of the Telecommunications Act 2000 (the "Act"), the WACC will be used by the Office when making a determination on call termination charges with a view of maintaining the principle of cost orientation where appropriate.

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GENERAL COMMENTS

Industry WACC versus Firm Specific WACC

The Office agrees with Digicel that different sectors and different companies may have different WACC. It is against this background that the Office in its previous cost of capital consultations attempted to calculate a separate WACC for different divisions in which the company operates. The Office also agrees with Digicel that a separate WACC should be estimated for fixed and mobile networks given the differences in risks that exist between the two types of networks. However, the Office disagrees that there is any need for further consultations as the two previous consultations has afforded interested parties extensive opportunity to comment on how the parameters for the WACC should be estimated. The process of estimating a cost of capital for mobile networks is no different from that used to estimate the WACC for the fixed network. Both Digicel and NERA in their response have commented on issues which they consider would vary between fixed and mobile networks such as gearing and beta. Taking these comments on board the Office will calculate separate WACC for fixed line networks and mobile networks.

Determination 1

The Office will estimate separate weighted average cost of capital for fixed line and mobile networks.

Cost of Equity Models

The shortcomings of the Capital Asset Pricing Model or CAPM are well known and have been thoroughly documented in academic literature. However, despite the weaknesses of the CAPM, the Office is of the view that based on the discussion in this section, it sees no evidence to suggest that any of the alternatives to the CAPM are superior. Each method of estimating the risk of equity investment has its own inherent deficiencies and the Office is unconvinced that any of these methods are superior to the CAPM. This view is unaffected by whether the analysis is for an emerging or developed market as the strong theoretical underpinnings and practical applicability of the CAPM continue to set it apart from the alternatives. This explains why the CAPM remains the preferred choice of regulators and many academics around the world.

The wide use of the CAPM provides clear indication that for regulators in both developed and developing countries the CAPM remains the most appropriate method for estimating the cost of equity capital.

In light of all the above, the Office therefore disagrees with Digicel that the CAPM is inappropriate for use in emerging markets. Despite the shortcomings of the CAPM it remains the most trusted, reliable, and used method of estimating the cost of capital

in both developed and emerging markets. Like the majority of its international counterparts, the Office will continue to rely on the CAPM rather than on any of the alternatives in estimating the cost of equity for telecommunications networks.

Determination 2

The cost of equity capital will be estimated using the capital asset pricing model.

Regulatory Opportunism

The OUR at all times seeks to consult in an open and fair manner with the intention of obtaining efficient results. The WACC and the CAPM in particular are based on estimating future values for various parameters used in the model. As the future is uncertain, the actual values cannot be known with any certainty, in some cases the result may exceed what turns out to be the actual value, and in other cases it may be lower than the actual value. The possible misestimating of a parameter by the OUR does not constitute 'opportunism' or bias on the part of the regulator.

Single or Range Estimates

While the Office is uncertain that use of a range would increase the accuracy of the estimated cost of capital, it accepts that this is a practice that has been used by many regulators. In most cases where this is done, the final estimate is a point estimate achieved by taking the midpoint of the high and low for the parameters. However, where there is a great deal of uncertainty about the value of a parameter, the OUR will employ range estimation.

Determination 3

The weighted average cost of capital estimated within a range with a point estimated determined based on the range for use in regulatory decisions.

Industry Specific Risks

It is the Office's view that the options available to investors in private companies are no different from those which are available to investors in public companies. The underlying theory remains the same, that is, non-systematic risk can be avoided by holding a well diversified portfolio.

WEIGHTED AVERAGE COST OF CAPITAL

Risk-free Rate

The risk-free rate is the return offered by a security to which there is no risk of default by the borrower, that is, no credit risk. In reality there is no such instrument, however, government securities are generally considered to be the best proxy of risk-free securities since there is little risk of the government defaulting on its obligations.

The CAPM is a forward-looking technique and as such the values chosen for the variables in the CAPM should generally be prospective even if they are estimated using retrospective data. As such, the Office will discontinue the method of using an average of the Treasury yields and instead use the current rate. The Office therefore disagrees with NERA's claim that the risk free rate should be estimated by averaging over a long period in favour of using the current rate as dictated by academic literature.

There are opposing views regarding whether the risk-free rate should be approximated using a short-term security or a long term-security. A short-term security would seemingly be the better option for estimating the risk free rate as a longer time period would increase the probability of default by the debtor. Also, over a short time period, less reinvestment is needed to equate actual return with expected return and so there is lower reinvestment risk. However, short-term interest rates tend to be more volatile than long-term interest rates. There is a great degree of consensus that a long-term security should be used where the analysis is long-term and a short-term security where the analysis is short-term.

With the exemption of buildings, the average lifetime of fixed assets across the various asset classes is 8 years for both fixed line and mobile networks. When the data on buildings is included, the average asset lifetime is 11 years for both types of networks. A similar analysis of debt liabilities using data from the Annual Reports of telecommunications operators shows that there was only one operator with debt maturity greater than 10 years. The Office is therefore of the opinion that a 10 year security is the appropriate maturity for use in estimating the risk-free rate for both fixed and mobile networks. This view is supported by recent regulatory decisions.

In this regard, the nominal market yield on 10-year U.S. Treasury securities with constant maturity as at July 2010 is 3.01%¹ and will be used as the risk-free rate for both fixed and mobile networks as it represents the most current monthly yield at the time of writing.

¹ http://www.federalreserve.gov/releases/h15/data/Monthly/H15_TCMNOM_Y10.txt

Determination 4

The appropriate maturity for the security to be used to measure the risk free rate is 10 years.

Determination 5

The U.S. dollar risk free rate applicable to both fixed line and mobile networks is 3.01%

Gearing

Gearing is essentially a measure of the company's debt relative to its value. Where value is estimated as debt (D) plus total equity (E). The gearing ratio can be calculated using book value, market value, or an optimal/target gearing ratio.

$$\text{Gearing} = D / (D + E)$$

The market value approach to gearing is generally considered more appropriate than estimating the capital structure based on book value. A book value measurement of the capital structure is at variance with the prospective nature of the WACC. Taking into account the responses received from NERA and Digicel, the market value gearing figures reported for emerging markets, and the gearing used by other regulators, the Office will use a gearing range of 10% - 30% for fixed line operators and a range of 10% - 20% for mobile carriers.

Determination 6

Market value gearing is the appropriate type of gearing for use in the estimation of the weighted average cost of capital.

Determination 7

The estimated gearing for fixed line networks is 10% - 30% while, the gearing for mobile networks is 10% - 20%.

Tax Adjustment

The after-tax cost of capital reflects the fact that interest paid to debt holders is tax deductible (that is, corporate taxes are applicable after interest is deducted). Thus, the cost of debt is also calculated as an after-tax cost to ensure that it is comparable

with the cost of equity, which is calculated after-tax. In Jamaica, the corporate tax rate is 33.33%.

Country Risk Premium

The country risk premium is a measure of the specific risk associated with investing in a particular country relative to a mature market. Consequently, the country risk premium represents the return investors require for taking on the additional risk associated with a specific country relative to its more stable political and economic counterparts. The country risk premium will be added to the equity risk premium to take account of indigenous factors in order to obtain the overall premium expected for investing in Jamaican equities relative to the risk free security.

Digicel in its response to the second consultation indicated that it favours a mix of using bond default spreads and market volatility to calculate the country risk premium. However, it did not provide a specific method of how this should be done.

It is the Office's view, like many other regulators, that the country risk premium calculated using the bond default spread provides the best measure of prospective country risk premium. This is as the factors which affect default risk are also likely to be the same factors that impact equity risk. Therefore, the Office will use the measure of the country risk premium provided by the sovereign default spread approach of 4.76%.

Determination 8

The country risk premium will be estimated using the sovereign default spread. Using data for July 2010, this is 4.76%.

Cost of Debt

The actual cost of debt as determined by the market through the yield on corporate bonds is preferred to the implied cost of debt. Given that the WACC is a forward looking technique, what is important is not the current yield on the bonds at the time of issue but instead the yield to maturity on the bonds.

The Office continues to favour the use of cost of debt based on actual borrowing costs to that of an implied cost of debt. However, given the lack of data to facilitate the estimation of a yield to maturity on corporate bonds, the implied approach will be used.

$$\text{Imputed Cost of Debt} = r_f + D_s + D_p$$

Using the formula, the imputed cost of debt is between 8.52% - 10.27%.

Determination 9

The applicable cost of debt for fixed line and mobile operators ranges between 8.52% - 10.27%.

Comparable Companies

The use of a thin stock market like Jamaica's would only serve to exacerbate the deficiencies of the CAPM especially with regard to the normality assumption. Therefore, the methodology that will be used by the Office in estimating the cost of equity is to do the estimation for a set of globally diversified telecommunications companies.

The sample of comparable companies for which the cost of capital is estimated is composed of international telecommunications companies from a broad cross section of countries in both emerging and developed economies. Given that the intention is to calculate separate cost of equity estimates for both fixed and mobile services, an attempt was made to use only 'pure-play' operators in the set of globally diversified comparable companies, or at the very least companies that earn the majority of their revenue from one sector. That is, the most appropriate companies were deemed to be those that offer only fixed line service or mobile services.

Market Risk Premium

The market risk premium or equity risk premium (ERP) is the return in excess of the risk free rate than an investor requires for investing in risky assets, in this case equities. The premium should be positive reflecting the greater riskiness associated with the investment relative to a risk free security.

The long run historical equity risk premium ranges between 4.11% - 6.03% depending on the averaging technique used, the implied equity risk premium in the stock market is 4.34%, and the average survey premium in March 2008 was 3.80%. The Office has decided to use the range given by the historical calculations.

Determination 10

The applicable market risk premium for fixed line and mobile operators is 4.11% - 6.03%.

Additional Risk Premiums

Small Cap Premium

While, the inclusion of a small cap premium can be justified under other risk models, it cannot be justified under the CAPM. The Office remains committed to the use of the CAPM as it remains the most trusted model of risk and return. The Office considers the inclusion of any small cap premium to be double counting as this premium would have already been included in the country risk premium.

Illiquidity Discount

An illiquidity discount refers to the practice of adjusting the value of an asset to take account of how easily it can be traded. Under this theory, the price of a highly liquid asset should be higher than the price of a similar asset that is more illiquid.

In the risk and return models that have developed from conventional portfolio theory, in particular the CAPM, there is no allowance for company specific risks such as an illiquidity of a particular stock. Only market risk is compensated for as it cannot be avoided.

Even if the argument could be made that companies in the Jamaican market face higher transaction costs and as such illiquidity is a legitimate market risk, the inclusion of a specific premium for illiquidity would still be inappropriate as it would be double counting risk which is already accounted for in the country risk premium.

Private Company Equity Risk

Digicel has argued for adjustment of the betas used in the CAPM to account for private company equity risk as Digicel contends that these companies face additional risk. While the Office acknowledges that private firms may be more risky than public firms due to being more illiquid, this represents a firm specific risk and not a market risk. Market risk by definition is risk that is common to all companies in a market.

The Office further believes that in the case of regulation, the inclusion of additional factors for private company equity risk or use of 'total risk betas' is unjustified. Giving a company a higher cost of capital on the basis that it is a private company, amounts to punishing other companies in the industry for being public. This would be illogical and has no place in a regulatory environment where fairness and equity are paramount to a competitive environment.

Real Options

Real options theory attempts to compensate investors for unsystematic risk thus violating the underlying assumption of the CAPM which is that investors should only be compensated for systematic risk as all other risks can be nullified by having a diversified portfolio. Given the Jamaican context, the Office is of the view that there

is no need for the inclusion of real options in the estimation of the cost of capital for telecommunications Carriers in Jamaica.

Determination 11

The Office finds that there is no basis for the inclusion of additional factors for small size, illiquidity, private equity, or real options.

BETA

The beta coefficient measures the systematic risk of investing in a company's equity. The CAPM is built upon the insight that investors will be rewarded for bearing only those risks, called systematic risks that cannot be diversified. Specifically, beta measures the risk that a stock adds to a diversified market portfolio.

The CAPM is a prospective measure and as such, the appropriate beta for the model is not the beta that best reflects the past riskiness of the company but rather the beta that best symbolises the future risk of the company relative to the market portfolio.

There are a number of factors that can impact the outcome of the beta obtained from the typical OLS regression. These include the choice of the index, the frequency of the returns, and the length of the data series. The Office will make use of one such method, the Blume-adjusted estimate, similar to that used by Bloomberg, Value Line, and Merrill Lynch.

The Office estimated beta using five years of monthly return, and three years of weekly returns regressed against the returns from the S&P 500 Index. The Blume-adjustment was then applied to the estimated beta. Finally, to take account of differences in the financial leverage of the comparable companies, the adjusted betas were unlevered and re-levered using the optimal market gearing.

The average beta for the set of comparable companies will be used as the lower range for the estimated beta of local operators. In recognition that local companies may have betas higher than operators in more mature markets, the upper 95% confidence interval of the betas from the set of comparable companies will be used as the upper limit of the range for the beta of local operators. The results as shown in Tables 20 and 21, indicate that the equity (re-levered) beta for fixed line networks ranges between 0.63 – 0.91 whereas for mobile networks it is between 0.80 – 1.14

Determination 12

The asset beta for fixed line and mobile networks is 0.58 – 0.70 and 0.63 – 0.91, respectively. Whereas the equity beta for fixed line and mobile networks ranges between 0.63 – 0.91 and 0.80 – 1.14, respectively.

Cost of Equity

The cost of equity is the rate of return required for investing in stocks. As noted earlier, the cost of equity will be measured using the CAPM. Based on a risk free rate of 3.01%, an equity beta between 0.63 – 0.91 for fixed line networks and 0.80 – 1.14 for mobile networks, an equity risk premium of between 4.11% - 6.03%, and a country risk premium of 4.76%, the estimated cost of equity capital is 8.60% - 12.83% for fixed line networks and 10.11% - 15.31% for Mobile networks in U.S. dollar terms.

Divisional Cost of Capital

The Office remains of the view that different sections of a telecommunications company will have different risk profiles and as such the use of a single cost of capital across all regulated activities may not be appropriate. The Office agrees with NERA that estimating the beta for pure play companies that operate in the different business areas for which the divisional cost of capital is needed would be the most appropriate method of arriving at divisional WACC estimates. However, finding publicly listed pure play companies in these different business areas is extremely difficult. While the benefits of a divisional estimate are clear, the uncertainty behind the approach is likely to overshadow these benefits.

Real versus Nominal WACC

It is standard industry practice that where prices are based on historical costs, the nominal WACC is appropriate. When prices are based on current costs, the real WACC should be applied to avoid double counting inflation. As things currently stand, LIME's accounting procedure for its fixed line network is based on current cost accounting. It therefore follows that the applicable cost of capital for the LIME's regulated fixed network tariffs has to be discounted for the effect of this asset revaluation. This avoids any double counting the inflation effect.

Determination 13

The applicable cost of capital for the dominant fixed network has to be discounted for the effect of asset revaluation in order to avoid double counting of inflation.

Determination 14

The applicable cost of capital for dominant mobile network in the interim is the nominal WACC. However, when mobile networks assets are based on current costs, the applicable cost of capital will be discounted to account for asset revaluation.

Determination 15

Expected Jamaican inflation for the financial year 2010/2011 is 6.00% - 8.00%. The expected inflation for the U.S. economy for the equivalent period is 1.80%.

PARAMETERS AND FINAL WACC ESTIMATE

The nominal U.S. dollar WACC for fixed line networks is 8.59% - 12.06%, with an ATWACC of 8.31% - 11.03%. This then converts to a nominal Jamaican dollar WACC of 13.07% - 18.89% and a nominal Jamaica dollar ATWACC of 12.64% - 17.19%. Given that LIME's assets are revalued to reflect the value of MEA, the Office remains of the view that the WACC has to be adjusted to prevent double counting the inflation for which LIME is already compensated. As such, the nominal Jamaican dollar WACC for LIME's regulated fixed network is between 11.28% - 16.30%, with the ATWACC being between 10.85% - 14.61%.

The nominal U.S. dollar WACC for mobile networks is 9.95% - 14.30%, with an ATWACC of 9.66% - 13.62% as shown by Table 26. This then converts to a nominal Jamaican dollar WACC of 14.48% - 21.26% and a nominal Jamaica dollar ATWACC of 14.05% - 20.13%.

Determination 16

Given that LIME's fixed network assets are valued at current cost, the WACC has to be adjusted to prevent the double counting of inflation for which LIME is already compensated.

Point Estimate

Although the WACC is estimated within range, for practical applicability a point estimate has to be determined. Standard practice is to take the mid-point of the high and low estimate as the point estimate. However, the Office in weighing the risk of underestimation against the risk of overestimation finds that it would be best to take a cautious approach and as such, at this stage, prefers a final estimate in the higher end of the range.

Determination 17

The point estimates for the nominal Jamaican dollar WACC for LIME's fixed network is 14.92%.

Determination 18

The point estimate for applicable to mobile networks is a Jamaican dollar WACC of 19.43%.

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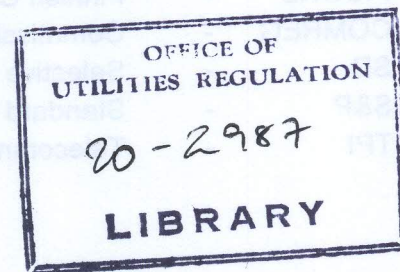
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Abbreviations

APT	-	Arbitrage Pricing Theory
ATWACC	-	After Tax Weighted Average Cost of Capital
BCG	-	Boston Consulting Group
CAPM	-	Capital Asset Pricing Model
ERP	-	Equity Risk Premium
GOJ	-	Government of Jamaica
IMF	-	International Monetary Fund
JDX	-	Jamaica Debt Exchange
LIBOR	-	London Interbank Offer Rate
MEA	-	Modern Equivalent Asset
OLS	-	Ordinary Least Squares
OUR	-	Office of Utilities Regulation
SMP	-	Significant Market Power
WACC	-	Weighted Average Cost of Capital
WATBY	-	Weighted Average Treasury Bill Rate
RIO	-	Reference Interconnection Offer
LRIC	-	Long Run Incremental Cost
URCA	-	Utilities Regulation and Competition Authority
ICTA	-	Information and Communications Technology Authority
ECTEL	-	Eastern Caribbean Telecommunications Authority
JSE	-	Jamaica Select Index
DCF	-	Discounted Cash Flow
DDM	-	Dividend Discount Model
IRG	-	Independent Regulatory Group
LPM-CAPM	-	Lower Partial Moment -
ARM	-	Asymmetric Response Model
TATT	-	Telecommunications Authority of Trinidad and Tobago
CFO	-	Chief Financial Officer
TRA	-	Telecommunications Regulatory Authority of the Kingdom of Bahrain
MCA	-	Malta Communications Authority
FICORE	-	Finnish Communications Regulatory Authority
COMREG	-	Commission for Communications Regulation
SD	-	Selective Default
S&P	-	Standard and Poors
TPI	-	Telecommunications Plant index

INTRODUCTION

- 1.0 The process of estimating the cost of capital commenced on May 9, 2008 when the OUR issued its first Consultation Document titled *Estimate of the Weighted Average Cost of Capital for Cable and Wireless Jamaica*. The cost of capital will be used by the Office as an input into any future Price Cap that may be imposed on LIME's fixed line services. It will also be used in calculating LIME's interconnection rates in its new reference interconnection offer (RIO 6). The OUR in recognition of the fact that a weighted average cost of capital (WACC) would also be needed as an input into the long-run incremental cost (LRIC) model which it plans to develop, decided to widen the scope of the WACC consultation and estimate a cost of capital for telecommunications carriers in general. In this regard, the OUR issued its second consultation document titled *Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers in Jamaica*.
- 1.1 Where available and appropriate, the WACC estimated for the industry used data from the Annual Reports submitted to the OUR by licensees in the Industry. In this regard, the Office used maximum figures across all carriers and as such, the WACC serves as a maximum cost of capital for any firm in the industry. Therefore, it would be unnecessary to then calculate the WACC for any individual company in the industry as the estimated WACC for that company would either be less than or equal to the WACC calculated for the industry. That is, that company's data would have already been taken into account in arriving at the estimated WACC.

Responses to Consultation

- 1.2 Responses to the second Consultative Document were received from:
- ii. Digicel Jamaica,
 - iii. LIME (NERA on behalf of LIME).

Purpose of Document

- 1.3 This Determination Notice summarises the Office's views on the estimate of the WACC for telecommunications networks and deals with any issues raised by respondents to the Consultation Document and gives the Office's considered judgement on these issues.

This document presents the study of the cost of capital for telecommunications Carriers in Jamaica. The estimated cost of capital will be used by the Office as an input into the next Price-Cap for LIME, the determination of interconnection charges between carriers, and any other tariffs that may need to be established by the Office.

Legislative Framework

1.4 Section 29 of the Telecommunications Act 2000 (the "Act") deals with the obligation of carriers to grant interconnection and states that:

"29. - (1) Each carrier shall, upon request in accordance with this Part, permit interconnection of its public voice network with the public voice network of any other carrier for the provision of voice services. ...

(4) The Office may, either on its own initiative in assessing an interconnection agreement, or in resolving a dispute between operators, make a determination of the terms and conditions of call termination, including charges.

(5) When making a determination of an operator's call termination charges, the Office shall have regard to the principle of cost orientation, so, however, that if the operator is non-dominant then the Office may also consider reciprocity and other approaches."

1.5 In accordance with Section 29 (4) and (5), the WACC will be used by the Office when making a determination on call termination charges with a view of maintaining the principle of cost orientation where appropriate.

GENERAL COMMENTS

Industry WACC versus Firm Specific WACC

- 2.0 Digicel stated in its response to the second Consultation Document that it is concerned with the OUR's intention to use one WACC for the industry for all regulatory purposes. In its opinion, the WACC varies greatly among different sectors of the industry and among different firms. Furthermore, Digicel states that it is also surprised that the OUR will not calculate a WACC for any of the companies in the telecommunications industry and will rather base its calculations on data from abroad which it feels is inappropriate. Digicel therefore requested that another consultation be undertaken for estimating a cost of capital for fixed networks and a separate consultation to estimate the WACC for mobile networks.
- 2.1 The Office agrees with Digicel that different sectors and different companies may have a different WACC. It is against this background that the Office in its previous cost of capital consultations attempted to calculate a separate WACC for different divisions in which the company operates. The Office also agrees with Digicel that a separate WACC should be estimated for fixed and mobile networks given the differences in risks that exist between the two types of networks. However, the Office disagrees that there is any need for further consultations as the two previous consultations have afforded interested parties extensive opportunities to comment on how the parameters for the WACC should be estimated. The process of estimating a cost of capital for mobile networks is no different from that used to estimate the WACC for the fixed network. Both Digicel and NERA in their response have commented on issues which they consider would vary between fixed and mobile networks such as gearing and beta. Taking these comments on board, the Office will calculate separate WACC for fixed line networks and mobile networks.
- 2.2 Given the small size of the local equities market and the fact that only one local telecommunications company is publicly listed, estimating a WACC for local companies without using data from abroad would be extremely difficult especially in the case of private companies where there is only one local publicly listed comparator. More importantly, the results from a cost of capital estimate using the local stock market would produce results which are highly questionable. Therefore, the OUR used data from local companies where it was available and appropriate for use in the estimate and supplemented this with data from international comparable companies. The approach of estimating a single WACC for all companies in a particular sector also conforms to industry norm and places no company at a disadvantage. This is due to the fact that where company specific data is used such as the premium on debt, the OUR used the maximum premium across all the applicable companies. In cases of international benchmark data such as beta, the figure would be the same even if the estimate was being done for each company.

Therefore, the upper level of the cost of capital represents a maximum return for all companies in the particular sector of the industry, at worst the cost of capital for a specific firm would be equal to this estimate. This approach is internationally recognised and similar to the approach that has been used by other regulators such as the Utilities Regulation and Competition Authority (URCA)² in the Bahamas, Eastern Caribbean Telecommunications Authority (ECTEL)³, and the Information and Communications Technology Authority (ICTA)⁴ of Cayman, two of these represent areas where Digicel has participated in similar consultations.

- 2.3 Unlike the cost of debt which can generally be determined with a fair deal of accuracy by examining the actual rate being paid by companies on long term loans, the cost of equity is more difficult to determine and has to be estimated using complex financial models. This invariably increases the risk of estimation error. Unlike debt, equity has no face value, dividend payments are not guaranteed and are instead subject to the level of profitability of the company and managerial decisions regarding how such profits should be used. This problem is further exacerbated in Jamaica given the small size of the stock market and the relatively low trading volumes. Estimating a cost of equity for the companies in the local telecommunications industry is made even more difficult due to the fact that only one licensee, LIME, is listed on the Jamaica Stock Exchange (JSE). Therefore, even simple equity related market data for most local telecommunications companies such as share price and market capitalisation which may be needed for estimating the cost of equity capital is unobtainable from the JSE.

Determination 1

The Office will estimate separate weighted average cost of capital for fixed line and mobile networks.

Cost of Equity Models

- 2.4 Digicel has also questioned the appropriateness of the application of the capital asset pricing model (CAPM) in emerging markets saying

²Utilities Regulation and Competition Authority, 2009, *Final Determination On: The Cost of Capital for Designated SMP Operators*.

³Eastern Caribbean Telecommunications Authority, (2008), 'Draft Manual for the LRIC Models of the Fixed and Mobile Telecommunications Networks for the ECTEL Member States' [http://www.ectel.int/pdf/consultations/LRIC/Manual%20to%20LRIC%20Models June%202008.PDF](http://www.ectel.int/pdf/consultations/LRIC/Manual%20to%20LRIC%20Models%20June%202008.PDF)

⁴Information and Communications Technology Authority, 2008, *Decision for the Costing Manual Consultation (CD 2005-1)*.

“The capital asset pricing model (CAPM) is considered by most experts to be the least flawed approach when being applied to companies in developed economies. Even there, however, the empirical evidence is not supportive. As Wright, Mason, and Miles say in their report to the UK Office of Fair Trading, “The ever-growing anomaly literature presents a considerable challenge to the CAPM.”

However, when the cost of capital in emerging markets is to be estimated the preference for CAPM over other approaches pretty much disappears. Some of the most respected experts advocate that other methods are preferred for in emerging markets...”

2.5 Although Digicel has not proposed an alternative model which it considers appropriate in emerging markets, the Office will examine the validity of Digicel’s claim that the CAPM is inappropriate in these markets. There are a multitude of financial models which have been developed by academics to estimate the cost of equity capital. The most popular of these are:

- Discounted Cash Flow (DCF) models;
- Arbitrage Pricing Theory (APT);
- Fama and French Three Factor Model; and
- Capital Asset Pricing Model (CAPM)

Discounted Cash Flow Model

2.6 The DCF model is built on the principle of net present value where future cash flows from the company are discounted to its present value. DCF *“analysis uses future free cash flow projections and discounts them (most often using the weighted average cost of capital) to arrive at a present value, which is used to evaluate the potential for investment.”*⁵ The model uses historical accounting data to calculate certain financial ratios which are then used to forecast future ratios⁶. A typical DCF model is the Dividend Discount model (DDM) where stock price is equal to the present value of discounted dividend payments. The basic DDM formula is as follows:

$$P = \sum_{t=1}^n \frac{D_t}{(1+k)^t}$$

⁵ <http://www.investopedia.com/terms/d/DCF.asp>

⁶ L. Peter Jennergren, 2008, *A Tutorial on the Discounted Cash Flow Model for the Valuation of Companies*, SSE/EFI Working Paper Series in Business Administration No. 1998:1, <http://swoba.hhs.se/hastba/papers/hastba0001.pdf>

where,

P - is stock price;
 D - is dividend; and
 k - is the cost of equity
 n - is lifetime of asset

- 2.7 The cost of equity is determined from the DCF model by solving for k . Like any other estimation technique, DCF models depend heavily on the assumptions used. However, small changes in these assumptions can lead to substantially different outcomes from the DCF model⁷. The use of any DCF model will require one or a combination of the following variables, dividend, cash flow, earnings, and stock price. Arriving at future values for these variables will require the estimation of growth rates, which requires assumptions to be made about whether to use a stable growth rate⁸ or varying growth rates. Estimating future values for these variables for companies that are listed on a stock exchange is a difficult task however, arriving at values for these variables for non-listed companies would be even more complex. Therefore, the Office does not consider DCF models useful in this exercise given that only one of the four major telecommunications companies is currently listed on a stock exchange.

Arbitrage Pricing Theory

- 2.8 In the face of doubts over the empirical reliability and testability of the CAPM as a tool for asset pricing, APT was developed as an alternative to the CAPM. Although the APT is much more complex compared to the CAPM both are similar in many respects, chief among these is that they both assume two types of risk – systematic risk and unsystematic risk – where only the systematic risk is accounted for in the pricing of the assets as diversification should negate the effects of unsystematic risks. Both theories presuppose that an asset's expected return is linearly related to its covariance with other random variables⁹. Unlike the CAPM, the APT assumes that there are various common risk factors which will affect the security's return and not just the return on the market portfolio¹⁰. If the price of the asset diverges from the

⁷“DCF works best when there is a high degree of confidence about future cash flows. But things can get tricky when a company's operations lack what analysts call “visibility” - that is, when it's difficult to predict sales and cost trends with much certainty. While forecasting cash flows a few years into the future is hard enough, pushing results into eternity (which is a necessary input) is nearly impossible. The investor's ability to make good forward-looking projections is critical - and that's why DCF is susceptible to error.” <http://www.investopedia.com/university/dcf/dcf5.asp>

⁸ “The Gordon growth model can be used to value a firm that is in 'steady state' with dividends growing at a rate that can be sustained forever.” <http://pages.stern.nyu.edu/~adamodar/pdfiles/valn2ed/ch13.pdf>

⁹Huberman, G., Wang, Z., 2005, *Arbitrage Pricing Theory*. <http://www.newyorkfed.org/research/economists/wang/APT-Huberman-Wang.pdf>

¹⁰ Shapiro, A., Balbirt, S., 2000, *Modern Corporate Finance - A multi Disciplinary Approach to Value Creation*, Chapter 6, pg. 202.

price derived by discounting returns on the asset by the rate given by the APT, then the exploitation of this arbitrage should cause the price to return to its true level. The expected return on the security can be specified as

$$E(r_i) = r_f + \beta_{ij} \lambda_j$$

where,

r_f - is the risk-free interest rate;
 β - is the matrix systematic risk;
 λ - is the matrix of common factors; and
 $j = 1, \dots, n$

- 2.9 Intuitively, the APT is really a modified version of the CAPM as both techniques have a lot of similarities and makes similar assumptions. The appeal of APT is that it allows for the risk/return associated with a stock to be affected differently by various risk factors rather than the situation with CAPM where the risk of a stock is determined by a single factor. However, the main problem with APT is that it does not identify the factors to be used. In this sense, the strength of the APT becomes its weakness, as one cannot say with any great deal of accuracy how many and exactly which factors should be chosen¹¹. According to Wright, Mason, and Miles (2003) “*the standard difficulty with multifactor models is the satisfactory identification of the factors. As in the case of other competitors to the CAPM, multifactor models have been criticised for over fitting and data mining*”¹². It is for this reason that the APT is rarely used by regulators and industry practitioners. Ofcom in its 2003 Wholesale Voice Call Termination Consultation¹³ also expressed the view that

“One advantage of the APT is that it can be expanded to encompass several risk factors. The CAPM is limited to one common risk factor. The general multi-factor APT can be expressed as

$$E(r_i) = r_f + \beta_{i1}\lambda_1 + \beta_{i2}\lambda_2 + \dots + \beta_{in}\lambda_n \quad [6 - 13]$$

Where β_{ij} is security i 's systematic risk associated with the j^{th} risk factor ($j = 1, \dots, n$); j is the market price of risk for the j^{th} risk factor; and n is the number of common factors. Empirical research based on Equation [6-13] seems to indicate that there are no more than three to five common risk factors affecting stock returns. The four factors identified by Chen, Roll, and Ross include unexpected changes in industrial output, in inflation, in the difference between the yield between a long term and short term Treasury bond, and in bond risk premiums.”

¹¹Turner, T., 2010, *The CAPM and APT; does one outperform the other.* www.paribus.tr.googlepages.com/t_turna.doc

“The APT demands that investors perceive the risk sources and that they can reasonably estimate factor sensitivities. In fact even professionals and academics cannot agree on the identity of the risk factors, and the more betas you have to estimate the more noise you have to live with. ...As we know that the APT really makes no predictions about what the factors are. Given the freedom to select factors without restriction, it can be argued that you can literally make the performance of a portfolio anything you want it to be.”

¹²Wright, S., Mason, R., Miles, D., 2003, *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*

¹³Ofcom, February 2003, *Wholesale Voice Call Termination Consultation* http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/mct_consultation/annexe.pdf

the CAPM was superior to its alternatives and that it remains the most appropriate model for WACC estimation¹⁴.

Ofcom states that:

“The Director’s view

E.12 The use of the CAPM is widespread among practitioners. For example:

- during the 2002 Competition Commission inquiry, 3 out of the 4 MNOs [mobile network operators] used the CAPM;*
- in its 2002 inquiry, the Competition Commission [CC] decided to use the CAPM, despite having been presented with the results of the same APT-based study that T Mobile has used to estimate the cost of capital in its response to the May consultation. The CC’s view was based on, principally:*
 - the fact that “four of the five main parties”, and additionally the group of fixed operators that submitted evidence to the CC, advocated the use of the CAPM;*
 - the Director’s assertion during the inquiry that there was no consensus among practitioners regarding the use of alternative models, and that it was planning to carry out some further research in this area (the outputs of this research are described below); and - a literature review that the CC carried out itself, which found no consensus that a multi-factor approach was superior to the CAPM (this was confirmed by the CC’s academic advisors);*
- all the UK’s economic regulators currently use the CAPM; and*
- none of the MNOs other than T Mobile have advocated the use of an alternative model to the CAPM, despite having had access to details of the study conducted on behalf of T Mobile during the CC inquiry.*

E.13 The Director is of the view that the CAPM remains the most appropriate model for WACC estimation. This view is supported by the output of an independent study carried out on behalf of Oftel and the UK’s other economic regulators.”

¹⁴ Ofcom has maintained this position in all its subsequent calculation of the cost of capital.

Turner states that:

"...in practise, APT does not work better than CAPM. That happens because of estimation error. APT does not tell us how many factors we should use and it does not tell us what the factors are. The CAPM is more simple-minded model but we can estimate β_i and R_M a lot more precisely, so the required return is reasonably accurate. The APT may be more advanced conceptually, but this is cancelled out by the greater estimation error. In practise, the required return we come up with is not more accurate than the CAPM. The CAPM is simpler to understand, easier to use. The APT is more difficult to understand much harder to use. APT is rarely used for computing required return, but it has useful applications in investment management."

Fama and French Three factor Model

2.10 As indicated by the Independent Regulators Group (IRG) (2007), the Fama and French "three-factor model can be thought of either as a special case of APT or as an enhancement of CAPM. The model has three factors: market factor, company size factor, and book/market value factor. While this model has been, to some extent, supported by the results of certain empirical studies, there has been a considerable debate on whether the risk premium associated with the two additional factors (company size and book/market value) are statistically significant."¹⁵ Further the underlying economic basis for why these factors would explain returns is difficult to justify¹⁶. Wright et al. (2003) have posited that the evidence in support of a positive risk premia on the additional two factors is weak on the following basis:

- *"FF [Fama and French] themselves acknowledge that the theoretical basis for their factors is, at best, patchy. While they can, to a limited extent, be rationalized ex post, there is no clear theory that posits a positive premium on the factor portfolios. Indeed, if anything, there is one simple theory that posits a premium of precisely zero: namely, that, in a CAPM world, positive excess returns on the factor portfolios should represent an unexploited arbitrage opportunity.*
- *Even within their own sample, the empirical evidence of significantly positive premia is not very strong. ... on the basis of standard t-tests (as reported in FF (1996)), the sample mean of the excess return SMB is of only marginal significance; the statistical significance of the mean excess return on HML is called into question by the possibility of data mining.*

¹⁵IRG, 2007, *Regulatory Accounting. Principles of Implementation and Best Practice for WACC calculation*

¹⁶http://www.ofcom.org.uk/consult/condocs/cost_capital/cost_capital.pdf

- We have extended the two original series in FF (1996) out of sample, using reasonable proxies. ...these proxies have means that are insignificantly different from zero. In the full sample, this implies that the t-statistics for the null hypothesis of a zero mean are distinctly more marginal, even at classical significance levels.
 - In contrast, for comparison, ...adding an additional 8 years of data somewhat increases the precision of the estimate of the equity risk premium, as it should do if the underlying true mean value is constant.”
- 2.11 The issues discussed in this section indicate why the Fama and French model is not widely used by regulators or industry practitioners. Furthermore, the inclusion of factors for company size and book/market value would seem to be contrary to the general principle of the CAPM and APT, the foundations on which the Fama and French model is built, which is to only compensate investors for systematic risk. *“Although plausible conceptually, multi-factor models have failed to established themselves, and have not gained any significant popularity for practical cost of capital estimation compared to the CAPM”¹⁷.*

Capital Asset Pricing Model

2.12 The CAPM is a theory of the relationship between a security’s risk or a portfolio of securities and the expected rate of return associated with that risk. The theory is based on the assumption that security markets are efficient and investors’ general willingness to trade risk for a higher expected return. The CAPM is designed to give the risk premium that is, the premium over the rate on risk-free rates. To apply the CAPM for a given company, it is necessary to estimate both that company’s beta and the market risk premium. This is

“a model that describes the relationship between risk and expected return and is used in the pricing of risky securities.

$$\bar{r}_a = r_f + \beta_a(\bar{r}_m - r_f)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

\bar{r}_m = Expected market return

The general idea behind the standard form of the CAPM is that investors need to be compensated in two ways: time value of

¹⁷ Frontier Economics, 2005, *Cost of Capital for Mobile Telecommunications Networks in Finland: A working paper prepared for FICORA.*

money and risk. The time value of money is represented by the risk-free (r_f) rate in the formula and compensates the investors for placing money in any investment over a period of time. The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market risk premium ($r_m - r_f$).¹⁸

- 2.13 Based on the limitations of the Jamaican capital market, in order to measure the risk faced by a firm in Jamaica's telecommunications industry, this estimation must be conducted in a global setting with adjustments for the risks specific to Jamaica. Digicel indicated in its response that given the shortcomings of the CAPM, it should not be applied in emerging markets. Digicel seems to be incorrectly assuming that the OUR estimated the cost of equity through the CAPM using data from the local equities market. The Office agrees with Digicel that the problems associated with the CAPM would be exacerbated by the small size of the local equities market. It is for this reason that the OUR has never relied on data from the local stock exchange in conducting its estimation of the cost of capital and has no intention of doing so. The Office instead estimates the cost of equity capital for a diversified set of global firms using the CAPM and then adds the applicable premiums to arrive at a cost of capital for local telecommunications companies.
- 2.14 The biggest problem with the CAPM is that the empirical record of the model is poor. As Fama and French (2004)¹⁹ point out, this may be due to the theoretical failings of the model but it may also be caused by the difficulties in implementing valid tests of the model. Hwang and Pedersen (2002)²⁰ examined the performance of the CAPM relative to two of its asymmetric alternatives – the Lower Partial Moment CAPM (LPM-CAPM), and an Asymmetric Response Model (ARM) – to determine which model best explains the returns in emerging equity markets. Hwang and Pedersen found that “for higher frequency returns which are highly non-normal, the ARM or LPM-CAPM is often chosen instead of the conventional CAPM. ... The daily returns, all of which are non-normal, are explained by CAPM only in 55% of cases. On the other hand, the weekly and monthly returns are explained with CAPM in around 80% of cases”. The results of the study varied depending on the particular emerging market examined but in general the CAPM performed well in explaining equity returns in emerging markets.
- 2.15 The shortcomings of the CAPM are well known and have been thoroughly documented in academic literature. However, despite the weaknesses of the CAPM, the Office is of the view that based on the discussion in this section, it

¹⁸ See <http://www.investopedia.com/terms/c/capm.asp>.

¹⁹ Fama, E., and French, K., 2004, *The Capital Asset Pricing Model: Theory and Evidence*

²⁰ Hwang, S., Pedersen, C., 2002, *Best Practice Risk Measurement in Emerging Markets: Empirical Test of Asymmetric Alternatives to CAPM*.

sees no evidence to suggest that any of the alternatives to the CAPM are its superior. Each method of estimating the risk of equity investment has its own inherent deficiencies and the Office is unconvinced that any of these methods is superior to the CAPM. This view is unaffected by whether the analysis is for an emerging or developed market as the strong theoretical underpinnings and practical applicability of the CAPM continue to set it apart from the alternatives. This explains why the CAPM remains the preferred choice of regulators and many academics around the world. Ofcom in its January 2005 Consultation Document titled *'Ofcom's Approach to Risk in the Assessment of the Cost of Capital'* states that *"the empirical shortcomings of the CAPM are known. Alternative models to address this issue have their own shortcomings - weak theoretical foundations and empirical challenges. In our view, there is at present no one clear successor to the CAPM for practical cost of capital estimation"*. Similarly, Damodaran²¹ states that *"in spite of all the criticism of the CAPM, I am not convinced that alternative models do much better in predicting expected returns, though there is evidence that they do better at explaining past returns"*. Similar views were expressed by the URCA in its *'Final Determination on: The Cost of Capital for Designated SMP Operators'*. The Telecommunications Authority of Trinidad and Tobago (TATT) has not yet consulted on its cost of capital however, the TATT has signalled its intention to use the CAPM in computing the cost of equity capital. TATT's rationale for its preference of the CAPM is its strong theoretical foundations, its simplicity, and its transparency²². The CAPM was also adopted by the ECTEL (2008). In fact, Ovum (2006²³ and 2007²⁴) the consultant for Digicel responding to the ICTA's LRIC model and ECTEL's LRIC models states that *"Ovum supports the use of the Capital Asset Pricing Model for the estimation of the weighted average cost of capital ..."*

- 2.16 The wide use of the CAPM provides clear indication that for regulators in both developed and developing countries the CAPM remains the most appropriate method for estimating the cost of equity capital. Figure 1 shows the result of an international survey of Chief Financial Officers (CFOs) of private companies as to which method they use to estimate the cost of equity. The results clearly show that the CAPM is the method most used for estimating the cost of equity by the CFOs.

Determination 2

The cost of equity capital will be estimated using the capital asset pricing model.

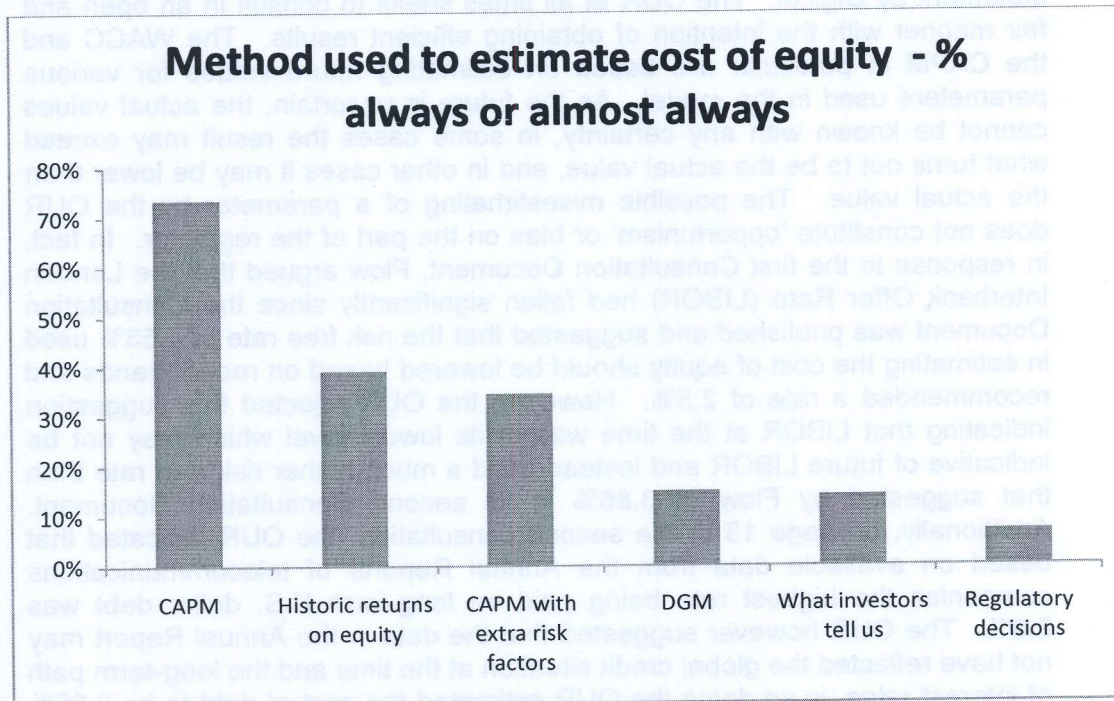
²¹ http://pages.stern.nyu.edu/~adamodar/New_Home_Page/val1.htm

²² Telecommunications Authority of Trinidad and Tobago, Consultation Document, (2009), 'Top Down Long Run Average Incremental Cost (LRAIC) Model Specification Paper.

²³ OVUM, 2006, *A Response to Cable and Wireless (Cayman Islands) LRIC Models*, A Report on Behalf of Digicel.

²⁴ OVUM, 2007, *Review of ECTEL LRIC Models of Fixed and Mobile Networks in 5 Eastern Caribbean States*, A Report to Digicel.

Figure 1 Methods Used to Estimate Cost of Equity



Source: Frontier Economics, 2005, *Cost of Capital for Mobile Telecommunications Networks in Finland: A working paper prepared for FICORA*

2.17 In light of all the above, the Office therefore disagrees with Digicel that the CAPM is inappropriate for use in emerging markets. Despite the shortcomings of the CAPM it remains the most trusted, reliable, and used method of estimating the cost of capital in both developed and emerging markets. Like the majority of its international counterparts, the Office will continue to rely on the CAPM rather than on any of the alternatives in estimating the cost of equity for telecommunications networks.

Regulatory Opportunism

2.18 Digicel states that it is concerned that a factor that “*may have been present in this consultation is a level of regulatory opportunism. In particular we have the impression that the OUR is interested in getting as lower a WACC as it can with insufficient concern for whether that WACC is compensatory for whichever firm it is to be applied to. Some of the OUR methods are unconventional and some are invalid... Doing whatever works to get regulated prices lower in the short term may have political appeal, however, in the long-run it is most certainly to the detriment of consumers as well as investors. Investors are most reluctant to invest where they perceive the risk of regulatory opportunism and thus the unambiguous long term outcome of such is that consumers suffer*”.

2.19 The Office is perturbed by the defamatory and unsubstantiated nature of this statement by Digicel. The OUR at all times seeks to consult in an open and fair manner with the intention of obtaining efficient results. The WACC and the CAPM in particular are based on estimating future values for various parameters used in the model. As the future is uncertain, the actual values cannot be known with any certainty, in some cases the result may exceed what turns out to be the actual value, and in other cases it may be lower than the actual value. The possible misestimating of a parameter by the OUR does not constitute 'opportunism' or bias on the part of the regulator. In fact, in response to the first Consultation Document, Flow argued that the London Interbank Offer Rate (LIBOR) had fallen significantly since the Consultation Document was published and suggested that the risk free rate of 4.53% used in estimating the cost of equity should be lowered based on recent trends and recommended a rate of 2.5%. However, the OUR rejected this suggestion indicating that LIBOR at the time was at its lowest level which may not be indicative of future LIBOR and instead used a much higher risk free rate than that suggested by Flow of 3.86% in its second Consultation Document. Additionally, on page 13 of the second consultation, the OUR indicated that based on available data from the Annual Reports of telecommunications companies the highest rate being paid on long-term U.S. dollar debt was 8.0%. The OUR however suggested that the data in the Annual Report may not have reflected the global credit situation at the time and the long-term path of interest rates, in so doing the OUR estimated the cost of debt to be 8.86% to take account of these factors. Therefore, the OUR has shown in many instances throughout the consultation process that what it sought to calculate was not the lowest cost of capital but the best estimate of the true cost of capital. As such, the Office strongly rejects the accusation of regulatory 'opportunism'.

Single or Range Estimates

2.20 It is Digicel's view that even in "*developed economies one cannot have confidence in a single CAPM estimate that is mechanically generated and may be applied to several companies – even if this was done using "correct" CAPM methods*".

2.21 As stated earlier the Office disagrees with the view of Digicel regarding the use of the CAPM. The idea behind using a range is that the true value of the parameter would likely be captured within the range. While the Office is uncertain that use of a range would increase the accuracy of the estimated cost of capital, it accepts that this is a practice that has been used by many regulators. In most cases where this is done, the final estimate is a point estimate achieved by taking the midpoint of the high and low for the parameters. The concern of the Office is that the estimate of the high and low values would still be determined using the same techniques as in the case where a single cost of capital is being estimated. Therefore, there is no guarantee that the range of estimates will be any more reliable than the single

estimate. However, where there is a great deal of uncertainty about the value of a parameter, the OUR will employ range estimation.

Determination 3

The weighted average cost of capital estimated within a range with a point estimated determined based on the range for use in regulatory decisions.

Industry Specific Risks

- 2.22 Digicel in its response to the second Consultation Document identified a list of industry specific risks and claimed that in order for firms to avoid these risks, they must be fully diversified across industries. The company also claims that most companies specialise in the industry in which they operate and do not diversify in this way. Digicel further asserts that investors in public companies may be able to avoid these risks through diversification although substantial residual risk may remain in small economies due to market segmentation.
- 2.23 It is the Office's view that the options available to investors in private companies are no different from that which is available to investors in public companies. The underlying theory remains the same, that is, non-systematic risk can be avoided by holding a well diversified portfolio.
- 2.24 The CAPM says that only systematic risks, as measured by beta, are associated with a risk premium. Non-systematic risks are not associated with premiums because they can be eliminated by diversification.²⁵ In this regard, Shapiro and Baldirer (2000) state the following:

"Unsystematic risk is largely irrelevant to the investor holding a well-diversified portfolio, because the effects of such disturbances can be expected to cancel out, on average, in the portfolio. On the other hand, no matter how well diversified the investment portfolio is, systematic risks, by definition, cannot be eliminated."

*The distinction between systematic and unsystematic risks underlies the pricing of risk in the CAPM, as well as in the more general (in some respects) **arbitrage pricing theory** (APT). According to both the CAPM and the APT, intelligent, risk averse investors seek to diversify their asset holdings to eliminate the unsystematic component of risk. As a result, only the systematic component will be rewarded with a risk premium. Arbitrage among securities will ensure that investors will not*

²⁵ Competition, for example, is a diversifiable risk which does not increase the risk premium according to capital market theory. See CRA's 2001 cost of capital study for C&WJ.

be rewarded for bearing unsystematic risks, because they can avoid these risks at no cost simply by diversifying their portfolios. In other words, the CAPM and APT assume that enough people will follow the adage "don't put all your eggs in one basket" to ensure that investors will be compensated only for bearing market risk. This illustrates one of the most important rules in finance: You don't get paid for doing something that is unnecessary or irrelevant. It is the equivalent of the economist's dictum that there is no free lunch."

Industry Specific Risk

2.22 Digital in its response to the second Consultation Document identified a list of industry specific risks and claimed that in order to avoid these risks, they must be fully diversified across industries. The company also claims that most companies specialise in the industry in which they operate and do not diversify in this way. Digital further asserts that investors in public companies may be able to avoid these risks through diversification through substantial residual risk may remain in small economies due to market segmentation.

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"Unsystematic risk is largely irrelevant to the investor holding a well-diversified portfolio because the effect of such disturbances can be expected to cancel out on average in the portfolio. On the other hand, no matter how well diversified the investment portfolio is, systematic risks by definition, cannot be eliminated.

The distinction between systematic and non-systematic risks underlies the pricing of risk in the CAPM, as well as in the more general (in some respects) arbitrage pricing theory (APT). According to both the CAPM and the APT, intelligent risk averse investors seek to diversify their asset holdings to eliminate the unsystematic component of risk. As a result, only the systematic component will be rewarded with a risk premium. Arbitrage among securities will ensure that investors will not

²² Compensation for example, is a diversifiable risk which does not increase the risk premium according to capital market theory. See CRA's 2007 cost of capital study for CAPM.

WEIGHTED AVERAGE COST OF CAPITAL

Risk-free Rate

- 3.0 The risk-free rate is the return offered by a security to which there is no risk of default by the borrower, that is, no credit risk. In the strictest terms, there should also be no reinvestment risk²⁶. In reality there is no such instrument, however, government securities are generally considered to be the best proxy of risk-free securities since there is little risk of the government defaulting on its obligations. The yield on US treasury securities is generally thought of as the best measure of the risk-free rate.
- 3.1 Digicel argues that *"the OUR has not adequately addressed the issue of estimating the RFR in an emerging market. The OUR has expressly identified a US Risk-free rate on page 30 of the Consultation but has not explained how this then enters into the calculation of the cost of equity or debt for Jamaican companies. The calculations appear to have been done outside the consultation such that readers of the consultation cannot trace how these (and other figures found in the Consultation) were derived. In this regard the consultation lacks the level of transparency that any consultation process should facilitate"*.
- 3.2 The OUR indicated in several areas of the Consultation Documents that it is using the CAPM in estimating the cost of capital. The CAPM formula used is the standard formula as stated on page 12 of the first consultation document and exhibited below. This formula clearly displays how the risk free rate enters into the model.

$$\bar{r}_a = r_f + \beta_a(\bar{r}_m - r_f)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

\bar{r}_m = Expected market return

- 3.3 This is the standard CAPM formula. In the second consultation on page 19 there is an entire section that addresses the risk free rate and issues relating to it that arose from the first consultation. The market risk premium is represented by $(r_m - r_f)$ and the OUR indicated on page 11 that it would use a market risk premium of 5.56% based on an average of the most recent premiums submitted by LIME. The OUR then explains how the risk free rate was used on page 19 when it states that *"Table 6 shows that combining the forward-looking BARRA betas with the risk free rate results in a weighted-average cost of equity for Jamaican telecommunications carriers of 13.60% in*

²⁶ For this reason a zero-coupon bond where available should be used to determine the risk-free rate.

U.S. dollar terms and 21.63% in Jamaican dollar terms". Therefore, the OUR clearly indicated how the risk free rate enters into the calculations. The OUR has not addressed the issue of estimating a risk free rate for emerging markets as this was not needed in the estimation. The OUR has indicated on several occasions in the consultation document that the cost of equity would be calculated for a comparable set of global companies, which was done in U.S. dollar terms with appropriate premiums added to estimate the cost of equity in Jamaican dollar terms. Therefore, the estimation of the risk free rate for emerging markets is irrelevant as the estimation was done in U.S. dollars for which a reliable risk free rate can easily be sourced.

- 3.4 NERA in its critique of the second Consultation Document on behalf of LIME argues that there is an internal inconsistency between the risk-free rate and the market risk premium used by the OUR saying that they should both be based on long term historic data or recent data. NERA's view is that it is inappropriate to use a long term historical market risk premium and a current estimate of the risk free rate. NERA further claims that the internal inconsistency is likely to lead to a downwardly biased estimate of the cost of equity.
- 3.5 The OUR's risk-free rate in the second Consultation Document was based on an average of the monthly yield on 10-year U.S. Treasury bonds for the two most recent years while, the market risk premium used was an average of the premiums submitted by LIME in its response to the first Consultation Document, which NERA claims was based on historical data over a period from 1990 – 2006 with the exception of one estimate which was a survey done in 2007. This is incorrect; the market risk premiums submitted by LIME used historical data ranging from 1900 - 2006²⁷. Using NERA's reasoning, the applicable risk free rate should be averaged over the same period 1900-2006 to ensure consistency with the market risk premium used. In the confidential report to the OUR, NERA recommends averaging over a period of 10 years to arrive at the risk free rate. However, this would not address the inconsistency to which NERA refers as the equity risk premium is based on an average of 106 years. The Office disagrees with NERA's assessment in this regard. An internal inconsistency between risk free rate and the market risk premium generally refers to using a security of one maturity for the risk free rate in the CAPM and estimating the market risk premium using a different maturity as stated by Shapiro and Balbirer (2000, pg 329). The Office accepts that having not calculated the market risk premium itself and instead using the premiums submitted by LIME it is not aware of which maturity was used in the calculation of said premiums. In this sense, there may indeed be an internal inconsistency but not as described by NERA. The approach of averaging across the series of market risk premiums would likely nullify the impact of any outliers and result in a 'true' estimate with little down side risk assuming

²⁷ It may have been a typographical error on the part of NERA when it claimed that the historical data was averaged over a period from 1990 - 2006.

that the majority of the premiums constituted a fair estimate. An underestimation would only have resulted if the majority equity risk premiums were lower below the 'true' premium. Given that the equity risk premiums were submitted by LIME, the OUR felt that there was little risk of the premiums being below the true value as this would not be beneficial to the company. In estimating the risk free rate, the OUR was trying to mitigate the risk of underestimation when it used an average of two years monthly Treasury yield rather than the current yield at the time. The market yield on U.S. Treasury securities at 10-year constant maturity in July 2009 was 3.56%, lower than the 3.86% used by the OUR in its second consultation. Therefore, contrary to NERA's statement, this upwardly biased the cost of equity.

- 3.6 The CAPM is a forward-looking technique and as such the values chosen for the variables in the CAPM should generally be prospective even if they are estimated using retrospective data. Shapiro and Balbirer (2000, pg 329) state that one of the common errors in using the CAPM to calculate the risk-adjusted cost of capital is *"using the historical average Treasury bond or Treasury bill return as the risk-free rate in the CAPM instead of using the actual (current) rate. You must use the current risk-free rate."* As such, the Office will discontinue the method of using an average of the Treasury yields and instead use the current rate. The Office therefore disagrees with NERA's claim that the risk free rate should be estimated by averaging over a long period in favour of using the current rate as dictated by academic literature²⁸.
- 3.7 There are opposing views regarding whether the risk-free rate should be approximated using a short-term security or a long term-security. A short-term security would seemingly be the better option for estimating the risk free rate as a longer time period would increase the probability of default by the debtor. Also, over a short time period, less reinvestment is needed to equate actual return with expected return and so there is lower reinvestment risk. However, short-term interest rates tend to be more volatile than long-term interest rates. There is a great degree of consensus that a long-term security

²⁸ Aswath Damodaran, December 2008, 'What is the risk-free rate? A Search for the Basic Building Blocks. "... Common (and dangerous) practices when confronted with rates that deviate from what they regard as "normal", analysts often substitute what they feel is a more normal rate when valuing companies. If the Treasury bond rate is 3.5%, an analyst may decide to use 5% as the normal risk-free rate in a valuation. Though this may seem logical, there are three potential problems. The first is that "normal" is in the eyes of the beholder, with different analysts making different judgments on what comprises that number. To provide a simple contrast, analysts who started working in the late 1980s in the United States, use higher normal rates than analysts who joined in 2002 or 2003, reflecting their different experiences. The second is that using a normal risk-free rate, rather than the current interest rate, will have valuation consequences. For instance, using a 5% risk-free rate, when valuing a company, will lower the value that you attach to the company and perhaps make it over valued. However, it is unclear whether that conclusion is a result of the analyst's view on interest rates (i.e., that they are too low) or on the company. Finally, interest rates generally change over time because of changes in the underlying fundamentals. Using a normal risk-free rate, which is different from today's rate, without also adjusting the fundamentals that caused the current rate will result in inconsistent valuation..."

should be used where the analysis is long-term and a short-term security where the analysis is short-term.

- 3.8 LIME indicated in response to the first consultation that the Treasury security chosen should be the one which best matches the company's investment horizon and suggested the use of the yield on a 10-year U.S dollar bond. Digicel in response to the second consultation has suggested that when choosing the risk-free rate, the treasury maturity period should match the average duration on the company's assets and liabilities. It further stated that "Digicel is a young firm and is growing rapidly which means that for Digicel 10 year bonds will understate the proper risk-free rate that should be applied to it. For this reason we are advised that a 20 year bond rate should be used in the estimation of Digicel's WACC."
- 3.9 Using data from the most recent available Annual Reports of telecommunications companies, Table 1 and Table 2 show the maximum and minimum asset lifetime for various categories of assets for both the fixed and mobile networks. For fixed networks, the average asset lifetime ranges from 7 – 15 years²⁹. For mobile networks, the average asset lifetime across all classes of assets ranges between 7 – 13 years. Even without using averages, Table 2 clearly shows that with the exception of buildings, the maximum lifetime of the remaining asset classes is 15 years for mobile networks, lower than the 20 years suggested by Digicel.

Table 1 Fixed Network Asset Lifetime in Years

Asset Category	Minimum	Maximum
Buildings	10	40
Plant and Machinery	4	20
Cables, Satellites, and Transmission Equipment	10	20
Furniture, Fixtures, and Fittings	-	10
Computer Equipment	-	5
Software	-	3
Motor Vehicle	3	5
Average	7	15

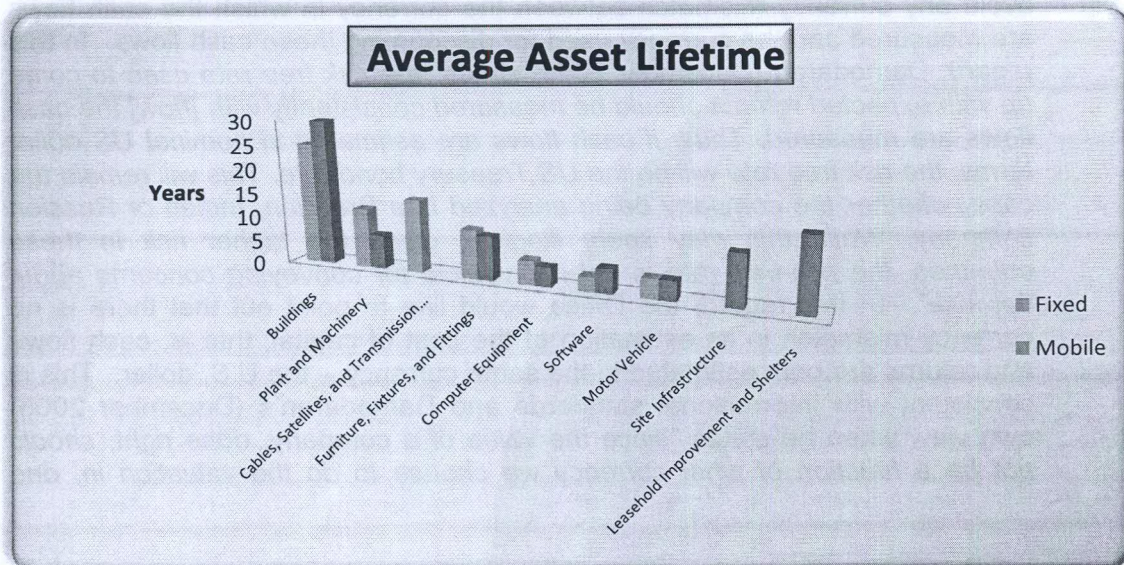
²⁹ Although LIME operates both a fixed and mobile network, the data from its Annual Report is used in the calculation for fixed line networks.

Table 2 Mobile Network Asset Lifetime in Years

Asset Category	Minimum	Maximum
Buildings	20	40
Plant and Machinery	-	7
Furniture, Fixtures, and Fittings	3	15
Computer Equipment	3	5
Software	-	5
Motor Vehicle	3	5
Site Infrastructure	7	14
Leasehold Improvement and Shelters	-	15
Average	7	13

3.10 Figure 2 shows a graph of the asset lifetime for both fixed line and mobile operators using the average asset lifetime across asset classes calculated using data from Annual Reports. With the exception of buildings, the average lifetime of fixed assets across the various asset classes is 8 years for both fixed line and mobile networks. When the data on buildings is included, the average asset lifetime is 11 years for both types of networks. A similar analysis of debt liabilities using data from the Annual Reports of telecommunications operators shows that there was only one operator with debt maturity greater than 10 years. The Office is therefore of the opinion that a 10 year security is the appropriate maturity for use in estimating the risk-free rate for both fixed and mobile networks. This view is supported by recent regulatory decisions. Table 3 shows that most regulators also use 10-year bonds as the maximum maturity when calculating the discount rate.

Figure 2: Average Asset Lifetime



- 3.11 In this regard, the nominal market yield on 10-year U.S. Treasury securities with constant maturity as at July 2010 is 3.01%³⁰ and will be used as the risk-free rate for both fixed and mobile networks as it represents the most current monthly yield at the time of writing.

Determination 4

The appropriate maturity for the security to be used to measure the risk free rate is 10 years.

Determination 5

The U.S. dollar risk free rate applicable to both fixed line and mobile networks is 3.01%

- 3.12 Digicel in its response attempted to calculate a Jamaican dollar risk free rate. As a rationale, the company states that *“As Jamaica does not issue long term bonds in Jamaican dollars and to avoid the need to adjust all projected cash flows for inflation and currency differences, the preferred approach would be to estimate a suitable local currency discount rate”*. The company also quotes Damodaran (December 2008) when he says *“it is not where a project or firm is domiciled that determines the choice of a risk free rate, but the currency in which the cash flows on the project or firm are estimated”*.
- 3.13 It should be noted here that what Damodaran was speaking to is the need to avoid any currency mismatch between the currency in which the cash flows are measured and the currency used for discounting these cash flows. In this regard, Damodaran (December 2008) states *“the risk free rate used to come up with expected returns should be measured consistently with [how] the cash flows are measured. Thus, if cash flows are estimated in nominal US dollar terms, the risk free rate will be the US Treasury bond rate. This will remain the case, whether the company being analyzed is a Brazilian, Indian or Russian company. While this may seem illogical, given the higher risk in these countries, the risk-free rate is not the vehicle for conveying concerns about this risk”*. In this regard, the Office would like to point out that there is no currency mismatch in its estimation of the cost of capital, that is, cash flows and returns are both estimated in the same currency – the U.S. dollar. This is consistent with international standards and Damodaran’s (December 2008) own view when he states *“since the value of a company, done right, should not be a function of what currency we choose to do the valuation in, one*

³⁰ http://www.federalreserve.gov/releases/h15/data/Monthly/H15_TCMNOM_Y10.txt

solution is to value the company in an alternate (mature market) currency". This is exactly what is done by the Office as the cost of capital is calculated in U.S. dollars. In this case, "the right risk-free rate to use will be the US treasury bond rate" as noted by Damodaran. Therefore, there is no need to estimate a Jamaican dollar risk free rate.

- 3.14 As Damodaran further notes in his December 2008 paper "Since it is far easier to estimate the other inputs to the discount rate computation, such as the equity risk premium and default spreads, in a mature market currency, ... [an] option is to compute the entire discount rate in the mature market currency and to convert that discount rate (r) into the local currency at the last step". This is also consistent with the approach used by the Office. The Office however accepts the method put forward by Digicel³¹ for converting from U.S. dollar cost of capital to Jamaican dollar cost of capital as follows:

$$WACC_{J\$} = (1 + WACC_{US\$}) * \frac{(1 + \text{Expected Inflation}_J)}{(1 + \text{Expected Inflation}_{US})} - 1$$

Table 3 Recent Regulatory Decisions on Risk Free Rate

Regulators	Underlying Security	Maturity Period	Risk Free Rate
OUR - Determination (2010)	US Treasury Bonds	10 Years	3.01%
TRA ³² (2009)	US Treasury Bonds	2 - 7 Years	3.20% - 3.70%
URCA (2009)	US Treasury Bonds	5 - 20 Years	4.20% - 5.20%
Ofcom ³³ (2009)	UK Gilts	2 - 4 Years	4.50%
FICORA ³⁴ (2008)	Finnish Government bonds	5 - 10 Years	4.06%
ECTEL (2008)	US Treasury Bills	N/A	3.66%
ComReg ³⁵ (2008)	Irish Government Bonds	10 Years	4.50% - 5.00%
MCA ³⁶ (2008)	Malta Government Bonds	5 - 10 Years	3.90% - 4.20%
ICTA (2008)	US Treasury Bonds	10 Years	4.40%

N/A not available

³¹ The formula given by Digicel is actually:

$$WACC_{J\$} = WACC_{US\$} * \frac{(1 + \text{Expected Inflation}_J)}{(1 + \text{Expected Inflation}_{US})} - 1$$

³² Telecommunications Regulatory Authority of the Kingdom of Bahrain (TRA), 2009, *Cost of Capital Determination*.

³³ Ofcom, 2009, *A New Pricing Framework for Openreach – Statement*.

³⁴ Finnish Communications Regulatory Authority (FICORA), 2008, *FICORA Assessment Principles for the Pricing of Mobile Termination*.

³⁵ Commission for Communications Regulation (Comreg), 2008, *Response to Consultation and Decision Notice - Eircom's Cost of Capital*.

³⁶ Malta Communications Authority (MCA), 2008, *Decision and Further Consultation on Estimating the Cost of Capital*.

Gearing

- 3.15 Gearing is essentially a measure of the company's debt relative to its value. Where value is estimated as debt (D) plus total equity (E). The gearing ratio can be calculated using book value, market value, or an optimal/target gearing ratio.

$$\text{Gearing} = D / (D + E)$$

- 3.16 The market value approach to gearing is generally considered more appropriate than estimating the capital structure based on book value. A book value measurement of the capital structure is at variance with the prospective nature of the WACC. As Shapiro and Balbirer (2000 pg 321) point out, the WACC should be the "*marginal cost, reflecting the cost of raising new capital to finance new investments. This means that component cost of financing for each source of capital must equal the required rate of return on new capital, not the past cost of raising capital from that source*". Book values may also be affected by changes in accounting policies and principles.
- 3.17 Determining market value gearing requires estimating market value equity and market value debt. Estimating the market value of equity is fairly straightforward for publicly traded companies as this is simply the market capitalisation of the company calculated by multiplying the number of shares outstanding by the share price. However, there is only one listed operator in Jamaica which makes determining the market value gearing for operators in Jamaica more difficult.
- 3.18 Therefore, the market value gearing for local telecommunication carriers has to be approximated using comparable companies in more developed markets where reliable data needed for the gearing calculation can be sourced.
- 3.19 Digicel argues that the OUR failed to report on the details of how it determined the gearing of 45.67 for comparable companies, who these companies are, and if these companies were not Jamaican, why the gearing of large companies was used. Digicel then submits a figure of 15% as representing its own gearing. In a specific response to one of the consultation questions about which type of gearing should be used and what is the suggested gearing, Digicel urges the OUR to use actual gearing for specific firms.
- 3.20 The list of comparable companies was indeed identified in several sections of the second consultation document, specifically in Tables 4, 5, and 6. However, the OUR admits that the gearing for these companies was missing from the tables. Issues relating to the choice of comparable companies were discussed on page 17 under the section 'Comparable Companies'. On the issue of using the actual gearing of each company, the Office reminds Digicel that only one of the four major telecommunications operators is publicly listed.

This means actual market value gearing for the three private companies does not exist. Therefore, if market value gearing is to be used as recommended by LIME in its response to the first consultation and supported by the Office, it will have to be estimated as the Office has done. If Digicel is for some reason recommending the use of actual book value gearing, the Office is not in favour of using this type of gearing as it is likely to be affected by the accounting policies of firms. In any case, Digicel's own book value gearing³⁷ using data from its 2009 Annual Reports is several multiples above the 15% its reports as its own gearing.

- 3.21 NERA in response to the second Consultation Document suggested that the OUR overestimated the level of gearing of local operators by using the gearing of operators in mature markets with investment grade credit rating. As such, NERA provided a table with gearing figures arrived at using comparators for LIME in emerging markets with market capitalisation less than \$15 billion and credit rating of BBB+ or lower. The table suggested gearing of 13% - 32% for fixed line operators and between 6% - 31% for mobile carriers (see extract of Table 3.4).

Table 3.4
Debt Levels & Credit Ratings of Telecom Operators in Emerging Markets

Company	Country	Gearing	Current Credit Rating ¹
<i>Fixed-line incumbents</i>			
Brasil Telecom	Brazil	16%	NR
Telecomunicacoes de Sao Paulo SA	Brazil	13%	NR/Baa2
Telefonos de Mexico	Mexico	32%	BBB+/A3
Telkom SA	South Africa	26%	BBB/Baa1(*-)
<i>Mobile carriers</i>			
Partner Communications Co.	Israel	15%	NR/Baa3
TIM Participacoes SA	Brazil	31%	NR
Turkcell Iletisim Hizmet	Turkey	6%	BB/Ba2

Source: Bloomberg. (1) Ratings as of 18 November 2009. * indicates a rating on negative watch.

- 3.23 Data from the website of Professor Damodaran is presented in Table 4 and shows that market value gearing for fixed line businesses ranges from a low of 1.09% for Indian companies to a high of 48.70% for operators in Europe. The average gearing for fixed line operators in emerging markets is 26.85% with 37.75% reported as the global average gearing. Market value gearing for mobile operators ranges between 5.59% and 33.33%, with a figure of 16.32% for carriers in emerging markets and 24.16% as a global average.

³⁷ Calculated using value on long term debt and shareholder equity reported in the balance sheet.

Table 4 Market Value Gearing

Industry Group	Telecom (Wireless)	Telecom. Services
	Mobile	Fixed
U.S.	16.55%	31.99%
Europe	33.33%	48.70%
China	5.59%	27.38%
India	18.66%	1.09%
Emerging Markets	16.32%	26.85%
Global	24.16%	37.75%

Source: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/

- 3.24 Taking into account the responses received from NERA and Digicel, the market value gearing figures reported for emerging markets reported in Table 4, and the gearing used by other regulators (Table 5), the Office will use a gearing range of 10% - 30% for fixed line operators and a range of 10% - 20% for mobile carriers. Fixed line operators tend to have higher gearing than mobile operators as shown in Table 4, which explains why the upper level of the gearing chosen for fixed line is greater than that for mobile. However, the lower limit of the gearing chosen is the same for both types of operators as the factors preventing the use of too much debt in the capital structure is the same across all local operators. The ranges chosen are also fairly consistent with that used by other regulators in recent decisions as shown in Table 5.

Table 5 Recent Regulatory Decisions on Gearing

	Fixed	Mobile
OUR - Determination (2010)	10% - 30%	10% - 20%
TRA (2009)	0%	0%
URCA (2009)	10% - 30%	10% - 30%
FICORA (2008)	-	30%
Ofcom ³⁸ (2007)	-	10%
ComReg (2008)	30% - 50%	-
ICT (2008)	45%	35%
MCA (2008)	20% - 40%	10% - 30%

Determination 6

Market value gearing is the appropriate type of gearing for use in the estimation of the weighted average cost of capital.

³⁸ Ofcom, 2007, *Mobile Call Termination – Final Statement*

Determination 7

The estimated gearing for fixed line networks is 10% - 30% while, the gearing for mobile networks is 10% - 20%.

Tax Adjustment

- 3.25 The after-tax cost of capital reflects the fact that interest paid to debt holders is tax deductible (that is, corporate taxes are applicable after interest is deducted). Thus, the cost of debt is also calculated as an after-tax cost to ensure that it is comparable with the cost of equity, which is calculated after-tax. In Jamaica the, corporate tax rate is 33.33%. The after-tax weighted average cost of capital (ATWACC) is calculated as follows:

$$ATWACC = w_d k_d (1 - t) + w_e k_e$$

where,

w_d is the fraction of debt in the capital structure,
 k_d is the forward-looking cost of debt,
 w_e is the fraction of equity in the capital structure,
 k_e is the forward-looking cost of equity, and
 t is the corporate tax rate (33.33%).

The pre-tax nominal cost of capital is calculated as:

$$\text{Pre-Tax WACC} = ATWACC / (1 - t)$$

Country Risk Premium

- 3.26 The country risk premium is a measure of the specific risk associated with investing in a particular country relative to a mature market. From an investor's perspective, emerging economies are generally regarded as more risky, with a less stable investment political and economic climate relative to economies of developed countries. Consequently, the country risk premium represents the return investors require for taking on the additional risk associated with a specific country relative to its more stable political and economic counterparts. The country risk premium will be added to the equity risk premium to take account of indigenous factors in order to obtain the overall premium expected for investing in Jamaican equities relative to the risk free security.
- 3.27 A comparison of the sovereign ratings assigned to different countries by various credit rating institutions provides an indication of the country risk in one country relative to another. The key feature of these credit ratings is that they are available for a wide cross section of countries and determined on a

consistent basis by each agency for each country it rates. This allows for the perceived credit risk of one country to be juxtaposed against the credit risk of other countries to determine relative risk across different countries. This sovereign credit rating is essentially an opinion about the ability and willingness of a government, to meet its financial obligations in accordance with the terms and conditions of loans that is, the likelihood that the issuer may default³⁹. Many of the factors that would impact a government's ability to meet its debt obligation are also liable to affect market risk.

- 3.28 While most ratings agencies would argue that their credit ratings are forward looking, these ratings have been criticised by many analysts as lagging the market in response to changes in risk.

Jamaican Sovereign Risk

- 3.29 Since the mid 1990's when the country endured a banking sector crisis, which led to an increase in the country's debt stock, Jamaica enjoyed a period of relative political and economic stability which led to the maintenance of a relatively stable credit rating for many years. However, the recent financial sector crisis that started in 2007 with developed economies has negatively impacted Jamaica much like most other countries due to the intertwined nature of the global market place. The crisis is characterised by a tightening of credit availability and led to a slowdown in world economic output. The impact on Jamaica has been borne out in several ratings downgrades since June 2007 as can be seen in Table 6. The foreign currency rating went from a 'B' rating for both the long term and short term rating with a stable outlook on June 12, 2007 to a 'SD'⁴⁰ (Selective Default) long term and short term rating on January 14, 2010. The 'SD' rating reflected the government's decision to implement a domestic debt exchange programme. The debt exchange was viewed positively by ratings agencies and as such, Standards and Poors (S&P) upgraded its opinion of the creditworthiness of Jamaica with respect to its foreign currency obligations in February 2010 to a 'B-' for the long term with a stable outlook and 'C' rating for the short term. In March 2010, Moody's revised its rating from 'Caa1' on foreign currency and 'Caa2' on local currency to 'B3'.

³⁹ <http://www2.standardandpoors.com/aboutcreditratings/>

⁴⁰ "An 'SD' rating is assigned when Standard & Poor's believes that the obligor has selectively defaulted on a specific issue or class of obligations, excluding those that qualify as regulatory capital, but it will continue to meet its payment obligations on other issues or classes of obligations in a timely manner. A selective default includes the completion of a distressed exchange offer, whereby one or more financial obligation is either repurchased for an amount of cash or replaced by other instruments having a total value that is less than par"

[http://www.standardandpoors.com/servlet/BlobServer?blobheadername3=MDT-
Type&blobcol=urldata&blobtable=MungoBlobs&blobheadervalue2=inline%3B+filename%3DRatings
Definitions.pdf&blobheadername2=Content-
Disposition&blobheadervalue1=application%2Fpdf&blobkey=id&blobheadername1=content-
type&blobwhere=1243688677977&blobheadervalue3=UTF-8](http://www.standardandpoors.com/servlet/BlobServer?blobheadername3=MDT-
Type&blobcol=urldata&blobtable=MungoBlobs&blobheadervalue2=inline%3B+filename%3DRatings
Definitions.pdf&blobheadername2=Content-
Disposition&blobheadervalue1=application%2Fpdf&blobkey=id&blobheadername1=content-
type&blobwhere=1243688677977&blobheadervalue3=UTF-8)

Table 6 Jamaica's S&P Sovereign Rating and Country T&C Assessment Histories as of June 30, 2010

Sovereign/Date	Local Currency Rating LT/Outlook/ST	Foreign Currency Rating LT/Outlook/ST	Foreign Currency Recovery Rating	Country T&C Assessment
Feb. 24, 2010	B-/Stable/C	B-/Stable/C	3	B
Jan. 14, 2010	SD/--/SD	SD/--/SD	4	B
Nov. 2, 2009	CCC/Negative/C	CCC/Negative/C	4	B
Aug. 5, 2009	CCC+/Negative/C	CCC+/Negative/C	4	CCC+
March 18, 2009	B-/Negative/C	B-/Negative/C	4	B+
Oct. 21, 2008	B/Negative/B	B/Negative/B	4	BB-
June 12, 2007	B/Stable/B	B/Stable/B	4	BB-
April 6, 2006	B/Stable/B	B/Stable/B		BB-
Nov. 1, 2005	B/Stable/B	B/Stable/B		B
Dec. 10, 2004	B/Stable/B	B/Stable/B		
Feb. 5, 2004	B/Negative/B	B/Negative/B		
July 28, 2003	B+/Stable/B	B/Stable/B		
Dec. 19, 2002	BB-/Negative/B	B+/Negative/B		
May 2, 2001	BB-/Stable/B	B+/Stable/B		
Dec. 13, 2000	B+/Positive/B	B/Positive/B		
Nov. 9, 1999	B+/Stable/NR	B/Stable/NR		

Source: <http://www.standardandpoors.com/ratings/articles/en/us/?assetID=1245215391570>

Measuring the Jamaican Country Risk Premium

Synthetic Rating

- 3.30 It is possible to use the sovereign rating to arrive at a premium for country risk. In such a case, a particular premium could be assigned to each rating class. This is called an imputed or synthetic spread. The benefit of this approach is that it allows a credit risk premium to be estimated for countries that do not issue debt in currencies other than their local currency where a reliable default free rate may not be readily available. Additionally, it may be reasonable to assume that countries with equivalent credit rating also have equivalent credit risk premiums. In this case, the credit risk premium could be calculated for another country with the corresponding credit rating. The primary drawback to the approach is that the underlying basis of the premium is the sovereign rating which, as pointed out earlier, may not reflect current market sentiment about risk.
- 3.31 Given Jamaica's Moody credit rating of B3, Table 7 imputes a country risk premium of 5.0% using synthetic rating for sovereign bonds or 6.5% using the synthetic rating for corporate bonds.

Table 7 Imputed Default Spreads by Sovereign Ratings Class - September 2008

Ratings	Sovereign Bonds/CDS	Corporate Bonds
Aaa	0.15%	0.50%
Aa1	0.30%	0.80%
Aa2	0.60%	1.10%
Aa3	0.80%	1.20%
A1	1.00%	1.35%
A2	1.30%	1.45%
A3	1.40%	1.50%
Baa1	1.70%	1.70%
Baa2	2.00%	2.00%
Baa3	2.25%	2.60%
Ba1	2.50%	3.20%
Ba2	3.00%	3.50%
Ba3	3.25%	4.00%
B1	3.50%	4.50%
B2	4.25%	5.50%
B3	5.00%	6.50%
Caa1	6.00%	7.00%
Caa2	6.75%	9.00%
Caa3	7.50%	11.00%

Source: Damodaran (September2008)⁴¹

Bond Default Spread

3.32 The most widely used measure of country risk premium is the bond default spread. Put simply, if a country issues debt in a currency for which a reliable risk free rate exists, then the difference between the yield to maturity on that bond and the risk free rate is the bond default spread. Generally speaking, synthetic/imputed ratings similar to those explained in the previous section represent a generalised version of the bond default spread. In the case of imputed rates, the spread for a country is based on its default rating rather than actual bond yields. For this reason, the bond default spread will tend to produce a more accurate estimate of the country risk premium as it reflects current market sentiment. The advantage of the default spread approach is that it is a market based measure of the country risk premium where changes in the value of a bond are determined by investors. This type of approach results in a premium that is continuous and dynamic. That is, unlike the synthetic rating approach discussed in the previous section which rarely

⁴¹ Aswath Damodaran, September 2008, *Equity Risk Premiums (ERP): Determinants Estimation and Implications*.

changes unless there is a period of significant instability. Even when it does change it moves from one discrete number to another whereas, the bond default spread will frequently be adjusted by the market along a continuous number range as the perception of risk changes. Therefore, two countries may have the same credit rating but different bond default spreads.

3.33 NERA has criticised the OUR's use of a two year average of bond default spreads as a measure of the country risk premium in the second Consultation Document suggesting that it should be based on the most recent data ("*recent 3 months*"). The Office finds NERA's argument to be conflicting with its position on the risk free rate where it contends that using recent data will bias the estimate downwards and favours the use of an average over a long time period. Surely, the same line of reasoning must hold with respect to the sovereign risk premium. Just as NERA feels that the Treasury yields at the time of its response were lower than its long run level, Jamaica's sovereign risk for the corresponding period must also have been higher than its long run path. This would have to follow logically as the sovereign risk measured by the default spread is the difference between the yields on GOJ U.S. dollar bonds and the yields on U.S. Treasury securities. If in the long run, Treasury yields will increase as NERA seems to be alluding to, even with the yields on GOJ U.S. dollar securities staying constant at their high levels, the default spread and by extension the sovereign risk premium would narrow. Therefore, the Office finds it inconsistent to argue for the use of a long-term average of treasury yields to mitigate against the effect of the currently low yields on the estimated risk free rate and then use of short-term average of default spreads to magnify the effect of the high yield on GOJ securities. The Office will approach the estimation of the sovereign risk premium in a manner consistent with the estimation of the risk free rate by using the current rate.

3.34 The bond default spread for Jamaica was calculated by subtracting the yield on 10-year U.S. Treasury bonds which is the measure of the risk free rate from the yield to maturity on 10-year GOJ U.S. dollar Brady bonds⁴². Figure 3 shows the sovereign default spread over the period January 2007 to June

⁴² The yield to maturity on GOJ U.S. dollar denominated bonds was sourced from Bank of Jamaica. For those periods where there was no 10- year GOJ bond issue, the yield curve was estimated using the Nelson-Siegel function with the result then optimised to minimise the sum of squared residuals. This function was chosen over the regular OLS regression as the yield curve will typically not be linear. The Nelson-Siegel function allows a non linear relationship to be fitted to the data. The Nelson-Siegel function is represented as follows:

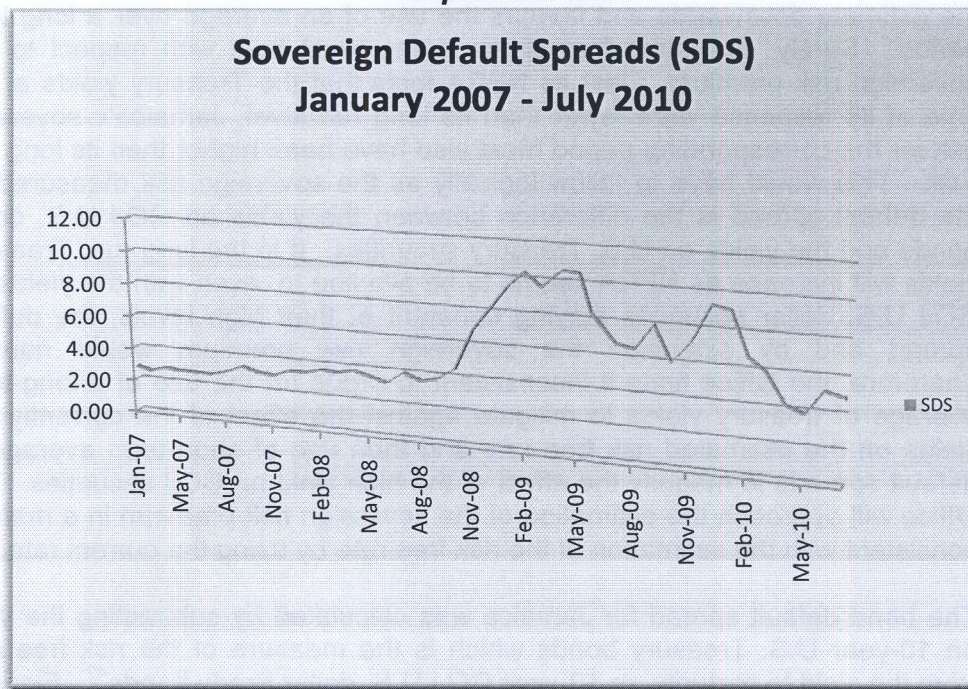
$$y(t) = \alpha_1 + (\alpha_2 + \alpha_3) \frac{\beta}{t} (1 - e^{-t/\beta}) - \alpha_3 e^{-t/\beta}$$

Where

- α_1 is the long rung level of interest rates
- α_2 is the short-term component
- α_3 is the medium-term component
- β is the decay factor
- t is the maturity

2010. Figure 3 shows that the sovereign default spread was relatively stable up to October 2008 at which time it began to increase reflecting the series of downgrades by rating agencies as the perceived risk of default intensified. However, since January 2010 the risk premium has declined significantly compared to its March 2009 high of 10.56%, with the premium of 4.76% for July 2010 being less than half of what it was at the March 2009 high. This reflects a return to stability with the premium approaching its long term mean.

**Figure 3: Imputed Default Spreads by Sovereign Ratings Class
September 2008**



Average Premium versus Current Premium

3.35 While using the bond default spread approach has the benefit of reflecting current market sentiment about risk, the drawback is that the resulting country risk premium may be subject to extreme volatility. Jamaica's country risk premium over the past 24 months averaged 7.07%⁴³, the full series is available in Appendix A. Figure 3 shows that prior to September 2008 the country risk premium was consistently below 4.00%, by November 2008 it increased to 8.02% when risk sentiment was high after which it gradually declined to 4.86% as at July 2010. This highlights the possible volatility that may occur over a relatively short period and the problem of estimating the

⁴³ The average country risk premium since January 2007 is 5.35%.

country risk premium using the spread for a single period as this period may be an outlier and more reflective of excessive market anxiety rather than the expectations of future country risk. In this case, averaging the country risk over the recent past may temper⁴⁴ the impact of extreme periods producing a result that is likely to be more representative of the prospective country risk. Damodaran (September 2008) states that normalising the spreads by averaging the most recent two years is appropriate only if the economic fundamentals of the country have not changed significantly over the period – whether to the upside or downside – but will produce misleading results if the economy experienced structural shifts during the period. It is the Office's opinion that the return to a borrowing relationship with the International Monetary Fund (IMF) and the intervention in the local bond market to force interest rates down with the Jamaica Debt Exchange (JDX) Programme represents a structural shift in the economy. In this case, the averaging technique may not be appropriate. The JDX took place in January 2010 and the 27 month standby agreement with the IMF was signed in February 2010, therefore, any averaging of the country risk premium would have to be over the post February 2010 period. This results in a sovereign default spread of 4.55% when averaged over the period March 2010, to July 2010. The Office will use the sovereign default spread for July 2010 of 4.76%, this is consistent with the risk-free rate.

Relative Equity Market Standard Deviation

3.36 Standard deviation is often used as a measure of risk in portfolio theory. It is argued that this analysis can be extended to estimate the risk of equity in emerging markets. The idea is that the equity risk premium should reflect the variation in risk between different equity markets. Where, the equity risk is measured by the standard deviation in stock prices. This assumes that an investor has a choice between investing in local equity and investing in foreign equity. The total country equity risk premium is then calculated as the product of the equity risk premium in the U.S. and the relative volatility between the local stock market and U.S. stock market. Subtracting the U.S. equity risk premium from the total equity risk premium gives a measure of the country risk premium. The total equity risk premium is represented with the following formula:

$$\text{Total Equity Risk Premium} = E_u * \left(\frac{\sigma_{el}}{\sigma_{eu}} \right)$$

⁴⁴ Given that a spike in the country risk premium is only ever likely to be to the upside, averaging will only lessen the impact of a high premium rather than nullify its influence all together. Markets tend to be more responsive to bad news than to good. Laakkonen, H. and M. Lanne, (2008), 'Asymmetric News Effects on Exchange Rate Volatility: Good vs. Bad News in Good vs. Bad Times' studied the asymmetric news effects on foreign exchange rate volatility and found that volatility in the market was greater in bad times than in good. Negative news had a stronger effect in good times while, positive news had relatively the same effect in both good and bad times.

https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=SNDE2008&paper_id=84

where,

E_u is the equity risk premium for a the U.S. market

σ_{el} is the measure of risk in the local equity market

σ_{eu} is the measure of risk in the U.S. equity market.

$\left(\frac{\sigma_{el}}{\sigma_{eu}}\right)$ is the measure of the relative risk between the two stock markets

3.37 The problem with this approach is that theory suggests that the standard deviation will be higher for markets with higher risk however the theory generally does not hold in practice as the volatility in equity markets are affected by liquidity, with illiquid markets having lower standard deviation than liquid markets. In this regard, this approach tends to produce premiums which may be unrealistically low for markets with low volatility, Table 8 illustrates this problem. Argentina currently has a credit rating of B- and its foreign currency debt is assigned a country risk premium of 1.56% while China which has a credit rating of A+ has a country risk premium of 5.52%.

Table 8 Relative Country Equity Risk Premium

Country	Standard Deviation in Index	Relative Volatility (to US)	Total Risk Premium	Country Risk Premium
Mexico	20.23%	1.32	5.30%	1.30%
Argentina	21.24%	1.39	5.56%	1.56%
Chile	21.25%	1.39	5.57%	1.57%
Peru	30.21%	1.98	7.91%	3.91%
Venezuela	30.17%	1.98	7.90%	3.90%
China	36.33%	2.38	9.52%	5.52%
Korea	22.54%	1.48	5.90%	1.90%
India	26.03%	1.70	6.82%	2.82%
Malaysia	19.52%	1.28	5.11%	1.11%
Thailand	21.27%	1.39	5.57%	1.57%
Indonesia	26.80%	1.76	7.02%	3.02%
Philippines	24.97%	1.64	6.54%	2.54%
Pakistan	27.19%	1.78	7.12%	3.12%
Vietnam	41.57%	2.72	10.89%	6.89%
Israel	16.61%	1.09	4.35%	0.35%
Nigeria	21.31%	1.40	5.58%	1.58%
Namibia	25.42%	1.66	6.66%	2.66%
Kenya	24.22%	1.59	6.34%	2.34%
Egypt	19.44%	1.27	5.09%	1.09%
Slovenia	19.56%	1.28	5.12%	1.12%
Russia	26.26%	1.72	6.88%	2.88%

Source: Damodaran (September 2008)

Default Spread and Relative Standard Deviation

3.38 While the default spread provides a measure of default risk, some analysts believe that this premium by itself only provides a partial measure of the equity risk specific to a country. In this regard, it is expected that the country equity risk premium should be higher than the default spread, the issue is how much higher. The volatility of equity market of the country relative to the bond market used to estimate the default spread provides an estimate of the country equity risk premium. This assumes that the choice is between investing in local stocks and the country's bonds. This can be estimated with the following equation:

$$\text{Total Equity Risk Premium} = E_m + D_s * \left(\frac{\sigma_e}{\sigma_b} \right)$$

where,

- E_m is the equity risk premium for a mature market
- $D_s * \left(\frac{\sigma_e}{\sigma_b} \right)$ is a measure of the country risk premium
- D_s is the default spread for the local country
- σ_e is the volatility of the local equity market
- σ_b is the volatility of the bond market used to calculate the default spread

3.39 Damodaran (September 2008) calculated an equity volatility to bond volatility measure of 1.5 for emerging markets, estimated across 28 emerging markets. Therefore, given a current bond default spread of 4.76% on GOJ bonds, and a relative volatility of 1.50, the country risk premium is estimated to be 7.15%.

3.40 While it may be plausible to suggest that the country equity risk premium should be higher than that given by default spreads as stated by Digicel, the idea that the true premium may be multiples higher than the default spread is questionable. Additionally, "there may be a potential for double counting risk, since the standard deviation in both the equity index and the government bond incorporates the volatility of the underlying riskless security"⁴⁵. This approach could produce a premium that is unrealistically high, not reflecting the expectation of any rational investor, and a premium unlikely to be achieved by an investment in equities at any future period. The problem is exacerbated for countries with high equity to debt volatility ratios especially in periods of high volatility in the credit market which yields high default spreads. The Office is therefore cautious about the use of this approach as a method of estimating the country risk premium.

⁴⁵ Aswath Damodaran (September 2008)

- 3.41 Digicel in its response to the second consultation indicated that it favours a mix of using bond default spreads and market volatility to calculate the country risk premium, it however provides no specific method of how this should be done. Its view is that the premium of 5.35%⁴⁶ used by the OUR in the second consultation was understated saying that Moody's lists a figure of 6.0% prior to the recession and its own bankers Citibank in recent times applied a political risk premium of 10.0% to Jamaica. No indication was provided as to the method used to arrive at either of these premiums.
- 3.42 Damodaran (September 2008) supports the use of the default spread plus relative premium approach to estimating the country risk premium as a measure of the premium for the immediate future, but believes that it should be adjusted down over time to converge to the country risk premium calculated from either the bond default spread or the relative standard deviation approach. This supports the view that country risk premium estimated from the spread plus premium approach is not sustainable and not representative of future premium. It is the Office's view, like many other regulators, that the country risk premium calculated using the bond default spread provides the best measure of prospective country risk premium. This is as the factors which affect default risk are also likely to be the same factors that impact equity risk. Therefore, the Office will use the measure of the country risk premium provided by the sovereign default spread approach of 4.76%.

Table 9 Recent Regulatory Decisions on Country Risk Premium

	Fixed	Mobile
OUR - Determination (2010)	4.76%	4.76%
TRA (2009)	1.50%	1.50%
URCA (2009)	2.10%	2.10%
ECTEL (2008)	6.36%	6.36%
ICTA (2008)	0.90%	0.90%

Determination 8

The country risk premium will be estimated using the sovereign default spread. Using data for July 2010, this is 4.76%.

⁴⁶ The OUR in fact used a country risk premium of 4.36%. Digicel's response seems to be based on the Consultation Document sent on August 27, 2009 rather than the revised version which was sent on August 31, 2009.

Cost of Debt

3.43 The cost of a company's debt can usually be approximated with a fair deal of accuracy by examining the actual debt obligations of firms. The following steps are generally used in estimating the cost of debt for a company:

- for a company that has issued bonds that are currently being traded the yield to maturity on a long term bond with no special features can be used as the cost of debt;
- if the company does not have any bonds that are currently being traded and the company has been rated by a rating agency, this rating can be cross referenced against the typical default spread of bonds with similar ratings to approximate a cost of debt;
- if the company does not have any bonds being traded and is not rated
 - but it has recently borrowed long term from a bank, the interest rate on this debt can be used; or
 - a synthetic rate for the company could be estimated and used to arrive at a default spread and a cost of debt⁴⁷;

3.43 Digicel in its response to the second consultation indicated that the OUR stated that the cost of debt for local telecommunications companies was estimated by adding a maximum 2.0% company risk premium to the average yield on GOJ six month Treasury Bills however with no indication of how this premium was estimated. The OUR did in fact state in Chapter 1 of the second Consultation Document that "*the estimate of the cost of debt for telecommunications carriers made use of data from the Annual Reports of telecommunications companies*". This was again reiterated in Chapter 3, paragraph 3.1. Paragraph 3.4 further stated that "*historically, local telecommunications companies borrow at a maximum rate of 2.5% above the 1 month LIBOR or maximum of 2% above the yield on GOJ six month Treasury Bills*". A review of the loan clauses in the most recent Annual Reports submitted to the OUR by telecommunications companies revealed that the companies were borrowing at a rate of 2.5% above the 1-month LIBOR in U.S. dollar terms and 2% above the yield on GOJ six month Treasury Bills in Jamaican dollar terms. Digicel further disputes the use of these numbers noting that "*even the biggest names in telecommunications around the world have to pay significantly more than 2% above the cost of own country six month government Treasuries for debt finance*". The

⁴⁷ Professor Ian Giddy, 2002, "Corporate Financial Restructuring", New York University, See <http://giddy.org/appliedfinance/restructuring.pdf>
"The cost of debt has to be estimated in the same currency as the cost of equity and the cash flows used in the valuation."

- company also claims that the OUR implies that local telecommunications companies raise the debt financing they need in Jamaica or that it makes commercial sense to do so. The company then challenges the OUR to provide the analysis to support this implied claim. The Office however reiterates that the data on borrowing obligations was taken from the most recent available Annual Reports of telecommunications companies, including that of Digicel⁴⁸. The OUR made no claim, whether implied or otherwise, as to where local telecommunication companies sourced borrowed funds as this is irrelevant to the analysis of the cost of capital. The OUR only chose to use the clause which refers to the rate paid on Jamaica dollar loans as the clauses on U.S. dollar loans would produce figures which seemed to be implausibly low.
- 3.44 Digicel further stated that if firms in Jamaica have issued their own bonds then the market yields on these bonds should be used. Digicel then declared that "2009 figures for Digicel's two most recent US\$ bond offering show an average cost of debt of 11%". The company further claims that taking account of other non-bond debt would push the rate higher and so in the interest of expediency 11% was submitted.
- 3.45 At the time of writing the second Consultation Document, the OUR was not aware that any of the telecommunications companies had issued bonds as this information was not communicated in the available Annual Reports for any of the operators. The Office agrees that where information on corporate bond issues is available then the yield on these bonds would be the preferred method of measuring the cost of debt. In this regard, the OUR wrote to the major carriers on June 25, 2010 requesting data on any corporate bond issues which are currently traded.
- 3.46 NERA has indicated its view that the cost of debt in the second Consultation Document was about 2% lower than it should have been as the OUR's debt premium in the second consultation should have been added to the risk free rate plus the country risk premium rather than the weighted average Treasury bill yield (WATBY) on 6-month GOJ Treasury bills. NERA also indicated that the OUR did not match the credit risk of LIME to its debt premium assumptions.
- 3.47 What NERA has done here is to essentially estimate an imputed cost of debt. The OUR would like to clearly point out that it made no assumptions in arriving at the maximum 2% debt premium, this figure was taken directly from the Annual Report of operators including LIME. Further, the OUR was not trying to estimate an imputed cost of debt, the intention was to calculate the

⁴⁸ As Digicel is aware, the Office cannot release information from the Annual reports of other carriers as these were submitted under confidential cover. However, the particular clause or at least a similar one is also present in Digicel's own Annual Report. In fact, Digicel's reply to the request for information on corporate bond issue indicates that the company does borrow locally.

actual cost of debt as this is preferred to an imputed interest cost given that it is the rate actually being paid by operators. The Annual Reports submitted by the operators indicated that the highest borrowing cost being paid on US\$ loans by any of the carriers was 8.0% on fixed rate debt or the 1-year LIBOR plus 0.75%. On Jamaica dollar loans, the maximum rate being paid was WATBY on GOJ 6-month Treasury bills plus a maximum of 2%. In arriving at the actual cost of debt being paid by operators, the OUR felt that using the 1-year LIBOR plus 0.75% or 8.0% on US dollar loans was too low so the OUR estimated the cost of debt using the clauses on Jamaican dollar denominated loans – that is, WATBY on GOJ 6-month Treasury bills plus a maximum of 2%.

Actual Cost of Debt

- 3.48 The actual cost of debt as determined by the market through the yield on corporate bonds is preferred to the implied cost of debt. Given that the WACC is a forward looking technique, what is important is not the current yield on the bonds as the time of issue but instead the yield to maturity on the bonds. The yield to maturity also has the advantage of being market determined and as such, it reflects the true cost of debt. The yield to maturity is the interest rate that equates the present value of all future cash flows to the bonds present value assuming that the bond is held to maturity⁴⁹. In order to be consistent with the maturity on the risk free rate, the required yield to maturity is that which is applicable to a 10-year corporate bond. As such, the requested corporate bond data will be used to estimate the yield to maturity being paid by the operators which will serve as the cost of debt.
- 3.49 Two of the operators replied to the OUR's request for information on outstanding bonds stating that neither they nor their parent company had any currently traded corporate bonds. There was also no mention of a credit rating for these two operators or their parent companies. Two other companies submitted information on bonds issued by their parent companies⁵⁰. For one of these companies, the bonds outstanding had the same maturity which meant that it was not possible to interpolate the yield to maturity for 10-year bonds. For the other company, the data that was received was of a general aggregated nature, providing little of the details for individual bonds as requested. As such, it was not possible to calculate a yield to maturity for any of these bonds. There was also no credit rating provided for either of these two companies. Although Digicel in its response claims that figures for its two most recent bonds is 11% and higher when non-bond debt is considered, there was no evidence to substantiate this claim. In fact, Digicel's response to the request for data on bond issues indicated that it was borrowing at substantially lower rates than the 11% quoted in its response to the second Consultation Document. Data from Digicel's Financial

⁴⁹ <http://www.investopedia.com/university/advancedbond/advancedbond3.asp>

⁵⁰ Based on the information received, none of the bonds have any special features.

Statements also fails to support the claim, that of rates of 11% and higher. The data submitted by Digicel actually supports the cost of debt used by the OUR in its second Consultation Document which was based on maximum borrowing rates from the Annual Reports of the major telecommunication operators.

Imputed Cost of Debt

3.50 The Office continues to favour the use of cost of debt based on actual borrowing costs to that of an implied cost of debt. However, given the lack of data to facilitate the estimation of a yield to maturity on corporate bonds, the implied approach will be used. The approach will generally follow that outlined by NERA in its reply which is as follows:

$$\text{Imputed Cost of Debt} = r_f + D_s + D_p$$

where,

- r_f is the risk free rate
- D_s is sovereign default spread
- D_p is the debt premium

3.51 The default premium used will range between 0.75% and 2.5%⁵¹ based on data from Annual Reports of telecommunications companies⁵². Using the formula, the imputed cost of debt is between 8.52% - 10.27% as shown in Table 10. The top end of the result is slightly higher than the 10.22% calculated by NERA in its response to the second consultation. Table 11 shows that the cost of debt for local telecommunications companies is higher than that estimated by other regulators in recent decisions. This is expected since Jamaica also has a higher country risk premium than these countries.

Table 10 Imputed Cost of Debt

	Minimum	Maximum
Risk-free Rate	3.01	3.01
Sovereign Default Spread	4.76	4.76
Debt Premium	0.75	2.5
Cost of Debt	8.52	10.27

⁵¹ Data from the Audited Financial Statements of operators reveals the interest rates on paid on U.S. dollar loans range from as low as 3.3% to 8.0% for fixed rate loans and 1-month LIBOR plus 2.5% to 1-year LIBOR + 0.75% on variable rate loans.

⁵² Audited Annual Reports were submitted by the following companies:

- LIME - March 31, 2009
- Digicel – March 31, 2009
- Flow – December 31, 2007
- Claro – December 31, 2008

Table 11: Recent Regulatory Decisions on Cost of Debt

	Fixed	Mobile
OUR - Determination (2010)	8.52% - 10.27%	8.52% - 10.27%
TRA (2009)	0.00%	0.00%
URCA (2009)	8.00% - 9.00%	8.00% - 9.00%
FICORA (2008)	-	5.56%
ComReg (2008)	5.70% - 6.90%	-
ICT (2008)	6.60%	6.60%
MCA (2008)	4.90% - 7.70%	4.90% - 7.70%

Determination 9

The applicable cost of debt for fixed line and mobile operators ranges between 8.52% - 10.27%.

Comparable Companies

- 3.52 A shortcoming of the CAPM methodology is that it assumes that returns are normally distributed and investors are mean variance optimisers. The accuracy of these assumptions has been questioned. For this reason, the use of a thin stock market like Jamaica's would only serve to exacerbate the deficiencies of the CAPM especially with regard to the normality assumption. Therefore, the methodology that will be used by the Office in estimating the cost of equity is to do the estimation for a set of globally diversified telecommunications companies.
- 3.53 The sample of comparable companies for which the cost of capital is estimated is composed of international telecommunications companies from a broad cross section of countries in both emerging and developed economies. As suggested by the respondents, separate cost of capital will be estimated for fixed line and mobile networks. Therefore, two sets of comparable companies were chosen, one group for estimating the cost of equity for fixed line networks and the other group for estimating mobile cost of equity.
- 3.54 Given that the intention is to calculate separate cost of equity estimates for both fixed and mobile services, an attempt was made to use only 'pure-play' operators in the set of globally diversified comparable companies, or at the very least companies that earn the majority of their revenue from one sector. That is, the most appropriate companies were deemed to be those that offer only fixed line service or mobile services. However, given the converging world of information communication, many companies offer a variety of services such as fixed line, internet services and data services. Another important criterion in choosing the set of comparable companies is that they

should be publicly traded firms listed on a major stock exchange so that reliable and extensive price data can be obtained for the estimation. The size of the companies as measured by their market capitalisation was also an important factor. Based on these considerations the OUR chose the 12 fixed line companies and 13 mobile services companies shown in Table 12 and Table 13, respectively.

Table 12 Comparable Fixed Line Companies

Fixed Line Companies	Country	Market Capitalisation (US\$M)	Debt/Equity	Tax Rate ⁵³
British Telecom	United Kingdom	16,670	1.15	0.28
CenturyLink	United States	10,460	0.74	0.40
Comptel Europe N.V	France	570	0.17	0.33
Frontier Communications Corporation	United States	2,300	2.09	0.40
Kingston Communications	United Kingdom	366	0.55	0.28
Telecomunicações de Sao Paulo S/A-Telesp	Brazil	10,870	0.19	0.34
Telefonos de Mexico, S.A.B. de C.V. Telmex	Mexico	13,130	0.50	0.28
Windstream Communications	United States	5,200	1.22	0.40
Consolidated Communications Holdings Inc.	United States	514	1.77	0.40
RCN Corporation	United States	525	1.47	0.40
SureWest Communications	United States	91	2.37	0.40
Vonage Holdings Corp.	United States	510	0.44	0.40

⁵³ KPMG's Corporate and Indirect Tax Rate Survey, 2009.
<http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/KPMG-Corporate-Indirect-Tax-Rate-Survey-2009.pdf>

Table 13 Comparable Mobile Services Companies

Mobile Service Companies	Country	Market Capitalisation (US\$M)	Debt/Equity	Tax Rate
China Mobile ⁵⁴	China	202,050	0.02	0.25
Leap Wireless	USA	1,020	2.69	0.40
Millicom International Cellular S.A.	Luxemburg	9,570	0.25	0.29
Mobistar N.V./S.A.	Belgium	3,480	0.00	0.34
NTT DOCOMO, INC	Japan	65,200	0.11	0.41
SK Telecom Co., Ltd	South Korea	9,940	0.58	0.24
NII Holdings	US	6,570	0.54	0.40
Turkcell Iletisim Hizmetleri A.S.	Turkey	11,680	0.13	0.20
U.S. Cellular	US	3,800	0.23	0.40
Vivo S.A.	Brazil	10,480	0.26	0.34
Far Eastone Telecommunications Company	Taiwan	4,405	0.00	0.25
Cellcom	Israel	2,550	0.44	0.26
Idea Cellular	India	4,816	0.40	0.34

Market Risk Premium

- 3.55 The market risk premium or equity risk premium (ERP) is the return in excess of the risk free rate that an investor requires for investing in risky assets, in this case equities. The premium should be positive reflecting the greater riskiness associated with the investment relative to a risk free security. The premium will also increase as the riskiness of the investment increases.
- 3.56 Digicel in response to the second Consultation Document states that *"in developing economies like Jamaica there is not an adequate time [series] of equity market data to use in calculating an ERP. For countries in this position the accepted approach is to set the ERP equal to the ERP in a country with a long data history. For Jamaica the USA appears to be the obvious choice"*. Digicel further claims that *"The OUR chose a simple average of numbers presented by C&W. Digicel notes that 3 of the 4 time series behind these numbers were 1970 – 2005. Digicel believes that experts would not be willing to rely on 1970 – 2005 data series where a much longer series was available. Common practice is to use the Ibbotson data series that runs from 1926, although some researchers prefer an even longer series"*.
- 3.57 The Office would like to point out that even if Jamaica's stock market (the JSE) had been in existence as long as that in the USA's, using data from the JSE to calculate the equity risk premium would yield misleading results. As the OUR has pointed out on many occasions in the consultative process, the

⁵⁴ China Mobile has a large market capitalization compared to the rest of the sample but it is included as it operates in an emerging market.

small size of Jamaica's stock market, its relatively low volatility, and the fact that it may be dominated by a few large companies are other problems which make data from the JSE inappropriate for use in estimating the cost of capital. It is for this reason that the OUR's estimation is done in U.S. dollars using comparable companies. The appropriate additional premiums are added to account for local market factors after which, the cost of capital is converted to Jamaican dollar terms. Given that the base calculations are done in U.S. dollars, the U.S. stock market is indeed the appropriate market for estimating the equity risk premium.

- 3.58 The Office would like to point out that Digicel's response is not to the applicable Consultation Document disseminated on August 31, 2009 but rather to the earlier version of the document sent on August 27, 2009. That notwithstanding, the 3 series to which Digicel is referring was calculated by Morningstar (formerly Ibbotson) who many regard as an expert in this field. This calls into question Digicel's claim that most experts would not be willing to rely on a 1970 – 2005 data series. In fact, Damodaran (September 2008) states that *"while there are many analysts who use all the data going back to the inception date, there are almost as many analysts using data over shorter time periods, such as fifty, twenty or even ten years to come up with historical risk premiums"*. The allure of using a short time period is that risk aversion of investors will change over time, as such using a short time period is likely to reflect current sentiment, which may provide a better estimate of the future premium than that obtained using distant historical data. However, the Office does indeed agree that the standard errors associated with these estimates may be a cause for concern.

Digicel further states

"The ERP numbers as presented in the OUR's Table 2 provide too little information describing the numbers and how they were derived for any of them to be used as part of an averaging exercise. For example, the ERP is a percentage in excess of the RFR (long term Treasuries) but the OUR's Table 2 does not provide information about this and we cannot assume that each has been determined in exactly the same way and in relation to the same Treasury assets. Indeed, the values in the bottom cell of the OUR Table 2 have more information provided with them than the values from the top of the Table which are those chosen by the OUR. We know that all the bottom cell examples represent arithmetic averages which we do not know about the averages used by the OUR i.e. the numbers in the top cell of Table 2. Digicel also notes that one of the figures which the OUR used in the averaging exercise, the 4.1%, is not found in Table 2 at all. We have no idea what it is or where it comes from and thus we cannot comment more on it except to note that it is below all ERP figures we have seen for the USA derived from long time series data."

The table being referred to by Digicel is exhibited below.

Source	Method	Market	Period	EMRP Estimate
Morningstar (formerly Ibbotson) "Stocks, Bonds, Bills, and Inflation Yearbook 2007", Valuation edition	Realised equity returns in excess of the risk free rate (in US dollar terms)	US	1970-2005	4.75%
	Realised equity returns in excess of the risk free rate (in US dollar terms)	Canada	1970-2005	3.89%
	Realised equity returns in excess of the risk free rate (in US dollar terms)	UK	1970-2005	5.54%
	Realised equity returns in excess of the risk free rate	US	1926-2006	7.1%
Duke University Fuqua business school (2007)	Survey of US CFOs	US	2007	3.4%
Dimson, Marsh, and Staunton, "Global Investment Returns Yearbook 2006"	Arithmetic average premium over bonds	US	1900-2005	6.5%
	Arithmetic average premium over bills	US	1900-2005	7.4%
	Arithmetic average premium over bonds	UK	1900-2005	5.3%
	Arithmetic average premium over bills	UK	1900-2005	6.1%
	Arithmetic average premium over bonds	World	1900-2005	5.1%
	Arithmetic average premium over bills	World	1900-2005	6.1%

3.59 Firstly, although Digicel claims that enough information was not provided about the first four numbers in the table to assume that they were calculated in a consistent manner and should not be used in any averaging, the OUR notes that these numbers were all calculated by the same company (Morningstar), over the same time period, using the same stated method. The Office is therefore of the view that enough information was provided to suggest that the premiums were all estimated in a consistent manner. Secondly, the applicable Consultation Document used an average of all the numbers in the table rather than the 6 used in the version of the consultation to which Digicel is responding. Thirdly, Digicel states that it has no idea where one of the numbers (4.1%) used in the averaging came from, however paragraph 2.3 of the second Consultation Document (August 27, 2009 version) states "the OUR has decided to use the average of the results from the most recent (2007) studies presented by LIME along with the MRP used in the Consultation Document (also computed in 2007)". This is in reference to the first Consultation Document, Paragraph 3.14 of which states that "a recent study by the Schwab Centre for Investment Research, estimates the international market risk premium to be 4.1%". The paragraph also provided a link to the study by the Schwab Centre.

3.60 In reference to the approach the OUR used of averaging a number of equity risk premiums, Digicel further states "as well as not being legitimate it gives

the impression that the OUR is “shopping” for numbers it prefers. The Office again takes issue with the snide and defamatory approach Digicel has adopted in responding to the second Consultation Document and would urge Digicel to conduct itself with more professionalism in future consultative processes. If the OUR was “shopping” for a number as Digicel claims, it would have persisted with the 4.1% premium used in the first Consultation Document rather than give credence to any of the numbers in a Table submitted by LIME. At the very least, if OUR was “shopping” for a number it would have chosen one of the lower equity risk premium from the table. Indeed, the OUR’s decision to take an average of the numbers submitted by LIME shows its commitment for fairness and its desire to arrive at the right equity risk premium. By averaging the numbers in the table, the OUR was implicitly acknowledging that the right equity risk premium was somewhere within the range of values submitted in the table. Rather than show a preference for any particular number, an average was used to give equal weight to each.

- 3.70 In further response, Digicel claims that *“using 10 years Treasury Bonds the geometric mean less the RFR gives an ERP of 6.10%, and the arithmetic mean an ERP 7.73% for the period 1926 – 1998. An update of the series would be ideal but the end result is unlikely to differ significantly. We believe the evidence shows that the OUR’s averaged figure of 4.8% for US equity risk in addition to the RFR is not correct as was the method used to obtain it. The figure is clearly too low”*. The company then used an average of the geometric premium (6.10%) and the arithmetic premium (7.73%) to arrive at a point estimate for the equity risk premium of 6.92%. Frankly, the Office finds Digicel’s position in this regard preposterous as the high end value of its proposed ERP (7.73%) exceeds even the highest premiums in the table submitted by LIME. In fact, Digicel’s low range for the ERP (6.10) exceeds all of the upper range values of the ERP in Table 17 which shows the results from recent regulatory decisions. However, most importantly, it was arrived at using a period 1926-1998, which omits the most recent 11 years from the data set. The company then tries to validate using this period saying that an updated series is unlikely to differ significantly. In a footnote to supposedly strengthen its argument it states that *“suggestions that these figures will be different in future are supposition and until it occurs are unproved. One theory is that financial services/advisory firms that try to provide such forecasts are trawling for business when they make these claims”*. It is absurd to think that a data set 11 years removed from the present will still reflect investor’s attitude toward risk and risk aversion. The fact that risk aversion of the average investor changes over time is, the very reason why many analysts prefer to estimate the equity risk premium over a short time period. Damodaran (September 2008) highlights this flawed thinking as exposed by Digicel as one of the five myths about equity risk premiums when he states”

“There are widely held misconceptions about equity risk premiums that we would like to dispel in this section.

....

3. *The equity risk premium does not change much over time: Equity risk premiums reflect both economic fundamentals and investor risk aversion and they do change over time, sometimes over very short intervals. Shocks to the system – a collapse of a large company or sovereign entity or a terrorist attack – can cause premiums to shoot up overnight. A failure to recognize this reality will lead to analyses that lag reality.”*

3.71 There are a variety of approaches that can be used to arrive at the market risk premium. These include:

- using survey data;
- estimating the premium using historical returns;
- estimating the implied premium in asset prices.

Using survey data

3.72 The benefit of using survey data to arrive at an equity risk premium is that the survey method it is fairly simple and allows for the data to be gathered easily. The results in Table 14 show the outcome of a quarterly survey conducted by Duke University and CFO Magazine where senior level financial officers were polled on financial issues. The table shows that for the March 2008 quarter, the average and median market risk premium over the 10-year Treasury Security is 3.80 and 4.20, respectively. Since the beginning of the survey in the June 2000 quarter to the March 2008 quarter, the highest reported average 10-year market risk premium was 4.65 for September 2000, with the average over the entire period being 3.46. These figures are generally lower than the risk premium of 5.56% used by the OUR in its 2009 consultation on the cost of capital for telecommunications carriers in Jamaica. However, the drawback of using survey data can be quite serious. Damodaran⁵⁵ lists some of these limitations as follows:

- *there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)*
- *The survey results are extremely volatile*
- *they tend to be short term; even the longest surveys do not go beyond one year.”*

⁵⁵ Aswath Damodaran, 'From Risk & Return Models to Hurdle Rates: Estimation Challenges

Table 14 CFO Survey Market Risk Premium

Summary statistics based on the responses from the 32 CFO Outlook Surveys from June 2000 to March 2008

A. By quarter

Survey date	Survey for	Number of survey responses	10-year bond yield	Average 10-year risk premium	Median risk premium	Disagreement (standard deviation of risk premium estimates)	Average of individual standard deviations	Average of individuals' worst 10% market return scenario	Average of individuals' best 10% market return scenario	Skewness of risk premium estimates	Average of individuals' asymmetry
6-Jun-00	2000Q3	206	6.1	4.35	3.9	2.99				0.81	
7-Sep-00	2000Q4	184	5.7	4.65	4.3	2.70				0.49	
4-Dec-00	2001Q1	239	5.5	4.20	4.5	2.31				0.37	
12-Mar-01	2001Q2	137	4.9	4.46	4.1	2.59				0.38	
7-Jun-01	2001Q3	204	5.4	3.79	3.6	2.43				0.49	
10-Sep-01	2001Q4	195	4.8	3.77	3.2	2.53				-0.11	
4-Dec-01	2002Q1	275	4.7	3.98	3.3	2.34				0.66	
11-Mar-02	2002Q2	234	5.3	2.88	2.7	2.17	3.21	3.66	12.23	0.30	-0.23
4-Jun-02	2002Q3	321	5.0	3.18	3.0	2.50	3.41	3.11	12.15	1.96	-0.39
16-Sep-02	2002Q4	363	3.9	4.00	4.1	2.27	3.36	3.10	12.01	1.03	-0.25
2-Dec-02	2003Q1	283	4.2	3.71	3.8	2.39	3.19	3.38	11.83	1.31	-0.28
19-Mar-03	2003Q2	180	3.7	3.66	3.3	2.12	3.57	1.92	11.40	0.49	-0.60
16-Jun-03	2003Q3	368	3.6	3.89	4.4	2.34	3.74	2.17	12.07	0.89	-0.33
18-Sep-03	2003Q4	165	4.3	3.21	3.7	1.87	2.80	3.34	10.78	-0.02	-0.42
10-Dec-03	2004Q1	217	4.4	3.83	3.6	2.22	3.24	3.35	11.94	0.74	-0.46
24-Mar-04	2004Q2	202	3.7	4.10	4.3	2.06	3.46	2.84	12.00	-0.03	-0.28
16-Jun-04	2004Q3	177	4.8	3.04	3.3	2.28	3.06	3.11	11.20	0.96	-0.39
12-Sep-04	2004Q4	177	4.3	3.24	3.3	2.32	3.13	2.70	10.98	0.64	-0.47
5-Dec-04	2005Q1	291	4.4	3.20	3.2	2.63	3.00	3.16	11.10	2.01	-0.36
28-Feb-05	2005Q2	275	4.3	3.19	3.2	2.47	2.99	3.23	11.16	1.49	-0.32
31-May-05	2005Q3	318	4.1	2.98	2.9	2.21	3.17	2.50	10.88	0.50	-0.25
29-Aug-05	2005Q4	325	4.2	2.93	2.8	2.20	3.23	2.26	10.82	0.96	-0.50
21-Nov-05	2006Q1	342	4.5	2.39	2.5	2.14	3.40	2.35	11.38	0.57	-0.23
6-Mar-06	2006Q2	278	4.6	2.57	2.4	2.37	3.43	2.11	11.18	1.11	-0.36
1-Jun-06	2006Q3	300	5.1	2.69	3.0	2.69	3.26	3.10	11.70	2.00	-0.23
11-Sep-06	2006Q4	465	4.8	2.50	2.3	2.47	3.29	2.57	11.28	1.37	-0.23
21-Nov-06	2007Q1	392	4.6	3.21	3.4	2.92	3.31	2.98	11.75	1.93	-0.29
1-Mar-07	2007Q2	388	4.6	3.13	3.5	2.39	3.31	2.79	11.56	1.83	-0.38
1-Jun-07	2007Q3	419	4.9	2.84	3.1	2.12	3.20	3.10	11.38	0.61	-0.38
7-Sep-07	2007Q4	486	4.5	3.35	3.5	2.81	3.08	3.39	11.54	1.80	-0.33
1-Dec-07	2008Q1	465	4.0	3.78	4.0	2.73	3.25	2.99	11.60	1.47	-0.32
7-Mar-08	2008Q2	388	3.8	3.80	4.2	2.87	3.16	3.11	11.50	2.28	-0.29
Average of quarters		296	4.57	3.46	3.44	2.43	3.25	2.89	11.51	0.98	-0.35
Std. dev. of quarters			0.80	0.59	0.61	0.28	0.20	0.46	0.43	0.67	0.09

B. By individual responses

All surveys	9,074	3.35	3.21	2.51						1.16	
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Source: Graham, J. and C. Harvey, (2008), "The Equity Risk Premium in 2008: Evidence from the Global CFO Outlook Survey", Working Paper, SSRN.

Using Historical Returns

3.73 The market risk premium can also be estimated by taking the return on a market portfolio of stocks usually approximated by an index and abstracting from that return the risk free rate. However, when calculating the market risk premium, there are many issues which remain the subject of some debate. Chief among these issues is over what period historical returns should be assessed. A short time period using the most recent historical series may better reflect the current dynamics of the market and as such may be a better representation of the future risk premium. However, a short time period may produce a risk premium which is skewed in a particular direction by the presence of recent extraordinary events. Additionally, the shorter the time

period used, the greater is the standard error of the estimate. Conversely, if the risk premium is assessed over a long time period, recent outliers in one direction would likely be nullified by past outliers in the opposite direction. The limitations of this approach are that it presumes that the past is a good approximation for the future and that investors risk aversion does not change over time. Another concern relates to what type of average should be used that is, should the risk premium be based on an arithmetic mean or a geometric mean. If the equity risk premium is being estimated over a long time period the practice is to use the geometric average⁵⁶.

3.74 There is also the issue of the so called 'equity risk premium puzzle' where it is argued that historical equity risk premiums are higher than the amount which would be suggested using typical utility models for wealth⁵⁷.

3.75 Table 15 shows an evaluation of the market risk premium over three periods – a long run, mid range and a short run period. The estimation compared the

⁵⁶Source: http://www.wiley.com/college/fin/damodaran283320/dis/s_a_dis_07.html

"The conventional wisdom is that the arithmetic mean is the better estimate. This is true if:

1. *you consider each year to be a period (and the CAPM to be a one-period model)*
2. *annual returns in the stock and bond markets are serially uncorrelated*

As we move to longer time horizons, and as returns become more serially correlated (and empirical evidence suggests that they are), it is far better to use the geometric risk premium. In particular, when we use the risk premium to estimate the cost of equity to discount a cash flow in ten years, the single period in the CAPM is really ten years, and the appropriate returns are defined in geometric terms.

In summary, the arithmetic mean is more appropriate to use if you are using the Treasury bill rate as your risk-free rate, have a short time horizon and want to estimate expected returns over that horizon.

The geometric mean is more appropriate if you are using the Treasury bond rate as your risk-free rate, have a long time horizon and want to estimate the expected return over that long time horizon."

⁵⁷ It has even been argued by some that there is no equity risk premium; that this risk premium may exist over some time period but not over all time periods, and may be present in some market rather than all markets.

Jeff Kearns and Dakin Campbell - Bloomberg

"Buying 30-year Treasuries is returning more than stocks for the first time since Jimmy Carter was president. ... Over the last 30 years there's been no risk premium," said Douglas Cliggott, manager of the \$81 million Dover Long/Short Sector Fund, which has beaten 92 percent of its peers this year. "It's potentially earth shattering because the equity market hasn't delivered the goods."

<http://noir.bloomberg.com/apps/news?pid=newsarchive&sid=aR8JREWPNuYQ>

John Quiggin

"...over the entire period since 1979, a strategy of buying 30-bonds (trading so that the portfolio always holds the most recently issued bond) has outperformed the strategy of buying stocks and reinvesting the dividends.

This is earth-shattering (or, at least, potentially finance-sector-shattering) because it refutes one of the central assumptions of nearly all investment advice: that, provided you are in for the long haul, stocks always beat bonds. Robert Shiller in Irrational Exuberance pointed out that this was historically true for the US (for periods over 20 years) but not for some other markets. Now it's no longer true for the US.

Over longer periods, there is still a substantial equity premium; that is, the return to holding stocks exceeds that for bonds."

<http://johnquiggin.com/index.php/archives/2009/03/14/bonds-beat-stocks-in-%E2%80%98earth-shattering%E2%80%99-reversal/comment-page-1/>

returns from the S&P500 Index relative to the return on 10-year US Treasury Bonds which is the measure of the risk free rate as explained earlier. Based on the reason explicated earlier in this section, the appropriate measure of the historical market risk premium is the long run geometric average. In this regard, the risk premium is 4.11%.

Table 15 Market Risk Premium

Period	Arithmetic Average	Geometric Average	Standard Error
1928-2009	6.03%	4.11%	2.25%
1969-2009	3.04%	1.60%	3.22%
1999-2009	-2.32%	-5.32%	6.23%

Using the Implied Premium in Asset Prices

3.76 Techniques have also emerged to estimate the forward look equity risk by looking at the implied return in the price of assets. The benefit of these approaches is that they are prospective and market driven. In general, implied equity risk premium models tend to produce estimates of the equity risk premiums below that obtained using historical returns. According to Damodaran (September 2008), the average implied equity risk premium between 1960 and 2007 has been approximately 4.0%. Most models for estimating implied equity risk premium are built on the dividend discount model. An example is the Stable Growth DDM Premium Model as calculated using the following equation:

$$\text{Value of Equity}^{58} = \frac{\text{Expected Cashflows}}{(\text{Require Return on Equity} - \text{Expected Growth Rate})}$$

3.77 The equation is solved for the required return on equity after which, the risk free rate is abstracted from this return with the result being the implied equity risk premium. Damodaran (2008) estimated the implied equity risk premium in September 2008 to be 4.54%.

3.78 On September 2009, the S&P 500 index closed at 1044.55⁵⁹, at the time, the dividend and buyback yield was 3.71%⁶⁰. The average dividend and buyback yield over the previous 5 years was 5.89% however, this high growth rate

⁵⁸ In this equation cash flows include both dividend and stock buybacks, using only dividends may understate the premium.

⁵⁹ <http://www.econ.yale.edu/~shiller/data.htm>

⁶⁰ S&P Indices, December 14, 2009, 'S&P 500 Buybacks Rebound 44%; Remain 80% off Their High', Press Release.

cannot continue infinitely as such, this rate will be used as the growth rate in dividend and buyback yield for the succeeding 5 year period after which, the risk free rate of 3.01% will be used. Table 16 shows the cash flows from dividend and stock buybacks for the five years of high growth and then the first year of low growth. The dividend and buyback for the first year was calculated by multiplying the index value at September 2009 (1044.55) by the dividend and buyback yield for the corresponding period (3.71%), the result was then multiplied by the growth rate of 5.89%.

Table 16 Estimated Cash flows on S&P 500 Index - September 2009

Year	Dividend and Buyback
1	41.04
2	43.45
3	46.01
4	48.72
5	51.59
6	53.36

The Office estimated the implied equity risk premium as at September 2009 using the following equation:

$$1044.55 = \frac{41.04}{(1+r)} + \frac{43.45}{(1+r)^2} + \frac{46.01}{(1+r)^3} + \frac{48.72}{(1+r)^4} + \frac{51.59}{(1+r)^5} + \frac{53.36}{(r-0.0342)(1+r)^5}$$

- 3.79 The equation is then solved for the required rate of return, with the result being 7.35%. The risk free rate (3.01%) is then subtracted from the return. This yields an implied equity risk premium of 4.34%.
- 3.80 The preceding discussion has shown the results from the various methods that can be used to estimate the equity risk premium. This shows that the long run historical equity risk premium ranges between 4.11% - 6.03% depending on the averaging technique used, the implied equity risk premium in the stock market is 4.34%, and the average survey premium in March 2008 was 3.80%. The Office has decided to use the range given by the historical calculations in spite of the issues identified about the 'equity risk puzzle'. It is the view of the Office that this range guards against any risk of underestimation. Table 17 shows that the Office's range for the market risk premium is in line with that used by regulators in recent regulatory decisions.

Table 17 Recent Regulatory Decisions on Market Risk Premium

	Fixed	Mobile
OUR - Determination (2010)	4.11% - 6.03%	4.11% - 6.03%
TRA (2009)	4.10% - 5.10%	4.10% - 5.10%
URCA (2009)	4.00% - 6.00%	4.00% - 6.00%
FICORA (2008)	-	4.06%
Ofcom (2009 and 2007, respectively)	5.00%	4.50% - 4.55%
ComReg (2008)	4.80% - 6.00%	-
ICT (2008)	6.00%	6.00%
MCA (2008)	5.00% - 6.00%	5.00% - 6.00%

Determination 10

The applicable market risk premium for fixed line and mobile operators is 4.11% - 6.03%.

Additional Risk Premiums

Small Cap Premium

3.81 Digicel's position on small cap premium is that it "is fully consistent with modern portfolio theory upon which CAPM is based, which states that risk is linked with return. Small-cap stocks unquestionably carry higher risks than large-cap stocks, hence they deliver higher returns". In support of its position Digicel claims that "one of the World's leading experts Aswath Damodaran⁶¹ of the Stern School of Business, states,

"[T]here are two ways in which we can respond to the empirical evidence that small market cap stocks seem to earn higher returns than predicted by the traditional capital asset pricing model. One is to view this as a market inefficiency that can be exploited for profit: this, in effect, would require us to load up our portfolios with small market cap stocks that would then proceed to deliver higher than expected returns over long periods. The other is to take the excess returns as evidence that betas are inadequate measures of risk and view the additional returns as compensation for the missed risk. The fact that the small cap premium has endured for as long as it has suggests that the latter is the more reasonable path to take."

3.82 The Office finds the statement made by Digicel to be incorrect. The CAPM indeed links risk and return however, it differentiates between systematic or

⁶¹ Damodaran (2008)

market risk⁶² and unsystematic risk which is specific to a particular company and can be avoided by holding a diversified portfolio. Under this model, investors are only rewarded for market risk. While, the inclusion of a small cap premium can be justified under other risk models, it cannot be justified under the CAPM, the Office remains committed to the use of the CAPM as it remains the most trusted model of risk and return. A discussion on the CAPM versus other risk model was done in the earlier section of this determination.

- 3.82 The Office also finds this to be a misquotation of Professor Damodaran as it seeks to give the impression that he is in agreement with the position of Digicel on this matter. Damodaran prefaces the section quoted by Digicel by stating:

“For the first part of this section, we stay within the US equity market and consider the practice of adjusting risk premiums for company-specific characteristics, with market capitalization being the most common example”.

- 3.83 This clearly indicates that Damodaran views the small cap premium as “company-specific” risk which as pointed out earlier is not accommodated under the CAPM contrary to Digicel’s claim. The Professor further states that:

“while the empirical evidence supports the notion that small cap stocks have earned higher returns after adjusting for beta risk than large cap stocks, it is not as conclusive, nor as clean as it was initially thought to be. The argument that there is, in fact, no small cap premium and [what] we have observed over time is just an artefact of history cannot be rejected out of hand.”

- 3.84 Additionally, in subsequent paragraphs to that which is quoted by Digicel, Damodaran definitively gives his position on the matter when he states:

“While the small cap premium may seem like a reasonable way of dealing with the failure of the CAPM, there are significant costs to using the approach.

- a. *Standard Error on estimates: One of the dangers we noted with using historical risk premiums is the high standard error in our estimates. This danger is magnified when we look at sub-sets of stocks, based on market capitalization or any other characteristic, and extrapolate past returns. The standard errors on the small cap premiums that are estimated are likely to be significant, as is evidenced in table 7.*

⁶² Market risk is risk that affects the entire class of assets and cannot be avoided through diversification.

- b. Small versus Large Cap: At least in its simplest form, the small cap premium adjustment requires us to divide companies into small market companies and the rest of the market, with stocks falling on one side of the line having much higher required returns (and costs of equity) than stocks falling on the other side.
- c. Understanding Risk: Even in its more refined format, where the required returns are calibrated to market cap, using small cap premiums allows analysts to evade basic questions about what it is that makes smaller cap companies riskier, and whether these factors may vary across companies.
- d. Small cap companies become large cap companies over time: When valuing companies, we attach high growth rates to revenues, earnings and value over time. Consequently, companies that are small market cap companies now grow to become large market cap companies over time. Consistency demands that we adjust the small cap premium as we go further into a forecast period.
- e. Other risk premiums: Using a small cap premium opens the door to other premiums being used to augment expected returns. Thus, we could adjust expected returns upwards for stocks with price momentum and low price to book ratios, reflecting the excess returns that these characteristics seem to deliver, at least on paper. Doing so will deliver values that are closer to market prices across assets, but undercuts the rationale for intrinsic valuation, i.e. finding market mistakes.”

3.85 NERA also recommends the inclusion of a small-cap premium contending that the difference between the size of the LIME and the size of the comparators used in the second consultation is stark with all the comparators being significantly larger than LIME. Using estimates of these large companies is likely to underestimate the true riskiness of LIME’s shares. Further, regulators in other jurisdictions have acknowledged the need for a small company premium for smaller regulatory firms with Of tel’s work on prices for mobile service providers cited as an example.

3.86 It is true that LIME with a market capitalisation of US\$91 million⁶³ is significantly smaller than all the comparators used in the second consultation, where the smallest company in the sample of comparables had a market capitalisation of US\$18.4 billion. If this was indeed a valid argument for the inclusion of a small cap premium, the necessity of this premium would now be in question given the size of the new set of comparable companies. The

⁶³ Figure presented by NERA in response to the second consultation.

largest firm in the current set of fixed line comparable companies has a market capitalisation of US\$16.7 billion with another company having a market capitalisation equivalent to that of LIME. Of the set of comparable mobile service companies, 11 of the 13 companies have a market capitalisation lower than US\$12 billion.

- 3.87 Both NERA and Digicel have strenuously argued against the use of any methodology or variable that is not in keeping with the standard global regulatory practice yet strangely they both lobby for the inclusion of a small cap and or illiquidity premium which is not generally supported by regulatory precedence. In fact, NERA makes reference the work of Ofstel rather than Ofcom to support its argument although Ofstel has been defunct since 2003. Since Ofcom took over the functions of Ofstel it has engaged in a number of consultations pertaining to the pricing of mobile services however, as far as the Office is aware, none of these have included a small cap premium⁶⁴. In any case, the Office considers the inclusion of any small cap premium to be double counting as this premium would have already been included in the country risk premium. This point is further explained in the subsequent section.

Illiquidity Discount

- 3.89 An illiquidity discount refers to the practice of adjusting the value of an asset to take account of how easily it can be traded. Under this theory, the price of a highly liquid asset should be higher than the price of a similar asset that is more illiquid. The cost of illiquidity is generally measured by transaction cost with assets that are more liquid having lower transaction costs. There are three aspects of risks associated with transactions costs, these are:
- a. High bid – ask spreads: this is the difference between what buyers will pay and what sellers will receive;
 - b. The impact trading has on prices: transacting in the assets may push the price of the asset in the direction of the transaction. That is, buying the asset may cause the price to increase and selling may cause the price to decrease.
 - c. Opportunity cost associated with waiting to trade: being a patient trader may reduce the risk associated with the first two aspects but it may lead to loss of a profitable opportunity.

⁶⁴ The Office does not claim to be an expert on the work of Ofcom and welcomes any correction on this matter.

- 3.90 Digicel presented a graph from Damodaran (2005)⁶⁵ where he presented the results of a regression study by Silber (1991)⁶⁶ using data on restricted stocks which sought to estimate a firm-specific illiquidity discount. Silber found that illiquidity discount was smaller for firms with higher revenues. The graph in question posited a base discount of 25% for profitable companies with revenue of US\$10 million, a premium which Digicel suggests is likely to understate the discount which should apply to its own business since the study relates to U.S. businesses and volatility in Jamaica would be lower.
- 3.91 It is worth noting that Digicel's revenue over the financial years 2008 – 2009 was significantly above US\$10 million and therefore a premium lower than 25% would not be applicable to Digicel if the results of the Silber study were to be adopted. Additionally, if an illiquidity discount was to be applied on the basis of Silber study, it would suggest rewarding a firm for being unprofitable as it indicates higher illiquidity discounts for unprofitable companies⁶⁷, this much like the idea of including special incentives in the CAPM for private companies is inappropriate in a regulatory environment. In any case, Damodaran (2005) went on to caution against the dangers of extending a regression run on a small number of restricted stocks when estimating discounts for private firms. Damodaran further summarised that "*there are legitimate criticisms that can be mounted against the regression approach. The first is that the R squared of these regressions is moderate (30-40%) and that the estimates will have large standard errors associated with them. The second is that the regression coefficients are unstable and likely to change over time.*"
- 3.92 In the risk and return models that have developed from conventional portfolio theory, in particular the CAPM, there is no allowance for company specific risks such as an illiquidity of a particular stock, only market risk is compensated for as it cannot be avoided. Damodaran (2005) indicates as much when he states "*in conventional asset pricing models, the required rate of return for an asset is a function of its exposure to market risk. Thus, in the CAPM, the cost of equity is a function of the beta of an asset, whereas in the APM or multi-factor model, the cost of equity is determined by the asset's exposure to multiple sources of market risk. There is little in these models that allow for illiquidity. Consequently, the required rate of return will be the same for liquid and illiquid assets with similar market risk exposure*".
- 3.93 Even if the argument could be made that companies in the Jamaican market face higher transaction costs and as such illiquidity is a legitimate market risk,

⁶⁵ Aswath Damodaran, 2005, *Marketability and Value: Measuring the illiquidity Discount*, Stern School of Business.

⁶⁶ Silber, W.L., 1991, Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices, *Financial Analysts Journal*, v47, 60-64.

⁶⁷ The graph presented by Digicel on the illiquidity discount in its response to the second Consultation Document was different from that which was presented in Damodaran (2005) as it was modified from to only show the results for profitable companies.

the inclusion of a specific premium for illiquidity would still be inappropriate as it would be double counting risk which is already accounted for in the country risk premium. The country risk premium used in the estimation of the cost of capital is the sovereign default spread. The country risk premium is the difference between the yield on GOJ U.S. dollar sovereign bonds and the risk free rate. The notion that investors will pay less for illiquid assets applies to bonds just as much as it applies to equities. The risk free rate used is the yield on U.S. 10-year Treasury securities which are highly liquid and hardly contains any illiquidity premium. On the other hand, the yield on GOJ treasury securities is highly illiquid compared to the risk free rate. This illiquidity will manifest itself in the form of higher yields on GOJ security thus rewarding investors for higher transaction costs of holding these bonds. Damodaran (2005) summarises this when he presents the results of a number of studies on this effect and states as follows:

“Chen, Lesmond and Wei (2005) compared over 4000 corporate bonds in both investment grade and speculative categories, and concluded that illiquid bonds had much higher yield spreads than liquid bonds. ... Not surprisingly, they find that liquidity decreases as they move from higher bond ratings to lower ones and increases as they move from short to long maturities. ... Subordinated bonds: A study of 211 subordinated bonds issued by 22 large banks in the United States concluded that more illiquid bonds trade at higher default spreads than otherwise similar liquid bonds. ... Looking across the studies, the consensus finding is that liquidity matters for all bonds, but that it matters more with risky bonds than with safer bonds⁶⁸...”

- 3.94 Additionally, higher than average betas were chosen for local fixed line and mobile services companies which provide compensation for the inherent illiquidity of the local companies. This will be explained further in the beta section. The Office is therefore confident that the risk of illiquidity/small size is already accounted for in the country risk premium and beta used. The URCA and TRA came to similar conclusions in their recent decisions on the cost of capital.

URCA (2009)

“URCA does not deny the insights provided by the small company risk discount theory, but notes that in setting the cost of capital it has allowed the [significant market power] SMP operators country risk premiums on the cost of equity and on the cost of debt. These premiums partly reflect the fact that Bahamian companies are generally smaller, are less well resourced and have more limited access to capital markets than many overseas firms. Therefore, these allowances

⁶⁸ While these studies specifically relate to corporate bonds, the general finding will certainly be similar for emerging market bonds which are less liquid than mature market bonds.

already allow for the small company effect, and making further allowances by excluding large companies from the peer group may amount to double-counting.⁶⁹

TRA (2009)

“Regarding liquidity, TRA has sought to quantify the order of magnitude of the premium investors might require in addition to the country risk premium, as compensation for the lower liquidity of the Bahrain All-share index relative to the national equity indices on which the estimate of the world ERP is based. TRA is therefore of the view that the additional risk of investing in Bahrain equities, relative to a diversified world equity index, is adequately represented by the country risk premium and an uplift of 50bp to the world ERP to compensate investors for lower liquidity of the Bahraini market. To the extent that lower liquidity might be already captured by the country risk premium, this reflects TRA’s overall conservative approach to this Determination”.

Private Company Equity Risk

3.95 Digicel has argued for adjustment of the betas used in the CAPM to account for private company equity risk as Digicel contends that these companies face additional risk. It is Digicel’s view that *“without adjustments to the CAPM model, betas for private firms will understate their market risk and their cost of capital.”* While the Office acknowledges that private firms may be more risky than public firms due to being more illiquid, this represents a firm specific risk and not a market risk. Market risk by definition is risk that is common to all companies in a market. It is therefore a fallacy to claim that CAPM betas underestimate market risk for private firms - if it only applies to private firms then it cannot be market risk. Digicel further claims that:

“It cannot then be assumed that Digicel’s cost of capital can be valued as if Digicel was a public firm. A time may be reached in a number of years when it can be argued that this should be done for regulatory purposes as future circumstances may suggest that the company should eventually go public. But as Digicel remains a rapidly growing entrepreneurial company in a very difficult financial period, that time is still a number of years off. It must therefore be the case that any regulation of a price of a service which Digicel supplies that involves the use of a WACC figure should reflect the fact [that] Digicel is a private entrepreneurial company where equity is not fully diversified. Digicel thus incurs a higher cost of capital than it would if it was a public

⁶⁹ The OUR did not add a country risk premium in its cost of debt as it used actual yield to maturity on debt issued by local telecommunications companies, which would have already implicitly include a country risk premium.

company. If for example a mobile service is to be price regulated in the future, the WACC used must take into account the financial reality faced by easily Jamaica's largest player – Digicel. A WACC that is set for a hypothetically public mobile company does not reflect that reality. For the OUR to adopt such an approach would under-compensate Digicel and expose the OUR to accusations of opportunism. Digicel would have no choice but to vigorously contest such a decision."

3.96 Digicel proceeds to quote a section of Professor Damodaran's work on 'valuing private firms' as he demonstrates one of a number of methods for estimating the cost of equity for private firms and in particular how to adjust for situations where the owners of these firms have most of their wealth invested in the company. However it is worth noting that Damodaran (2001)⁷⁰ stresses at several points in his book, most notably in the introduction and conclusion to this section that how private firms are valued depends on the purpose of the valuation. Damodaran specifically addressed valuing private companies for two cases:

1. For sale to a private entity; and
2. For sale to a publicly traded firm or for an initial public offering.

3.97 In this regard Damodaran states:

"When valuing private firms, the motive for the valuation matters, and can affect the value. In particular, the value that is attached to a publicly traded firm may be different when it is being valued for sale to an individual, for sale to a publicly traded firm or for an initial public offering. In particular, whether there should be a discount on value for illiquidity and non-diversifiable risk or a premium for control will depend upon the motive for the valuation. ...

The absence of historical price information for private firm equity and the failure on the part of many private firm owners to diversify can create serious problems with estimating and using betas for these firms. ...

When valuing a private firm for sale to an individual or private entity, we have to consider three specific issues. The first is that the cost of equity, which we have hitherto assumed to be determined purely by the risk that cannot be diversified, might have to be adjusted for the fact that the potential buyer is not well diversified. The second is that equity holdings in private businesses are illiquid, leading to a discount on the estimated value. The discounts on restricted stock issues made by publicly traded firms or the bid-ask spreads of these firms may provide

⁷⁰ Aswath Damodaran, 2001, *Investment Valuation: Second Edition*, John Wiley and Sons

us with useful information on how large this discount should be. The third is that a controlling interest in equity of a private firm can trade at a significant premium over a minority interest.

The valuation of a private firm for sale to a publicly traded firm or initial public offering follows a much more conventional route. We can continue to assume that the cost of equity should be based only upon non-diversifiable risk and there is no need for an illiquidity discount. There can still be a control value, if less than a controlling interest is sold to the publicly trade firm or if non-voting shares are issued in the initial public offering”.

- 3.98 The Office agrees with Damodarn when he indicates that how a private firm is valued will depend on the purpose of the valuation. The Office further believes that in the case of regulation, the inclusion of additional factors for private company equity risk or use of ‘total risk betas’ is unjustified. Giving a company a higher cost of capital on the basis that it is a private company, amounts to punishing other companies in the industry for being public. This would be illogical and has no place in a regulatory environment where fairness and equity are paramount to a competitive environment. If the Office decides to set termination rates, the cost of capital will be an essential input in this process, Digicel is essentially claiming that it should be allowed to charge higher termination rates than LIME for instance purely because of the fact that LIME is a public company and Digicel is a private company. The Office can see no place for this sort of discrimination in the industry.
- 3.99 A company may choose the benefits associated with private equity such as having greater control over the company and the possibility of making higher returns ahead of the benefit of greater liquidity associated with being a public company. If for any reason, the company believes that the benefits of being public outweigh that of being private then that company can simply go public. The fact that Digicel chooses to remain private is a decision of the company for which it cannot be rewarded by a regulator. Digicel states that it is “easily Jamaica’s leading player” and as such, it is quite possible that Digicel may in fact be the least risky of all the telecommunications operators in Jamaica, even when compared with those that are public companies.⁷¹ Notwithstanding the claim that Digicel is “easily Jamaica’s leading player”, the company suggests that its equity is more than twice as risky as LIME’s, having calculated its cost of equity as being 44.70% versus its estimate of 21.28% for LIME. The Office finds this position untenable. It is standard industry practice that where the cost of capital is to be derived for private companies, the estimate is done by doing the calculation for comparable

⁷¹ The OUR is not saying that this is the case, it is simply alluding to the fact that although illiquidity is greater for private companies relative to public firms, this may be outweighed by the benefits of size and market control.

public firm. In this regard, the Malta Communications Authority (MCA)⁷² determined that “where companies are not publicly traded, their betas should be estimated by reference to the betas of comparable companies operating in the electronic communications sector, as adjusted to take into account the effect of financial leverage and tax rates”. This is exactly the procedure used by the OUR.

Real Options

3.100 Real options theory is generally concerned with the rights of the business to make decisions. “Real options capture the value of managerial flexibility to adapt decisions in response to unexpected market developments. ... The real options method applies financial options theory to quantify the value of management flexibility in a world of uncertainty.”⁷³ While this is a relatively new area in investment valuation, Ofcom carried out an analysis in its consultation document titled ‘Ofcom’s Approach to Risk in the Assessment of Cost of Capital’ published January 26, 2005 and came to the following conclusions

“Ofcom proposes that the value of wait and see options is likely to be:

- significant in the case of next generation access Carriers;
- relevant to a degree in the case of next generation core Carriers; and
- small in other cases

3.101 Digicel continues to argue for the inclusion of addition premiums to account for real options. The company claims that while it accepts that the value of real options is small for traditional fixed networks, the value should be higher for mobile network investment. Based on the findings of Ofcom, the option which is most valuable is the “wait and see option”⁷⁴. This option is thought to be of greatest value in the case of next generation access carriers, relevant to a degree in the case of next generation core networks, and negligible in all other cases. While LIME and Claro have both launched partial 3G service, the Office is not aware of any of local carriers having a next generation access or core network. In the case of LIME and Claro, their 3G networks have been launched in stages which lessen the risk of the investment as the companies will be better able to forecast demand for the product. Furthermore, real options theory attempts to compensate investors for unsystematic risk thus violating the underlying assumption of the CAPM which is that investors should only be compensated for systematic risk as all other

⁷² Malta Communications Authority, 2008, *Decision and Further Consultation on Estimating the Cost of Capital*.

⁷³ <http://www.real-options.org/>

⁷⁴ If an investment is reversible, then the value of wait and see options will not be significant.

risk can be nullified by having a diversified portfolio. Given the Jamaican context, the Office is of the view that there is no need for the inclusion of real options in the estimation of the cost of capital for telecommunications Carriers in Jamaica. The Office, continues to have serious concerns about the practical applicability of real options, there is as yet no consensus or regulatory precedent as to the need or method of applying real options to regulation.

Determination 10

The Office finds that there is no basis for the inclusion of additional factors for small size, illiquidity, private equity, or real options.

BETA

- 3.102 The beta coefficient measures the systematic risk of investing in a company's equity. The CAPM is built upon the insight that investors will be rewarded for bearing only those risks, called systematic risks that cannot be diversified. Specifically, beta measures the risk that a stock adds to a diversified market portfolio. A stock with more risk than the market will have a beta greater than one and a stock with less risk will have a beta lower than one.
- 3.103 Digicel questions why the OUR did not use a set of comparable companies from emerging markets in the region to estimate beta given that these would provide better estimates of Digicel's beta. NERA contends that the *"the OUR's approach towards selecting comparators is likely to underestimate the systematic risk of regulated telephone services in Jamaica. The OUR only selects comparators which operate in mature markets, where the telephone services are considered a 'necessity'."*
- 3.104 The Office recognises that there are merits in the suggestion to use comparators from emerging markets or from the region however, it maintains that by using a set of comparable companies from a wide cross section of countries, including Mexico it presents an unbiased estimate of industry beta. It should also be noted that some of the companies used in the sample of comparable companies in the second Consultation Document also have operations in the region such as Telefonica S.A which has operations in Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Peru, Puerto Rico, and Venezuela. There are also other companies in the sample such as Deutsche Telecom which operate in other developing markets outside the region such as Hungary, Croatia, Romania, and Montenegro. As such, the beta of Telefonica and Deutsche Telecom will be impacted by its operations in these countries. The argument could also be made that telephone is as much a necessity in Jamaica as it is in mature markets, especially in the case of mobile communication where the

penetration rate has long been above 100% with persons even having multiple phones. Therefore, the Office remains convinced that its approach of using a global set of comparable companies provides a fair and unbiased estimate of beta for telecommunications companies in Jamaica.

3.105 NERA further stated that the 'necessity' characteristic of telecommunications service in emerging markets may be lower than that of more mature markets and suggests the inclusion of comparators of similar size operators in smaller emerging markets where demand for telecommunications service is likely to be more exposed to the effects of business cycles. The claim of higher exposure to business cycles may in fact be quite true in the case of fixed line services however, for mobile service this may not hold. Table 18 shows that mobile subscription has increased in every year since 2000, even over the period of the recent global recession. However, the Office is not against the idea of including some smaller companies from smaller emerging markets in the set of comparable firms, which has indeed been done as shown by Table 12 and Table 13. However, there are practical difficulties with finding publicly listed companies with reliable market data which are the same size as our local companies. Additionally, given the inclusion of a country risk premium which takes account of factors such as illiquidity of the local market and using high end betas, using a sample of only small firms would amount to double compensation.

Table 18 Penetration Rates for Mobile, Fixed line and Broadband Based on Subscription ('000)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Population	2,597	2,613	2,625	2,632	2,644	2,657	2,670	2,682	2,692	2,699
Mobile	250	598	1,245	1,576	1,848	1,981	2,275	2,684	2,723	2,956
Fixed	507	511	435	450	423	319	343	370	317	302
PENETRATION										
Mobile	9.62%	22.88%	47.43%	59.89%	69.87%	74.58%	85.21%	100.08%	101.15%	109.53%
Fixed	19.53%	19.57%	16.56%	17.10%	16.00%	12.01%	12.84%	13.78%	11.76%	11.21%

3.106 Digicel indicated that in the case of LIME, it does not see why the OUR did not estimate LIME's beta since the company is traded publicly. Given the small size of the JSE, the Office does not see any usefulness of using any data from the local stock market in its CAPM estimation. The result of any CAPM variable estimated using JSE data would be highly questionable, unreliable, and serve as little more than anecdotal evidence.

3.107 The CAPM is a prospective measure and as such, the appropriate beta for the model is not the beta that best reflects the past riskiness of the company but rather the beta that best symbolises the future risk of the company relative to

the market portfolio. In this regard, in past estimates of the cost of capital, the OUR utilised predictive betas sourced from BARRA⁷⁵. These betas are expected to be better predictors of future risk than betas computed purely from historical returns using standard ordinary least squares (OLS) regression. Digicel however argued against the use of Barra betas saying that there is no proof that they perform better than historical regression betas and it is not used by other regulators. NERA states that "*BARRA does not provide details of their methodology and the results cannot be empirically verified and therefore cannot be subjected to scrutiny*". The Office accedes to the points made against the use of BARRA betas and abandons the use of these betas in favour of more traditional regression betas.

- 3.108 Digicel further claims that "*the average beta for Wireless network companies in the USA is 1.28 according to Damodaran using data supplied by ValueLine. On average fixed line providers in the USA appear to have a beta of 1.06. We should have no expectation that mobile or fixed licensees in Jamaica will have betas close to these values*".
- 3.109 The Office is unclear of the exact source of these betas which Digicel attributes to Damodaran as Digicel did not divulge its source document. However, from Damodaran's latest data on beta from his website⁷⁶ he reports an average beta of 1.50 and 1.10⁷⁷ for wireless network companies and fixed line companies in the U.S., respectively. Damodaran also reported an average beta of 0.66 for wireless telecoms companies and 0.61 for telecom services (fixed line) companies in emerging markets. Therefore, Digicel's conclusion that companies in Jamaica would not have betas anywhere close to the level of telecommunications companies in the U.S. appears to be well founded albeit, not in the direction which Digicel seems to think. Digicel further presents two tables from Ofcom's 2003 investigation into mobile telecoms which show betas ranging from 1.0 – 2.7 for various mobile operators in the U.K. While data from 2002-2003 may provide some indication of what betas were in the past it is hardly likely to reflect current or even future estimates of Beta. In fact, Ofcom's 2009 '*Estimate of Equity Beta for UK Mobile Owners*'⁷⁸, prepared by the Brattle group, the same group that prepared the data in one of the tables presented by Digicel, reported up-to-date betas averaged across all companies ranging from 0.48 to 0.66 as shown in Table 19.

75 BARRA is an internationally known financial consulting firm providing risk measurement services to investment managers, corporations, consultants, securities dealers and traders, and master custodians.

⁷⁶ http://pages.stern.nyu.edu/~adamodar/New_Home_Page/

⁷⁷ The OUR is not aware if the data used to estimate the beta is from Value Line as it was not stated.

⁷⁸ Caldwell, R., Lapuerta, C., 2009, 'Estimate of Equity Beta for UK Mobile Owners', the Brattle Group <http://stakeholders.ofcom.org.uk/binaries/consultations/wmctr/annexes/equitybeta.pdf>. Note that this report looks at the beta for the parent companies of four of UK mobile phone companies which Ofcom intends to use for the level of mobile termination charges.

Table 19 Up-to-date Beta Estimates

	1 Yr				2 Yr			
	Beta	SE	Low	High	Beta	SE	Low	High
<i>Vodafone</i>								
All-Share	0.77	0.07	0.64	0.90	0.84	0.04	0.76	0.92
All-World	0.52	0.08	0.35	0.68	0.66	0.06	0.54	0.78
All-EU	0.56	0.06	0.44	0.68	0.71	0.04	0.63	0.80
<i>Telefonica</i>								
All-Share	0.47	0.04	0.40	0.54	0.67	0.03	0.61	0.72
All-World	0.48	0.05	0.38	0.58	0.64	0.04	0.56	0.73
All-EU	0.53	0.04	0.46	0.60	0.72	0.03	0.67	0.77
<i>France Telecom</i>								
All-Share	0.35	0.05	0.25	0.44	0.51	0.03	0.45	0.58
All-World	0.40	0.06	0.27	0.52	0.55	0.05	0.46	0.64
All-EU	0.41	0.05	0.32	0.50	0.57	0.03	0.50	0.63
<i>Deutsche Telekom</i>								
All-Share	0.46	0.05	0.36	0.57	0.62	0.04	0.54	0.69
All-World	0.54	0.07	0.40	0.67	0.69	0.05	0.58	0.79
All-EU	0.48	0.05	0.38	0.59	0.64	0.04	0.56	0.72
<i>Simple Average Across Companies</i>								
All-Share	0.51				0.66			
All-World	0.48				0.64			
All-EU	0.50				0.66			

Source: Caldwell, R., Lapuerta, C., 2009, 'Estimate of Equity Beta for UK Mobile Owners', the Brattle Group

- 3.110 Estimating the beta for a particular company through regression requires regressing the returns from a stock against the returns from the market. In this case, the market is usually approximated with an index. The regression equation is as follows:

$$R_i = \alpha + \beta R_m$$

where,

R_i is the return for the company
 R_m is the return for the market

- 3.111 There are a number of factors that can impact the outcome of the beta obtained from the typical OLS regression. These include the choice of the index, the frequency of the returns, and the length of the data series. Gray⁷⁹ et al. (2005) found that standard OLS beta estimates based on four years of monthly data performed worse than almost every alternative that was considered. IRG (2007) indicated that betas obtained from regression analysis of historical information are likely to contain estimation error because betas vary significantly over time. As such the IRG states that historical betas

⁷⁹ Gray, S., Hall, J., Bowman, J., Brailsford, T., Faff, R., and Officer, B., 2005, *The Performance of Alternative Techniques for Estimating Equity Betas of Australian Firms*, Prepared for the Energy Networks Association.

may need to be complemented with other forward-looking approaches. In this regard, many data providers use adjusted-regression estimated of beta. The Office will make use of one such method, the Blume-adjusted estimate, similar to that used by Bloomberg, Value Line, and Merrill Lynch. This adjustment is also used by a number of regulators, these include URCA and TRA. The process for calculating Blume-adjusted estimate⁸⁰ is as follows:

$$\beta_a = \beta_r(0.67) + 1.00(0.33)$$

where,

β_a is the adjusted beta

β_r is the unadjusted OLS regression beta

- 3.112 This adjustment pushes the regression betas closer to one, those below one are increased and those above one are decreased. The rationale for this adjustment is that studies have shown that over time, the beta of all companies tend to move towards one.

Measurement Issues

Market index

- 3.113 Beta is intended to measure the risk added to a diversified market portfolio by a particular stock. In this regard, the returns of the company should ideally be measured against the market portfolio. However, this is impracticable given the scale of the market. In this case, it is standard practice to approximate the market using an index – a subset of the market. The Office has chosen to use the S&P 500 index as its proxy for the market. This is one of the most widely used indices in beta and CAPM estimation. The choice of the S&P 500 index is also appropriate give that the estimation is being done in U.S. dollars and the majority of the comparable companies used in the estimation are listed on one of the stock exchanges in America.

Frequency of Returns

- 3.114 The CAPM is silent on the frequency of the returns that should be used in the estimation of beta. Using a short return period such as daily or intra-day allows for more data points to be captured but estimates may be biased by non-trading during the return period. Using yearly, semi-annual, or quarterly returns avoids the non trading problem but severely restricts the number of

⁸⁰ Aswath Damodaran, 2006, *Estimating Risk Parameters*.

"Most other services use similar techniques, with small differences in the weights attached to each number."

observations available. The Office used both weekly and monthly returns in its estimation of beta.

Time Period

3.114 The CAPM also does not speak to the period over which beta should be estimated therefore, different persons will choose different periods based on what they deem to be appropriate, with each choice having its advantages and limitations. Typically, beta is estimated over a period of 1 – 5 years depending on the frequency of the data used. The benefit of using a longer time period is that it increases the sample size and possibly the robustness of the estimate. However, this is counterbalanced by changes the company may have undergone in the recent past. A shorter time period captures the current state of the company but the loss of data points may affect the reliability of the estimate. Using weekly returns, beta will be estimated using 3 years of data and with monthly returns, beta will be estimated using 5 years of data.

Estimating Beta

3.115 The Office estimated beta using five years of monthly returns, and three years of weekly returns regressed against the returns from the S&P 500 Index. The Blume-adjustment was then applied to the estimated beta. Finally, to take account of differences in the financial leverage of the comparable companies, the adjusted betas were unlevered and re-levered using the optimal market gearing. NERA highlights that this was missing from the approach used by the OUR in its second consultation which may have led to beta estimates lower than those used by other regulators. The formula for unlevering beta is as follows:

$$\beta_u = \frac{\beta_L}{1+(1-t)(D/E)}$$

where,

β_L is the levered (raw) adjusted beta

β_u is the unlevered beta

t is the corporate tax rate

D/E is the debt/equity ratio

3.116 As suggested by NERA in LIME's confidential report to the OUR, the average beta for the set of comparable companies will be used as the lower range for the estimated beta of local operators. In recognition that local companies may have betas higher than operators in more mature markets, the upper 95% confidence interval of the betas from the set of comparable companies will be used as the upper limit of the range for the beta of local operators. The

results as shown in Tables 20 and 21, indicate that the equity (re-levered) beta for fixed line networks ranges between 0.63 – 0.91 whereas for mobile networks it is between 0.80 – 1.14 (the full tables are shown at Appendix B).

Table 20 Beta of Comparable Fixed Line Companies

Fixed Line Companies	Unlevered		Re-levered (10% Gearing)		Re-levered (30% Gearing)	
	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta
British Telecom	0.63	0.52	0.68	0.56	0.82	0.68
CenturyLink	0.58	0.55	0.62	0.59	0.73	0.69
Comptel Europe N.V	0.53	0.27	0.57	0.29	0.68	0.35
Frontier Communications Corporation	0.40	0.44	0.42	0.47	0.50	0.56
Kingston Communications	0.87	0.61	0.94	0.66	1.14	0.80
Telecomunicações de Sao Paulo S/A-Telesp	0.70	0.82	0.75	0.88	0.90	1.05
Telefonos de Mexico, S.A.B. de C.V. Telmex	0.77	0.68	0.84	0.73	1.01	0.89
Windstream Communications	0.56	0.54	0.60	0.58	0.71	0.68
Consolidated Communications Holdings Inc.	0.54	0.52	0.58	0.56	0.68	0.66
RCN Corporation	0.73	0.76	0.77	0.81	0.91	0.96
SureWest Communications	0.12	0.39	0.12	0.42	0.15	0.50
Vonage Holdings Corp.	N/A	0.97	N/A	1.04	N/A	1.22
Mean	0.58	0.59	0.63	0.63	0.75	0.75
Minimum	0.12	0.27	0.12	0.29	0.15	0.35
Maximum	0.87	0.97	0.94	1.04	1.14	1.22
Standard Deviation	0.20	0.19	0.22	0.21	0.27	0.24
Upper 95% Confidence Interval	0.70	0.70	0.76	0.75	0.91	0.89

N/A: Not available as series is only 50 data points

Table 21 Beta of Comparable Mobile Service Companies

Mobile Service Companies	Unlevered		Re-levered (10% Gearing)		Re-levered (20% Gearing)	
	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta
China Mobile	0.84	0.90	0.91	0.98	1.00	1.07
Leap Wireless	0.53	0.50	0.56	0.54	0.61	0.58
Millicom International Cellular S.A.	1.36	1.25	1.47	1.35	1.60	1.48
Mobistar N.V./S.A.	0.41	0.54	0.44	0.58	0.48	0.63
NTT DOCOMO, INC	0.43	0.48	0.45	0.51	0.49	0.55
SK Telecom Co., Ltd	0.69	0.56	0.74	0.60	0.82	0.66
NII Holdings	0.70	1.39	0.74	1.49	0.80	1.60
Turkcell Iletisim Hizmetleri A.S.	0.90	0.94	0.98	1.02	1.07	1.12
U.S. Cellular	0.81	1.15	0.87	1.23	0.93	1.33
Vivo S.A.	0.94	1.04	1.01	1.11	1.10	1.21
Far Eastone Telecommunications Company	0.58	0.44	0.63	0.48	0.69	0.52
Cellcom	N/A	0.53	N/A	0.58	N/A	0.63
Idea Cellular	N/A	0.60	N/A	0.65	N/A	0.70
Mean	0.74	0.79	0.80	0.85	0.87	0.93
Minimum	0.41	0.44	0.44	0.48	0.48	0.52
Maximum	1.36	1.39	1.47	1.49	1.60	1.60
Standard Deviation	0.27	0.33	0.30	0.36	0.32	0.39
Upper 95% Confidence Interval	0.91	0.98	0.98	1.05	1.06	1.14

N/A: Not available as Cellcom series is only 41 data points, Idea Cellular series is 40 data points.

Table 22 Recent Regulatory Decisions on Asset and Equity Beta

	Asset Beta		Equity Beta	
	Fixed	Mobile	Fixed	Mobile
OUR - Determination (2010)	0.58 - 0.70	0.74 - 0.98	0.63 - 0.91	0.80 - 1.14
TRA (2009)	0.55 - 0.70	0.55 - 0.70	0.55 - 0.70	0.55 - 0.70
URCA (2009)	-	-	0.60 - 1.1	0.80 - 1.4
FICORA (2008)	-	1.10 - 1.30	-	1.57 - 1.86
Ofcom (2009 and 2007, respectively)	-	0.90 - 1.46	0.76 - 0.96	1.00 - 1.6
ComReg (2008)	0.45 - 0.57	-	0.64 - 1.39	-
ICTA (2008)	0.50	0.70	0.91	1.08
MCA (2008)	0.80 - 1.00	1.00 - 1.05	-	-

Determination 11

The asset beta for fixed line and mobile network is 0.58 – 0.70 and 0.63 – 0.91, respectively. Whereas, the equity beta for fixed line and mobile networks ranges between 0.63 – 0.91 and 0.80 – 1.14, respectively.

Cost of Equity

3.117 The cost of equity is the rate of return required for investing in stocks. As noted earlier, the cost of equity will be measured using the CAPM where

$$k_e = r_f + \beta_e(ERP + CRP)$$

where,

k_e is the cost of equity capital;
 r_f is the risk free rate;
 β_e is the equity beta;
 ERP is the equity risk premium; and
 CRP is the country risk premium

3.118 Based on an risk free rate of 3.01%, an equity beta between 0.63 – 0.91 for fixed line networks and 0.80 – 1.14 for mobile networks, an equity risk premium of between 4.11% - 6.03%, and a country risk premium of 4.76%, the estimated cost of equity capital is 8.60% - 12.83% for fixed line networks and 10.11% - 15.31% for Mobile networks in U.S. dollar terms (see Table 25 and Table 26).

Divisional Cost of Capital

3.119 The Office remains of the view that different sections of a telecommunications company will have different risk profiles and as such the use of a single cost of capital across all regulated activities may not be appropriate. In measuring the divisional cost of capital, the OUR used a heuristic (subjective) approach developed by the Boston Consulting Group (BCG). The idea behind the BCG method is that the WACC calculated for the entire company is seen as an average of the WACC for each division within the organisation, where some departments may be more risky than the overall company while others may be less risky. Therefore, the cost of capital for a particular division is estimated by juxtaposing the risk associated with that division against the average risk of the overall company.

3.120 While not necessarily disagreeing with the OUR on the principle of a divisional cost of capital, Digicel expressed its opposition to the method used by the OUR to estimate the divisional WACCs and suggested that what was more important is separate targeted WACCs for fixed line and mobile networks. Digicel further states that the OUR provided no discussion on how it assigned values to the various categories in the BCG approach. Digicel further noted that the BCG method has not been subjected to investigation and analysis in the literature and the company has doubts about relying on the method for

- regulatory purposes. The company then further stresses the need for separate WACCs to be computed for each company.
- 3.121 NERA agrees that risk of regulated interconnection service should be lower than the beta of retail service but asserts that where a different WACC is to be applied to interconnection and retail service, different betas should be estimated for the two lines of businesses.
- 3.122 As stated earlier, the Office agrees with Digicel on the usefulness of distinct WACCs for fixed line networks and mobile networks. The Office is essentially estimating an efficient WACC for the telecommunications networks in Jamaica separated into two distinct sectors – fixed line and mobile services. The WACC involves two main elements, the cost of debt and the cost of equity. Given that the cost of equity for a local telecommunications firm cannot be directly measured it has to be estimated using the cost of equity of telecommunications companies in other jurisdictions which allow for a reliable calculation. As such, the only difference between the estimated cost of capital for different local mobile networks for instance would be the result of differences in their borrowing costs. As reliable borrowing costs were also not available as most companies do not have any outstanding bonds, the cost of debt for the industry also had to be imputed. In all cases, a maximum value is used in the range. Therefore, the WACC for any individual local mobile network would be at most equal to the Office's estimated cost of capital for mobile networks. Digicel's argument for separate WACC estimates for each individual network would have more relevance in more developed equity markets where the companies were publicly listed and issued bonds to raise funding. In this case, the beta and the market gearing of individual companies could be estimated reliably which may then result in different cost of equity estimates.
- 3.123 The OUR's intention with using the BCG method was for the individual companies to complete the BCG matrix with what they believe to be the situation for their own companies given that they would know more about the risk of their own departments than the OUR. The Office would then consolidate the results from all the respondents to produce its final BCG figures for estimating the divisional cost of capital. While, the Office agrees that the BCG approach is subjective and relatively untested, the logic behind the approach is strong and intuitively very appealing. In this regard, the Office believes the approach would likely have produced results in line with expectations if operators had populated the matrix with their views.
- 3.124 The Office agrees with NERA that estimating the beta for pure play companies that operate in the different business areas for which the divisional cost of capital is needed would be the most appropriate method of arriving at divisional WACC estimates. However, finding publicly listed pure play companies in these different business areas is extremely difficult.

- 3.125 In light of the subjectivity of the methodology used by the OUR in setting the divisional cost of capital, the lack of appropriate alternatives at this time, the lack of support for the BCG approach from operators, and the possible risk of mis-estimation, the Office will at this point discontinue the use of the divisional cost of capital. While the benefits of a divisional estimate are clear, the uncertainty behind the approach is likely to overshadow these benefits. The Office will re-examine the issue of arriving at a divisional cost of capital in future estimations of the cost of capital for telecommunications networks.

Determination 12

In light of the poor support for the method used to estimate the divisional cost of capital, the Office will not calculate divisional WACCs in this document. The matter will be re-examined at some future period.

Real versus Nominal WACC

- 3.126 With respect to the issue of using real or nominal WACC Digicel states as follows *“if the regulated prices are not regulated in real terms then the WACC should be in nominal terms. Except for price capping it is most often the case that prices are regulated in nominal terms. With this in mind Digicel has estimated values in this response in nominal terms. We urge the OUR to follow a similar approach i.e. to use real WACC only when regulated prices are set in real terms. This represents internationally accepted practice.”*
- 3.127 It is standard industry practice that where prices are based on historical costs, the nominal WACC is appropriate. When prices are based on current costs, the real WACC should be applied to avoid double counting inflation. As things currently stand, LIME’s accounting procedure for its fixed line network is based on current cost accounting. That is, the value of LIME’s fixed network assets is adjusted annually to reflect changes in exchange rate and technological progress. The book value of each asset is adjusted, up or down, to reflect the value of a modern equivalent asset (MEA) at current prices. LIME’s fixed network assets are revalued using a combination of the AUS Telephone Plant Index (TPI) and the changes in the exchange rate. LIME indicated in response to the first Consultation Document that this does not fully reflect the effect of inflation and as such the abstracting for inflation from the calculated WACC underestimates the cost of capital for LIME’s fixed network. As Appendix C shows, changes in the exchange rate do tend to be generally lower than changes in the consumer price index (CPI)⁸¹ as such changes in the exchange rate only partially compensates for inflation. However, to apply a nominal cost of capital to LIME’s fixed network would amount to compensating the company twice for the portion of inflation

⁸¹ The change in the CPI is the inflation rate.

accounted for by the movement in the exchange rate and the TPI. It therefore follows that the applicable cost of capital for the LIME's regulated fixed network tariffs has to be discounted for the effect of this asset revaluation. This avoids any double counting the inflation effect.

- 3.128 Currently, there is no price regulation of mobile rates, however with the OUR's impending consultation on a LRIC model, it is expected that in the future all regulated rates, fixed and mobile, will be based on the current cost of assets. In the interim, if any regulation of the mobile rates is implemented, it will be based on historical costs and nominal WACC as the current cost of assets for these networks may not be available.

Determination 13

The applicable cost of capital for the dominant fixed network has to be discounted for the effect of asset revaluation in order to avoid double counting of inflation.

Determination 14

The applicable cost of capital for dominant mobile network in the interim is the nominal WACC. However, when mobile networks assets as based on current costs, the applicable cost of capital will be the discounted to account for asset revaluation.

Estimating the WACC for the Regulated Fixed Network

- 3.129 In the case where regulated assets are valued at cost, the inflation premium must be taken out of the nominal WACC to arrive at the real WACC. Here the applicable inflation premium is that relating to capital assets. The revaluation of capital assets will typically account for inflation and technological progress.
- 3.130 In the case of LIME, the revaluation measure used only partially accounts for inflation and technological progress. LIME's accounting procedures for regulated fixed network assets are based on current cost accounting. That is, the value of LIME's fixed networks assets is adjusted annually, to reflect changes in exchange rate and technological progress. The book value of each asset is adjusted to reflect the value of modern equivalent assets (MEA) at current prices. Thus, inflation is already partly taken into account in the current cost accounting procedures. It follows therefore that the applicable cost of capital must be adjusted to avoid double counting the inflation effect.

- 3.131 NERA puts forward two issues with the OUR's proposal for compensating for inflation in its second Consultation Document. The first is that the approach does not compensate for Jamaican inflation. The second is that the OUR uses an inconsistent time period to calculate the 'currency adjuster' (revaluation rate) and inflation in the real WACC calculations. NERA states that *"the OUR's currency adjuster' is calculated over the period 2002 - 2008 and is based on actual (outturn) changes in exchange rate. By contrast, inflation used in calculating the WACC is based on government bond yield over a historic period 2007 – 2009"*.
- 3.132 The OUR will address the problems pointed out by NERA by first not calculating a real WACC for the regulated fixed network but rather an adjusted nominal WACC to account for the fact that LIME is already partially compensated for the effects of inflation by the exchange rate adjustment. This is necessary to prevent any double counting for this portion of inflation. The second problem is corrected by the discontinuation of the use of averages, that is, all variables used in the estimation will consistently be based on their current value.
- 3.133 Since the benefit of asset revaluation accrues to equity holders, the rate of asset revaluation must be abstracted from return on equity to arrive at the real WACC. Additionally, an amount should be removed to account for the gearing effect. The effect of gearing on revaluation is explained as follows:

If Company X has a total capital base of \$100 million with 50% equity gearing and capital assets are subsequently revalued upwards by 10%, all the revaluation accrues to equity holders so the total capital base would now be \$50 million debt and \$60 million equity. Therefore, the value of equity has increased by 20%. To calculate the WACC, the cost of equity must be adjusted by the real revaluation rate which is the inverse of the gearing ratio multiplied by the revaluation rate. In the case of this example, the real revaluation rate would be $1/0.50 * 10\% = 20\%$. That is,

$$\text{Real Revaluation Rate} = 1/\text{Gearing}_e * \text{Revaluation Rate}$$

- 3.134 The OUR estimated the revaluation rate for LIME's fixed line network by taking the product of the annual change in the TPI for the North Atlantic region and the annual change in the exchange rate⁸² then subtracting one. This is shown in Table 23.

⁸² April to March

	Change in AUS Telephone Plant Index	Change in Exchange Rate	Revaluation Rate
2002	0.9700	1.0572	0.0256
2003	0.9682	1.0728	0.0387
2004	0.9547	1.1815	0.1279
2005	0.9712	1.0437	0.0137
2006	1.0324	1.0291	0.0625
2007	1.0119	1.0489	0.0614
2008	1.0108	1.0533	0.0646
2009	1.0086	1.0923	0.1017
2010	0.9945	1.1677	0.1613
Average	0.9914	1.0829	0.0730

3.135 Therefore, the revaluation rate is 16.13%. Given an equity gearing of 70% - 90%, the real revaluation rate applicable to LIME's fixed network is therefore 17.92% - 23.04%.

Moving From US\$ WACC to Jamaican Dollar WACC

3.136 As indicated earlier, the Office will use the approach presented by Digicel for transforming the WACC from U.S. dollar terms to Jamaican dollar terms. This will account for the difference in inflation expectations. The formula for this conversion is as follows:

$$WACC_{J\$} = (1 + WACC_{US\$}) * \frac{(1 + \text{Expected Inflation}_j)}{(1 + \text{Expected Inflation}_{US})} - 1$$

3.137 The projected inflation for Jamaica is between 6.0% – 8.0%⁸³ for the current fiscal year ending March 2011. Table 24 shows an annualised percentage forecast of 1.8% for U.S. headline inflation for the corresponding period (2011:Q1). These values will be used in converting the U.S. dollar WACC to Jamaican dollar terms. How and when the cost of capital is converted can affect the outcome. If the nominal WACC, pre-tax WACC, and after-tax WACC are all estimated in U.S. dollars and then converted to Jamaican dollars the resultant Jamaican dollar estimates will not equate to each other⁸⁴.

⁸³ Bank of Jamaica, August 26, 2010, *Revision of the Bank of Jamaica's Inflation Forecast for FY2010/11*, News Release.

⁸⁴ A nominal US\$ After-tax WACC of 11.03% with a corresponding US\$ pre-tax WACC of 16.55% converts to a Jamaican dollar after-tax and pre-tax WACC of 17.80% and 23.65%, respectively using expected Jamaican inflation of 8.0% and expected US inflation of 1.8%. However given a tax rate of 33.33%, an after-tax WACC of 17.80% actually equates to a pre-tax WACC of 26.69% and not the 23.65% stated earlier. Similarly, a pre-tax WACC of 23.65% actually equates to an ATWACC of

Therefore, the Office will convert the U.S. dollar cost of equity and debt to a Jamaican dollar cost of equity and debt and use these to estimate the Jamaican dollar cost of capital in order to obtain internally consistent results.

Table 24 **Projections for U.S. Inflation**

Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)								
	Headline CPI		Core CPI		Headline PCE		Core PCE	
	Previous	Current	Previous	Current	Previous	Current	Previous	Current
<i>Quarterly</i>								
2010:Q3	1.8	1.4	1.4	1.4	1.7	1.3	1.2	1.1
Q4	1.8	1.6	1.5	1.2	1.6	1.5	1.3	1.1
2011:Q1	1.9	1.8	1.5	1.2	1.8	1.7	1.4	1.4
Q2	2.0	1.6	1.6	1.4	1.7	1.5	1.5	1.4
Q3	N.A.	1.9	N.A.	1.6	N.A.	1.7	N.A.	1.5
<i>Q4/Q4 Annual Averages</i>								
2010	1.6	0.9	1.0	0.9	1.4	1.2	1.2	1.1
2011	2.0	1.8	1.6	1.5	1.8	1.7	1.6	1.5
2012	2.4	2.1	2.0	1.9	2.0	1.8	1.8	1.7
<i>Long-Term Annual Averages</i>								
2010-2014	2.19	2.00	N.A.	N.A.	1.80	1.82	N.A.	N.A.
2010-2019	2.40	2.30	N.A.	N.A.	2.15	2.11	N.A.	N.A.

Source: Philadelphia Fed⁸⁵

Determination 15

Expected Jamaican inflation for the financial year 2010/2011 is 6.00% - 8.00%. The expected inflation for U.S. economy for the equivalent period is 1.80%.

15.77% rather than 17.80%. The nominal (vanilla) WACC is not affected by when the conversion takes place.

⁸⁵ <http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/2010/survg310.cfm>

PARAMETERS AND FINAL WACC ESTIMATE

- 4.0 Table 25 shows that the nominal U.S. dollar WACC for fixed line networks is 8.59% - 12.06%, with an ATWACC of 8.31% - 11.03%. This then converts to a nominal Jamaican dollar WACC of 13.07% - 18.89% and a nominal Jamaica dollar ATWACC of 12.64% - 17.19%. Given that LIME's assets are revalued to reflect the value of MEA, the Office remains of the view that the WACC has to be adjusted to prevent double counting the inflation for which LIME is already compensated. As such, the nominal Jamaican dollar WACC for LIME's regulated fixed network is between 11.28% - 16.30%, with the ATWACC being between 10.85% - 14.61%.

Table 25 Parameters and WACC for Fixed Line Networks

	Minimum	Maximum	Point Estimate
Risk Free Rate	3.01%	3.01%	3.01%
Gearing	10.00%	30.00%	20.00%
Country Risk Premium	4.76%	4.76%	4.76%
Cost of Debt	8.52%	10.27%	10.27%
Cost of Debt - J\$	13.00%	16.99%	15.90%
Market Risk Premium	4.11%	6.03%	5.07%
Asset Beta	0.58	0.70	0.7
Equity Beta	0.63	0.91	0.91
Tax Rate	33.33%	33.33%	33.33%
Revaluation Rate	17.92%	23.04%	20.48%
Expected Inflation - Jamaica	6.00%	8.00%	7.00%
Expected Inflation - U.S.	1.80%	1.80%	1.80%
Cost of Equity	8.60%	12.83%	11.96%
Cost of Equity - J\$	13.08%	19.70%	17.67%
Nominal WACC - US\$	8.59%	12.06%	11.62%
Nominal After-Tax WACC - US\$	8.31%	11.03%	10.93%
Nominal Pre-Tax WACC - US\$	12.46%	16.55%	16.40%
Nominal WACC - J\$	13.07%	18.89%	17.32%
Nominal After-Tax WACC - J\$	12.64%	17.19%	16.26%
Nominal Pre-Tax WACC - J\$	18.95%	25.78%	24.39%
Nominal less Revaluation WACC - J\$	11.28%	16.30%	14.92%
Nominal less Revaluation After-Tax WACC - J\$	10.85%	14.61%	13.86%
Nominal less Revaluation Pre-Tax WACC - J\$	16.27%	21.91%	20.78%

- 4.1 The nominal U.S. dollar WACC for mobile networks is 9.95% - 14.30%, with an ATWACC of 9.66% - 13.62% as shown by Table 26. This then converts to a nominal Jamaican dollar WACC of 14.48% - 21.26% and a nominal Jamaica dollar ATWACC of 14.05% - 20.13%.

Table 26 Parameters and WACC for Mobile Service Networks

	Minimum	Maximum	Point Estimate
Risk Free Rate	3.01%	3.01%	3.01%
Gearing	10.00%	20.00%	15.00%
Country Risk Premium	4.76%	4.76%	4.76%
Cost of Debt	8.52%	10.27%	10.27%
Cost of Debt - J\$	13.00%	16.99%	15.90%
Market Risk Premium	4.11%	6.03%	5.07%
Asset Beta	0.74	0.98	0.98
Equity Beta	0.80	1.14	1.14
Tax Rate	33.33%	33.33%	33.33%
Revaluation Rate	0.00	0.00	0.00
Expected Inflation - Jamaica	6.00%	8.00%	7.00%
Expected Inflation - U.S.	1.80%	1.80%	1.80%
Cost of Equity	10.11%	15.31%	14.22%
Cost of Equity - J\$	14.65%	22.33%	20.05%
Nominal WACC - US\$	9.95%	14.30%	13.62%
Nominal After-Tax WACC - US\$	9.66%	13.62%	13.11%
Nominal Pre-Tax WACC - US\$	14.49%	20.43%	19.67%
Nominal WACC - J\$	14.48%	21.26%	19.43%
Nominal After-Tax WACC - J\$	14.05%	20.13%	18.63%
Nominal Pre-Tax WACC - J\$	21.07%	30.20%	27.95%

Determination 16

Given that LIME's fixed network assets are valued at current cost, the WACC has to be adjusted to prevent the double counting of inflation for which LIME is already compensated.

Point Estimate

- 4.2 Although the WACC is estimated within range, for practical applicability a point estimate has to be determined. Standard practice is to take the mid-point of the high and low estimate as the point estimate. However, the Office in weighing the risk of underestimation against the risk of overestimation finds

that it would be best to take a cautious approach and as such, at this stage, prefers a final estimate in the higher end of the range. Table 25 and 26 illustrate the point estimates chosen for each parameter with the resulting point estimate for the WACC. In this regard, the point estimates for the nominal Jamaican dollar WACC for LIME's fixed network is 14.92%. The point estimate applicable to mobile networks is a Jamaican dollar WACC of 19.43%.

Determination 17

The point estimates for the nominal Jamaican dollar WACC for LIME's fixed network is 14.92%.

Determination 18

The point estimate for applicable to mobile networks is a Jamaican dollar WACC of 19.43%.

APPENDIX A

Appendix A Sovereign Default Spreads

GOJ 10-Year Yield to			
Dates	Maturity	10yr US Treasury	SDS
Jan-07	7.53	4.76	2.77
Feb-07	7.28	4.72	2.56
Mar-07	7.38	4.56	2.82
Apr-07	7.41	4.69	2.72
May-07	7.47	4.75	2.72
Jun-07	7.78	5.10	2.68
Jul-07	7.96	5.00	2.96
Aug-07	8.04	4.67	3.37
Sep-07	7.63	4.52	3.11
Oct-07	7.53	4.53	3.00
Nov-07	7.52	4.15	3.37
Dec-07	7.49	4.10	3.39
Jan-08	7.36	3.74	3.62
Feb-08	7.31	3.74	3.57
Mar-08	7.28	3.51	3.77
Apr-08	7.19	3.68	3.51
May-08	7.11	3.88	3.23
Jun-08	8.03	4.10	3.93
Jul-08	7.56	4.01	3.55
Aug-08	7.62	3.89	3.73
Sep-08	8.12	3.69	4.43
Oct-08	10.59	3.81	6.78
Nov-08	11.55	3.53	8.02
Dec-08	11.81	2.42	9.39
Jan-09	12.85	2.52	10.33
Feb-09	12.43	2.87	9.56
Mar-09	13.38	2.82	10.56
Apr-09	13.42	2.93	10.49
May-09	11.63	3.29	8.34
Jun-09	10.45	3.72	6.73
Jul-09	10.08	3.56	6.52
Aug-09	11.54	3.59	7.95
Sep-09	9.36	3.40	5.96
Oct-09	10.51	3.39	7.12
Nov-09	12.69	3.40	9.29
Dec-09	12.69	3.59	9.10
Jan-10	10.36	3.73	6.63
Feb-10	9.62	3.69	5.93
Mar-10	7.89	3.73	4.16
Apr-10	7.65	3.85	3.80
May-10	8.56	3.42	5.14
Jun-10	8.06	3.20	4.86
Jul-10	7.77	3.01	4.76

Yields in red based on OUR's interpolation

APPENDIX B

Appendix B1 Beta of Comparable Fixed Line Companies

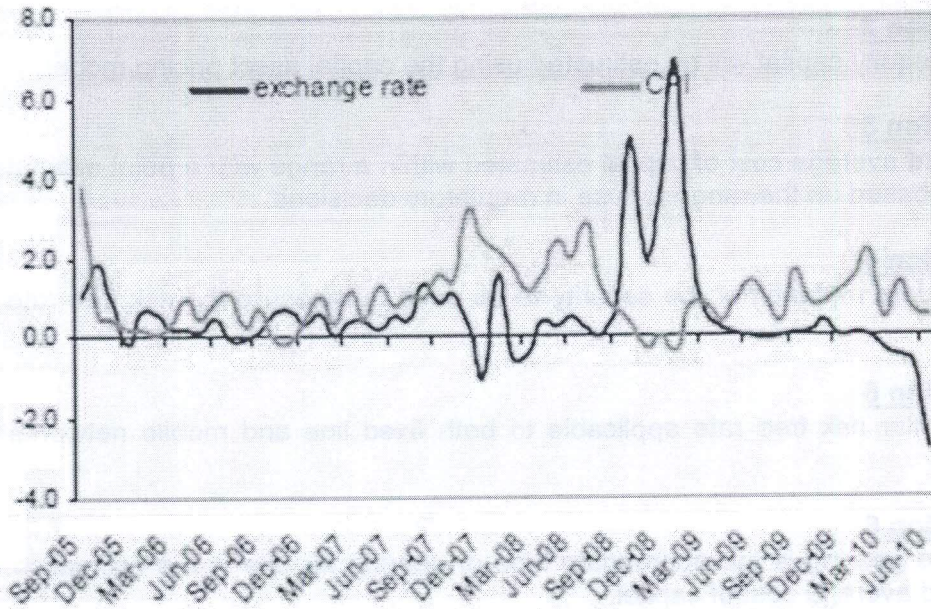
Fixed Line Companies	Monthly Levered		Weekly Levered		Blume Adjusted		Unlevered		Re-levered (10% Gearing)		Re-levered (30% Gearing)	
	Regression Beta	Regression Beta	Regression Beta	Regression Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta
British Telecom	1.22	0.92	1.15	0.95	0.63	0.52	0.68	0.56	0.82	0.68	0.82	0.68
CenturyLink	0.75	0.70	0.83	0.80	0.58	0.55	0.62	0.59	0.73	0.69	0.73	0.69
Comptel Europe N.V	0.39	-0.04	0.59	0.30	0.53	0.27	0.57	0.29	0.68	0.35	0.68	0.35
Frontier Communications Corporation	0.84	1.00	0.89	1.00	0.40	0.44	0.42	0.47	0.50	0.56	0.50	0.56
Kingston Communications	1.32	0.78	1.21	0.85	0.87	0.61	0.94	0.66	1.14	0.80	1.14	0.80
Telecomunicações de Sao Paulo S/A-Telesp	0.68	0.88	0.79	0.92	0.70	0.82	0.75	0.88	0.90	1.05	0.90	1.05
Telefonos de Mexico, S.A.B. de C.V. Telmex	1.08	0.88	1.05	0.92	0.77	0.68	0.84	0.73	1.01	0.89	1.01	0.89
Windstream Communications	0.97	0.91	0.98	0.94	0.56	0.54	0.60	0.58	0.71	0.68	0.71	0.68
Consolidated Communications Holdings Inc.	1.18	1.12	1.12	1.08	0.54	0.52	0.58	0.56	0.68	0.66	0.68	0.66
RCN Corporation	1.55	1.64	1.37	1.43	0.73	0.76	0.77	0.81	0.91	0.96	0.91	0.96
SureWest Communications	-0.07	0.94	0.28	0.96	0.12	0.39	0.12	0.42	0.15	0.50	0.15	0.50
Vonage Holdings Corp.	N/A	1.34	N/A	1.23	N/A	0.97	N/A	1.04	N/A	1.22	N/A	1.22
Mean	0.90	0.92	0.93	0.95	0.58	0.59	0.63	0.63	0.75	0.75	0.75	0.75
Minimum	-0.07	-0.04	0.28	0.30	0.12	0.27	0.12	0.29	0.15	0.35	0.15	0.35
Maximum	1.55	1.64	1.37	1.43	0.87	0.97	0.94	1.04	1.14	1.22	1.14	1.22
Standard Deviation	0.46	0.40	0.31	0.27	0.20	0.19	0.22	0.21	0.27	0.24	0.27	0.24
Upper 95% Confidence Interval	1.17	1.15	1.11	1.10	0.70	0.70	0.76	0.75	0.91	0.89	0.91	0.89

Beta of Comparable Mobile Service Companies

Mobile Service Companies	Monthly Levered		Weekly Levered		Blume Adjusted		Unlevered		Re-levered (10% Gearing)		Re-levered (20% Gearing)	
	Regression Beta	Regression Beta	Regression Beta	Regression Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta	Monthly Beta	Weekly Beta
China Mobile	0.79	0.88	0.86	0.92	0.84	0.90	0.91	0.98	1.00	1.07		
Leap Wireless	1.57	1.47	1.38	1.32	0.53	0.50	0.56	0.54	0.61	0.58		
Millicom International Cellular S.A.	1.89	1.71	1.60	1.47	1.36	1.25	1.47	1.35	1.60	1.48		
Mobistar N.V./S.A.	0.12	0.32	0.41	0.54	0.41	0.54	0.44	0.58	0.48	0.63		
NTT DOCOMO, INC	0.18	0.26	0.45	0.51	0.43	0.48	0.45	0.51	0.49	0.55		
SK Telecom Co., Ltd	0.99	0.70	0.99	0.80	0.69	0.56	0.74	0.60	0.82	0.66		
NII Holdings	0.89	2.26	0.92	1.84	0.70	1.39	0.74	1.49	0.80	1.60		
Turkcell Iletisim Hizmetleri A.S.	0.98	1.05	0.99	1.03	0.90	0.94	0.98	1.02	1.07	1.12		
U.S. Cellular	0.89	1.46	0.92	1.31	0.81	1.15	0.87	1.23	0.93	1.33		
Vivo S.A.	1.16	1.32	1.11	1.22	0.94	1.04	1.01	1.11	1.10	1.21		
Far Eastone Telecommunications Company	0.38	0.16	0.58	0.44	0.58	0.44	0.63	0.48	0.69	0.52		
Cellcom	N/A	0.56	N/A	0.71	N/A	0.53	N/A	0.58	N/A	0.63		
Idea Cellular	N/A	0.64	N/A	0.76	N/A	0.60	N/A	0.65	N/A	0.70		
Mean	0.89	0.99	0.93	0.99	0.74	0.79	0.80	0.85	0.87	0.93		
Minimum	0.12	0.16	0.41	0.44	0.41	0.44	0.44	0.48	0.48	0.52		
Maximum	1.89	2.26	1.60	1.84	1.36	1.39	1.47	1.49	1.60	1.60		
Standard Deviation	0.54	0.63	0.36	0.42	0.27	0.33	0.30	0.36	0.32	0.39		
Upper 95% Confidence Interval	1.21	1.33	1.14	1.22	0.91	0.98	0.98	1.05	1.06	1.14		

APPENDIX C

Trends in Changes in Exchange Rate and Headline Inflation



Source: Bank of Jamaica, *Quarterly Monetary Policy Report April – June 2010*.

APPENDIX D

List of Determinations

Determination 1

The Office will estimate separate weighted average cost of capital for fixed line and mobile networks.

Determination 2

The cost of equity capital will be estimated using the capital asset pricing model.

Determination 3

The weighted average cost of capital estimated within a range with a point estimated determined based on the range for use in regulatory decisions.

Determination 4

The appropriate maturity for the security to be used to measure the risk free rate is 10 years.

Determination 5

The U.S. dollar risk free rate applicable to both fixed line and mobile networks is 3.01%.

Determination 6

Market value gearing is the appropriate type of gearing for use in the estimation of the weighted average cost of capital.

Determination 7

The estimated gearing for fixed line networks is 10% - 30% while, the gearing for mobile networks is 10% - 20%.

Determination 8

The country risk premium will be estimated using the sovereign default spread. Using data for July 2010, this is 4.76%.

Determination 9

The applicable cost of debt for fixed line and mobile operators ranges between 8.52% - 10.27%.

Determination 10

The applicable market risk premium for fixed line and mobile operators is 4.11% - 6.03%.

Determination 11

The asset beta for fixed line and mobile network is 0.58 – 0.70 and 0.63 – 0.91, respectively. Whereas, the equity beta for fixed line and mobile networks ranges between 0.63 – 0.91 and 0.80 – 1.14, respectively.

Determination 12

In light of the poor support for the method used to estimate the divisional cost of capital, the Office will not calculate divisional WACCs in this document. The matter will be re-examined at some future period.

Determination 13

The applicable cost of capital for the dominant fixed network has to be discounted for the effect of asset revaluation in order to avoid double counting of inflation.

Determination 14

The applicable cost of capital for dominant mobile network in the interim is the nominal WACC. However, when mobile networks assets as based on current costs, the applicable cost of capital will be the discounted to account for asset revaluation.

Determination 15

Expected Jamaican inflation for the financial year 2010/2011 is 6% - 8%. The expected inflation for U.S. economy for the equivalent period is 1.80%.

Determination 16

Given that LIME's fixed network assets are valued at current cost, the WACC has to be adjusted to prevent the double counting of inflation for which LIME is already compensated.

Determination 17

The point estimates for the nominal Jamaican dollar WACC for LIME's fixed network is 14.92%.

Determination 18

The point estimate for applicable to the mobile network is a Jamaican dollar WACC of 19.43%.

