Office of Utilities Regulation

Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers in Jamaica

Second Consultation Document

OFFICE OF UTILITIES REGULATION

August 31, 2009

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ABBREVIATIONS

APT	–	Arbitrage Pricing Theory
BOJ	–	Bank of Jamaica
CAPM	–	Capital Asset Pricing Mechanism
ERP	–	Equity Risk Premium
GOJ	–	Government of Jamaica
LIBOR	–	London Interbank Offered Rate
LRIC	–	Long-Run Incremental Cost model
MEA	–	Modern Equivalent Asset
MRP	–	Market Risk Premium
OUR	–	Office of Utilities Regulation
RIO	–	Reference Interconnection Offer
S&P	–	Standard and Poor's
SMP	–	Significant Market Power
WACC	–	Weighted Average Cost of Capital

ABSTRACT

*The Office opened its consultation into the estimation of the weighted average cost of capital (WACC) for Cable and Wireless Jamaica (C&WJ) on May 9, 2008. However, given that the WACC will also be a critical input into the L*ong-Run Incremental Cost (LRIC) model, amendments to C&WJ's Reference Interconnection Offer (RIO), and any other tariff which may need to be determined *by the Office, the OUR has decided to refocus the consultation to estimate the WACC for telecommunications Carriers in Jamaica.*

This Consultation Document seeks to estimate the cost of capital for Jamaican telecommunications carriers based on the estimated cost of debt and equity for the industry. The cost of debt is estimated using debt information from carriers. The Capital Asset Pricing Model (CAPM) was used to estimate the cost of equity which is the same method used in previous consultations on the matter. A divisional cost of capital is also calculated for the businesses of providing retail telephone service and interconnection services.

COMMENTS FROM INTERESTED PARTIES

Persons who wish to express opinions on this Consultation Document are invited to submit their comments in writing to the OUR. Responses to this Document should be sent by post, fax or email to:

Rohan Swaby
P.O Box 593
36 Trafalgar Road
Kingston 10
Fax: (876) 929-3635
Email: rswaby@our.org.jm

Responses are requested by September 28, 2009

Respondents are requested to limit their use of confidentiality markings as far as possible, and are encouraged to supply their responses in electronic form so that they can be posted to the OUR's website.

Comments on Responses

There will be a specific period for respondents to view other responses (non-confidential) and to make comments on them. The replies may take the form of either correcting a factual error or putting forward counter arguments.

Comments on responses are requested by October 12, 2009

Arrangement for viewing responses

The responses received by the OUR will also be made available to the public through the OUR's Information Centre (OURIC). Persons who wish to view the responses should make an appointment by contacting:

Kishana Munroe
Information Officer
Telephone: (876) 968 6053
Fax: (876) 929 3635
Email: kmunroe@our.org.jm

Individuals with appointments should visit the OUR's offices at:
3rd Floor, Petroleum Corporation of Jamaica (PCJ) Resource Centre,
36 Trafalgar Road, Kingston 10.

Photocopies of selected responses may be requested at a price which just reflects the cost to the OUR.

Consultative Timetable

The timetable for this consultation is summarized below:

Event	*Date*
Publish Consultative Document	August 31, 2009
Responses to this document	By September 28, 2009
Comments on Responses	By October 12, 2009
Determination Notice	By November 09, 2009

CHAPTER 1: INTRODUCTION

1.0 The Office of Utilities Regulation (OUR) began consulting on the estimation of the weighted average cost of capital (WACC) for Cable and Wireless Jamaica (C&WJ) on May 9, 2008 when it issued a Consultation Document titled 'Estimate of the Weighted Average Cost of Capital for Cable and Wireless Jamaica. The WACC is a critical input into the price cap plan for C&WJ as it is needed for the calculation of initial prices.

1.1 The WACC will also be needed for other work that is being carried out by the Office such as the Long-Run Incremental Cost (LRIC) model, amendments to C&WJ's Reference Interconnection Offer (RIO), and any other tariff which may need to be set by the Office. As such, the OUR has decided to estimate the cost of capital for telecommunications Carriers in Jamaica rather than undertake the assessment for an individual company.

1.2 The methodology used for calculating the WACC generally follows that used in a similar study done by Charles Rivers Associates for the Office in 2000 as well as, the dictates of international best practices.

1.3 The estimate of the cost of debt for telecommunications carriers made use of data from the Annual Reports of telecommunications companies. The cost of equity was estimated using the Capital Asset Pricing Model (CAPM), which is generally regarded as the most empirically reliable method of measuring the risk associated with holding equity securities. This is notwithstanding the fact that the CAPM has its shortcomings. The estimated cost of debt and cost of equity were then used to calculate the WACC for telecommunications carriers in Jamaica.

1.4 A WACC was estimated for two divisions of a carrier's operation, with those being the provision of interconnection services and retail telephony. Both nominal and real pre-tax WACC and after-tax WACC are reported for each of the aforementioned divisions.

1.5 The rest of the document is structured in the following manner, Chapter 2 addresses the estimation of the risk premium and Chapter 3 discusses the cost of debt. The capital asset pricing model (CAPM) and the resulting WACC are examined in Chapter 4. Chapter 5 looks into the importance of real options while Chapter 6 presents the parameters and the results.

Responses to the First Consultation

1.6 Responses to the first consultative document were received from:

i. Digicel Jamaica,
ii. Flow Jamaica and,
iii. LIME (formerly C&WJ).

Purpose of Document

1.7 This document presents the study of the cost of capital for telecommunications Carriers in Jamaica, with specific emphasis on the cost of capital for the business of providing interconnection services and retail telephony. 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 rates that may need to be established by the Office.

Legislative Framework

1.8 Section 29 of 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."*

1.9 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.

CHAPTER 2: RISK PREMIUM

2.0 The country risk premium is a measure of the specific risk associated with investing in Jamaica. This is a combination of the sovereign risk premium and the currency risk premium. The sovereign risk premium is a measure of the risk that the government will default on its debt obligations while, the currency risk premium approximates the risk associated with a change in an investment's value due to currency exchange rate changes, or the uncertainty about the rate at which revenues or costs denominated in a particular currency can be converted into another.

2.1 As pointed out by Digicel, since the release of the first Consultation Document, the world has entered a riskier period. This has been evidenced by the recent downgrade of Jamaica's foreign and domestic currency rating by Standard and Poor's (S&P). S&P indicated that "Jamaica's vulnerable fiscal profile, combined with difficult financing conditions, may compel the government to undertake a debt exchange that we could regard as a distressed debt exchange. … Jamaica's fiscal accounts, which were already under pressure before the international financial crisis started last September, have deteriorated even further this year"[1].

2.2 The world is currently experiencing a global recession with continued tightening in credit markets which was not as severe at the time when the first Consultation Document was written. LIME in its response to the first consultation suggested that based on data taken from Citibank as at March 2008, the sovereign risk premium should be 4.68% relative to the 3.13% used in the first consultation. They also presented a currency risk premium of 9.20% compared to the Office's calculation of 7.13%. This is estimating the premiums using one particular point in time which may be suitable in periods of stability, with variables remaining fairly close to there long term average. However, given the volatility experienced in recent times, the OUR has estimated the country risk premium by averaging over the period January 2007 to July 2009[2]. This should give a better approximation of the forward-looking long-term risk premium as it averages the period of instability with a period stability. A similar methodology is used for estimating other variables used in the document. The 6 month GOJ Treasury Bill yield was used to calculate the country risk premium instead of the usual 1 year Treasury Bill yield as there are only 2 data points available

[1] http://www.bnamericas.com/cgi-bin/getresearch?report=112829.pdf&documento=896976&idioma=I&login=

[2] The data used for this calculation will be updated with the latest available data when the Office issues its Determination Notice, this will also be the case for most of the data used in this document.

for this variable over the averaging period[3]. As shown in Table 1, this gives a country risk premium of 13.38%, which comprises a sovereign risk premium of 4.36% and a currency risk premium of 9.03%. The OUR estimated the 10 year GOJ Brady Bond yield curve using data from the Bank of Jamaica (Original source: *Openheimer & Co. Inc*). A statistical approach was used to estimate a monthly yield curve from the GOJ Global Bond yield rates covering the period January 2007 to July 2009. The bond tickers are of varying maturity dates and differing coupon rate. The OUR regressed the yields of GOJ Global Bonds on the natural log of their maturity dates and obtained an estimate of the impact of maturity dates on yields. A maturity date of 10 years was then substituted into this regression to generate a predicted value for the yield of a 10-year GOJ bond as shown in Appendix B.

Table 1
SOVEREIGN RISK AND CURRENCY EXCHANGE PREMIUM
Averaged for the Period January 2007 to July 2009

Sovereign Risk Premium and Currency Exchange Premium Calculation

182-Day Jamaican Treasury Bill Yield	6 Month-Year US Treasury Bond Yield	Total Risk Premium
15.884%	2.504%	13.380%

Sovereign Risk Premium Calculation

Jamaican Brady Bond Yield 10 Year	Comparable US T-Bond Yield	Sovereign Risk Premium
8.217%	3.862%	4.355%

Currency Exchange Premium Calculation

Total Premium	Sovereign Risk Premium	Currency Exchange Premium
13.380%	4.355%	9.025%

Question 2.1: Do respondents agree with the proposed country risk premium? If no, state the reasons and provide data to support your response.

[3]The two available data points are 14.06 for October 2007 and 16.69 for October 2008, for an average of 15.38%.

MARKET RISK PREMIUM

2.3 LIME has presented a table which indicates that various sources have calculated the market risk premium (MRP) to range from a low of 3.4% to a high of 7.4% (See Table 2) and recommended that a premium of 6.0% be used. The OUR has decided to use the average of the results in the table presented by LIME, this results in an overall MRP of 5.56%.

Table 2

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	3.88%
	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%

Question 2.2: Do respondents agree with the proposed market risk premium? If no, state the reasons and provide data to support your response.

CHAPTER 3: COST OF DEBT

3.0 The estimation of a WACC will unavoidably include some degree of uncertainty. This is primarily due to the fact that many of the parameters used in carrying out the WACC calculation are not directly observable and instead need to be estimated. The uncertainty associated with the estimated WACC generally relates to the evaluation of the cost of equity rather than the cost of debt. The future cost of a company's debt can usually be approximated with greater accuracy by examining the actual debt obligations of firms and the conditions attached to these loans, as well as looking at the trends in the market.

3.1 The cost of debt a company faces will undoubtedly change over time, much like all other parameters used in calculating the cost of capital. The cost of debt was calculated using information taken from the Annual Reports of telecommunications companies.

3.2 Digicel in its submission contends that the world has entered a much riskier period and as such the cost of debt used in estimating the cost of capital should be revised upwards as the estimates are likely to be out dated. A similar view was expressed by LIME who has suggested that based on the yield curve derived from the GOJ debt instruments, the appropriate cost of debt should be 10.50% for US dollar linked debt and 19.70% on Jamaican dollar denominated debt. These were calculated from the yield curve on GOJ debt plus an additional 2% company risk premium.

3.3 Conversely, Flow in their submission has indicated that the LIBOR has actually fallen significantly since the publication of the WACC consultation. Flow also argues that the risk free rate used in estimating the cost of equity should be lowered based on recent trends and recommends a rate of 2.5%. The risk free rate used by the OUR in the first consultation document was the market yield on U.S. Treasury Securities at 30-year constant maturity. As At July 2009, the yield on these 30-year Treasury Securities was 4.41%, slightly[4] below the rate of 4.53% used in the first Consultation Document. The LIBOR[5] at end of July 2009 had fallen to 0.27938%.

3.4 The OUR concurs with the view that the world has entered a period of uncertainty and debt rates are likely to fluctuate over time. Historically,

[4] http://www.federalreserve.gov/releases/h15/data/Monthly/H15_TCMNOM_Y30.txt
[5] LIBOR is an acronym for London Interbank Offer Rate.

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. However, the LIBOR is currently at it lowest level which may not be indicative of future LIBOR. Conversely, GOJ Treasury Bill rates are currently at a high level which is also not likely to be indicative of future rates[6]. This highlights the divergence in interest rate policies implemented locally relative to those of the major countries which constitute the international capital market[7].

3.5 Generally, in periods of stability, the cost of debt can be determined by looking at actual borrowing costs. However, in recent times, interest rates have been fairly unstable due to numerous rate changes by central banks around the world as they try to counter the effects of the global economic climate. Against the background of the global economic instability, the cost of credit has been trending upwards. Data indicates that the highest rate currently being paid by companies in the industry on long term U.S. dollar debt is 8.0%. Therefore, current borrowing cost being faced by companies as reported in their annual reports may not fully capture the effects of the global credit situation and the long term path for interest rates. As such, the OUR has estimated the cost of debt for telecommunications carriers to take account of current trends in the credit market.

3.6 The cost of debt for telecommunications companies in Jamaica is estimated by adding the maximum company premium of 2.0% to the average yield on GOJ six month Treasury Bills, where the average is taken over the period January 2007 to July 2009. This balances the high interest rate period with the period of stability experienced prior to the global recession. As shown in Table 3, this results in a cost of debt of 17.88% in Jamaican dollar terms. Subtracting the currency risk premium from the Jamaica dollar cost of debt produces the U.S. dollar denominated cost of debt of 8.86%.

[6] The 1 month LIBOR at the end of July 2009 was 0.27938% compared to the LIBOR of 4.57% at the beginning of January 2008. Conversely, the GOJ six month Treasury Bill yield for July 2009 was 20.60% compared to a rate of 13.33% in January 2008.

[7] There are signs that this is beginning to change as the Bank of Jamaica (BOJ) has reduced rates on their open market instruments three times in the past 4 weeks (on July 24th, July 30th, and August 20th.), taking off a total of 350 basis points across all tenors. These rates are generally considered to be signal rates for other interest rates.

Table 3
COST OF DEBT FOR TELECOMMUNICATIONS NETWORKS

	J$ Terms	US$ Terms
Average Yield on GOJ 6 Month Treasury Bills (January 2007 to July 2009)	15.88%	
Company Premium	2.00%	
Cost of Debt for Telecommunications Networks	17.88%	8.86%

3.7 Using the average yield on Moody's Aaa[8] and Baa[9] corporate bonds in 2008, the cost of debt for the comparable global companies is estimated to be 6.42% as shown in Table 3.

Table 4
COST OF DEBT FOR COMPARABLE GLOBAL COMPANIES
Averaged for the Period January 2007 to July 2009

Company	Country	Moody's Ratings	Market capitalization	Cost of Debt
AT&T	USA	A2	$211,235,555,970	5.55%
BCE INC	Canada	Baa2	$29,151,244,600	7.19%
BRITISH TELECOMS	UK	Baa2	$35,662,882,086	7.19%
NIPPON TELEGRAPH & TEL	Japan	Aa2	$68,284,458,135	5.55%
FRANCE TELECOM S.A	France	N/a[1]	$87,265,396,950	N/a
TELEFONICA S.A.	Spain	Baa1	$138,017,681,013	7.19%
DEUTSCHE TELEKOM AG	Germany	Baa1	$82,384,919,220	7.19%
VODAFONE	UK	Baa1	$171,225,484,760	7.19%
TELEFONOS DE MEXICO S.A.	Mexico	A3	$18,381,130,200	5.55%
VERIZON	USA	A3	$104,976,676,640	5.55%
1 - Bond rating not available	**Weighted average Cost of Debt**			6.42%

Question 3.1: Do respondents agree with the estimated cost of debt for telecommunications carriers? If no, state why and provide supporting evidence.

GEARING

3.8 Gearing is essentially a measure of the company's debt relative to its value. Where debt (D) is the sum of all borrowed both long-term and short-term funds while, value is estimated as debt plus total equity (E).

[8] http://www.federalreserve.gov/releases/h15/data/Monthly/H15_AAA_NA.txt
[9] http://www.federalreserve.gov/releases/h15/data/Monthly/H15_BAA_NA.txt

The gearing ratio can be calculated using book value, market value, or an optimal gearing ratio.

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

3.9 LIME has indicated that market value gearing is more appropriate as it better approximates the returns that investors expect. Book values may be affected by the firms accounting policy or changes in accounting principles.

3.10 Determining market value gearing requires estimating market value equity and market value debt. Estimating the market value of equity is fairly straightforward and is the firm's market capitalisation as calculated by the number of shares outstanding multiplied by the share price. The market value of debt is more difficult to ascertain as it is generally not observable as most companies do not rely solely on bond issues but also have regular non-traded debt such as bank debt. Converting book value debt to market value requires treating the entire book value debt as a coupon bond. The "coupon [is] set equal to the interest expenses on all the debt and the maturity set equal to the face-value weighted average maturity of the debt"[10]. This coupon bond is then valued at the current cost of debt. The problem with using market value gearing in the calculation of the cost of capital for telecommunications carriers in Jamaica is that data on market capitalisation is only available for companies which are publicly listed.

3.11 A third option involves using an optimal or efficient gearing ratio. Here, the regulation would indicate an optimal capital structure. The average gearing ratio for the comparable companies was determined to be 45.67% and this is used a proxy for the optimal gearing ratio.

Question 3.2: Which type of gearing do respondents recommend be used and what is the corresponding value of the gearing ratio? Explain and provide supporting data.

[10] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/valquestions/mktvalofdebt.htm

CHAPTER 4: CAPM AND THE WACC

BETA

4.0 The Office used the Capital Asset Pricing Model (CAPM) to estimate the cost of equity used in the Consultation Document. The CAPM describes the relationship between risk and expected return and is used in the pricing of risky securities. Notwithstanding the fact that estimates obtained from the use of the CAPM will include some amount of measurement error, this methodology remains the most widely used and accepted by regulators and industry practitioners worldwide. Two sets of parameters need to be estimated for use as inputs into the CAPM, these are the equity risk premium (ERP) and beta which measures the systematic risk of investing in equity securities.

4.1 Both Digicel and LIME have suggested that betas calculated solely from historical data would be more appropriate than the use of forward looking estimates. LIME also indicated that their current cost of equity was computed using historical betas, however this is not the case as LIME's cost of equity was calculated using predictive betas from BARRA[11], which is also the source of the betas used in the current consultation.

4.2 The WACC is a forward-looking technique and the use of betas calculated purely from historical data would be inconsistent with the prospective nature of the estimation. "Historical estimates only reflect the past riskiness of an equity security that need not be representative of the future riskiness that is relevant to equity investors. Since CAPM is designed to reflect investors' expectations, the exclusive reliance on historical measures of risk would not reflect the true expected return performance of stocks[12]." The Independent Regulatory Group (IRG) in a study titled 'Principles of Implementation and Best Practices for WACC Calculation' published February, 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 may need to be complemented with other forward-looking approaches.

[11] BARRA is an internationally known financial consulting firm that provides risk management services.

[12] Consultation Document – Estimate of the Weighted Average Cost of Capital for cable and Wireless Jamaica Published May 9, 2008.

4.3 Against this background, the OUR chose not to calculate historical regression betas and instead made use of forward-looking betas provided by BARRA, a widely recognised provider of such data. The predicted betas were developed using modelling techniques which account for factors which affect the future risk of a company. In this regard, the BARRA betas should actually increase the reliability of the estimated cost of equity. Table 5 shows that the weighted average BARRA predicted beta for the comparable global companies is 0.79.

Table 5
ESTIMATED BETAS FOR GLOBAL COMPANIES

Company			Levered (Raw)	Unlevered	Re-levered
	Tax Rate	Bara Predicted Beta	Historical Beta		
AT&T	39.27%	0.93	1.13	0.81	0.95
BCE INC	36.10%	0.70	0.93	0.67	0.96
BRITISH TELECOMS	28.00%	0.79	1.31	0.53	1.71
NIPPON TELEGRAPH & TEL	39.54%	0.71	0.28	0.22	0.88
FRANCE TELECOM S.A	34.43%	0.64	1.31	0.79	1.14
TELEFONICA S.A.	32.50%	0.69	1.25	0.49	1.77
DEUTSCHE TELEKOM AG	38.90%	0.73	1.54	0.99	1.07
VODAFONE	28.00%	0.80	1.02	0.84	0.83
TELEFONOS DE MEXICO S.A.	28.00%	0.82	1.02	0.30	2.35
VERIZON	39.27%	0.84	0.95	0.57	1.16
Weighted Average	34.40%	0.79	1.10	0.69	1.15

Source of tax rates: http://chrisbanescu.com/blog/2008/12/27/us-corporate-tax-rates-vs-all-oecd-countries/

Source of UK tax rate: http://www.ukinvest.gov.uk/United-Kingdom/4016067/en-GB.html

COMPARABLE COMPANIES

4.4 In response to the first consultation, Digicel has rightly pointed out that 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 have 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. The methodology used by the Office in calculating the WACC was to estimate the WACC for a set of globally diversified telecommunications companies. A weighted average of the companies' data was used in order to neutralise the impact of any individual firm on the overall estimate. Additional risk premiums were incorporated in the WACC estimation to take account of localised factors such as political and currency risk

4.5 LIME contends that the OUR has assessed their equity beta using as a proxy the top 10 global Telco's from the largest developed western economies. The OUR however used a global set of large diversified telecommunications companies including Nippon Telegraph and

Telephone from Japan as well as Telefonos de Mexico S.A of Mexico. The companies are a subset of the 18 companies used in the original estimation of C&WJ's cost of capital in 2000. Therefore, the estimates obtained from using a global set of companies is more robust than those that would result from only using a set of Latin American companies. The idea here is to determine what it would take to compensate an international investor for the risk of investing in Jamaica.

SINGLE ESTIMATE VERSUS INTERVAL ESTIMATES

4.6 It was suggested that a range should be reported to identify the area in which the cost of capital will fall. This is usually done in cases where both high and low estimates of parameters are calculated. The estimate of the high and low parameters would have to 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. The width of the interval could also make the results fairly meaningless. Additionally, the WACC will be used as an input when determining certain rates to be charged by a firm, therefore the OUR would need to apply a specific value when making any decision on these rates. However, if a range is calculated, the problem is then to determine exactly which value should be applied as the cost of capital when setting tariffs.

Question 4.1: Should the WACC be estimated in a range? If yes, state reasons and explain how it could be applied.

SMALL COMPANY PREMIUM

4.7 LIME has suggested the need for the inclusion of small company premium on the basis of a study by Fama and French (1993) who suggested that the CAPM may be mis-specified with respect to size. The nature of the CAPM is that it compensates investors for systematic risk and not company specific risk which can be diversified away. While, the CAPM does have its shortcomings, it has been proven to be the most reliable and widely used method of estimating the cost of equity. As indicated by the IRG, the Fama and French "three-factor model can be thought of either as a special case of APT[13] 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

[13]Arbitrage Pricing Theory

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."[14] It is for this reason that the Fama and French model is not widely used by regulators or industry practitioners. Furthermore, the inclusion of a small company premium would be contrary to the general principle of the CAPM which is to only account for systematic risk.

RISK FREE RATE

4.8 A risk free asset is one with essentially no risk of default by the borrower, that is, no credit risk. In reality there is no such instrument, however, treasury 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.

4.9 Consistent with the forward looking nature of the CAPM, the OUR used the market yield on U.S. Treasury Securities at 30-year constant maturity as a measure of the risk-free rate in the first consultation. However, LIME has indicated that the treasury security chosen should be the one which best matches companies investment horizon and suggested the use of the yield on a 10-year U.S. Treasury Bond, the OUR has no objection to this suggestion. The average of the yield on 10-year U.S. Treasury Securities over the period January 2007 to July 2009 is 3.86%. 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 12.60% in U.S. dollar terms and 21.63% in Jamaican dollar terms.

[14] IRG – Regulatory Accounting. Principles of Implementation and Best Practice for WACC calculation February 2007

Table 6
MODEL ESTIMATES OF COST OF EQUITY

Company	CAPM Cost of Equity 10-yr Treasury Bonds
AT&T	9.04%
BCE INC	7.73%
BRITISH TELECOMS	8.23%
NIPPON TELEGRAPH & TEL	7.83%
FRANCE TELECOM S.A	7.42%
TELEFONICA S.A.	7.70%
DEUTSCHE TELEKOM AG	7.90%
VODAFONE	8.28%
TELEFONOS DE MEXICO S.A.	8.40%
VERIZON	8.52%
Weighted Average	**8.25%**
Jamaican Telecommunications Carriers (US$)	**12.60%**
Jamaican Telecommunications Carriers (J$)	**21.63%**

Question 4.2: Do respondents agree with the use of the yield on 10-year U.S. Treasury Bonds as a measure of the risk free rate?

REAL WACC

4.10 As indicated in Chapter 3 (Asset Valuation section) of the Determination Notice titled 'Revised C&WJ's Price Cap Plan' issued by the OUR January, 2004,

> "*The Office believes that asset valuation for regulatory purposes should reflect the economic value of existing plant. That value is calculated by determining the value of MEA*[15] *(new) replacement plant that can perform the same functions. The value of (older) embedded plant is then depreciated using estimates of economic depreciation that are consistent with the asset valuations. This approach accounts both for inflation and cost reduction due to technological improvement.*"

[15] Modern Equivalent Asset

4.11 Therefore, if the valuation of a company's assets reflects the value of MEA at current cost, then inflation is not taken out as the asset is at current cost. The OUR is of the view that for regulatory purposes, asset valuation should reflect the economic value of the plant. The Revised C&WJ's Price Cap Plan Determination also goes on to state that:

> "In general, *if asset valuations are based on current costs, the relevant cost of capital is the real cost of capital. The real cost of capital, unlike the nominal cost, does not include a premium for inflation.*
>
> *A regulated company implicitly gets an inflation premium if its plant is revalued to reflect current costs. …*
>
> *The inflation premium must be subtracted from the nominal WACC to arrive at the real WACC. The relevant inflation premium is that applicable to the capital assets, which is precisely the rate for which the company is already compensated through its accounting policy of capital revaluations and should therefore not be compensated again*."

4.12 Thus, for the avoidance of double counting, 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. Since the benefit of asset revaluation accrues to equity holders, the rate of asset revaluation must be subtracted from return on equity to arrive at the real WACC. Additionally, an amount should be subtracted to account for the gearing effect. The effect of gearing on revaluation is explained in the paragraph below.

4.13 If Company X has a total capital base of $100M with a 50:50 gearing ratio and capital assets are subsequently revalued by 10%, all the revaluation accrues to the equity holders and so the total capital base would now be $50M debt and $60M equity. In other words the equity would have increased by 20%. Therefore, to calculate the real 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 the example, the real revaluation rate would be 1/0.50 * 10% = 20%. That is

$$\text{Real Revaluation Rate} = \frac{1}{Gearing_E} * \text{Revaluation Rate}$$

4.14 The OUR estimated the revaluation rate by taking the product of the annual change in the AUS Telephone Plant Index (TPI) for the North Atlantic region and the annual change in the exchange rate minus one.

As shown in Table 7, the average of the revaluation rates over the past 8 years is 5.63%.

Table 7
ESTIMATED REVALUATION RATE

	Change in AUS Telephone Plant Index	Change in Exchange Rate	Revaluation Rate
2002	0.9700	1.0574	0.0257
2003	0.9682	1.0727	0.0386
2004	0.9547	1.1815	0.1280
2005	0.9712	1.0438	0.0137
2006	1.0324	1.0290	0.0624
2007	1.0119	1.0490	0.0615
2008	1.0108	1.0526	0.0639
Average	0.9885	1.0694	0.0563

Question 4.3: Do respondents agree with the estimated revaluation rate and the method used to arrive at the rate? If no, please explain why and provide an alternate rate and methodology.

DIVISIONAL COST OF CAPITAL

4.15 Different sections of a telecommunications company will have different risk profiles, making the choice of a single WACC undesirable. The use of divisional WACC is not a new idea and is used by other regulators such as Ofcom which uses it to assess the risk associated with different areas of BT's operations. Over the years, many new methods of determining a cost of capital for the various sections of a company's business have developed. The Office first embarked on divisional cost of capital estimation in 2000 when the WACC for C&WJ was calculated.

4.16 While the OUR agrees with LIME that computing a divisional cost of capital is a complex exercise, different areas of a business will have diverse risk profiles making the use of single cost of capital for all areas of the firm inappropriate. For instance, revenue from retail telephone service is more susceptible to the effects of direct competition and the existence of possible substitutes than the business of providing network interconnection. Therefore, the OUR is of the view that divisional cost of capital is essential. As a result, a divisional cost of

capital will be computed for the business of providing retail telephony and interconnection services.

4.17 The heuristic (subjective) approach developed by the Boston Consulting Group (BCG) is used to estimate the divisional WACC. 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 risk of the company. As indicated in Table 8, the BCG method involves assigning a value of 1 to 5 for each of the 6 evaluation criteria. The overall company is assigned a value of 3 for each criteria resulting in a total weight of 18 for the company. A division that is deemed to be more risky than the overall company with respect to a particular evaluation criterion is allotted a value greater than 3 and a value lower than 3 when it is believed to be less risky. The divisional WACC is then estimated using the following formula:

Divisional WACC = (Divisional Rating*Overall Firm WACC)/Overall Firm rating

Table 8

BCG Matrix

Criteria	Low Risk	*Value*					High Risk
		1	2	3	4	5	
Control	Low external influence on return						High external influence on return
Market	Stable, without cycles						Dynamic, cyclical
Competitors	Few, constant market shares						A lot, variable market share
Products/Concepts	Long life cycle, no subsidies						Short life cycle, subsidies
Barriers to Entry	High						Low
Cost Structure	Low fixed costs						High fixed costs

Source: http://www.vernimmen.net/ftp/memoire_Should_we_use_the_company-wide_cost_of_capital_in_investment_decisions.pdf

4.18 Based on the OUR's evaluation of risk associated with telecommunications in Jamaica, the business of providing network interconnection services is assigned a total value of 14 while, retail telephony is given a value of 22. Table 9 indicates the specific value assigned to each criterion for each division

Table 9

Network Interconnection

Criteria	Low Risk	Value	High Risk
Control	Low external influence on return	4	High external influence on return
Market	Stable, without cycles	3	Dynamic, cyclical
Competitors	Few, constant market shares	1	A lot, variable market share
Products/Concepts	Long life cycle, no subsidies	1	Short life cycle, subsidies
Barriers to Entry	High	1	Low
Cost Structure	Low fixed costs	4	High fixed costs
Total		**14**	

Retail Telephone

Criteria	Low Risk	Value	High Risk
Control	Low external influence on return	5	High external influence on return
Market	Stable, without cycles	3	Dynamic, cyclical
Competitors	Few, constant market shares	4	A lot, variable market share
Products/Concepts	Long life cycle, no subsidies	3	Short life cycle, subsidies
Barriers to Entry	High	3	Low
Cost Structure	Low fixed costs	4	High fixed costs
Total		**22**	

Question 4.4: **Do respondents agree with the value assigned to each criterion for the retail and interconnection divisions? If no, please provide alternative values with sufficient explanation for each.**

CHAPTER 5: REAL OPTIONS

5.0 Real options theory is generally concerned about 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."[16]

5.1 Real options theory is a relatively new area of investment valuation and as such the international community is still divided on its applicability and appropriateness to the regulation of rates. As such, real options theory is not widely used by regulators. However, Digicel has put forward an argument for its inclusion in the estimation of the cost of capital.

5.2 Ofcom in a consultation document titled 'Ofcom's Approach to Risk in the Assessment of Cost of Capital' published January 26, 2005 undertook a fairly detailed analysis of the need to incorporate real options with respect to estimating BT's cost of capital. An abstract of the most relevant points of Ofcom's analysis is presented below. They begin by presenting a set of circumstances under which the standard use of the CAPM framework may not provide a sufficient basis for modelling risk.

> *"**Types of specific risk***
>
> *Demand risk*
>
> *6.3 In some instances, an investment will not be profitable unless demand expands significantly from its current level. This is most likely to be relevant to investments that are made with a view to supporting new applications that are not currently available. A telecoms example might be very high bandwidth services supplied to residential customers. The success of such an investment will depend upon significant growth in new end user applications that are currently not available to customers. This future demand is very uncertain, and is thus a source of risk with respect to this type of investment. …*
>
> *… Technology risk*
>
> *6.5 Technology risk relates to those elements of risk that are uniquely or largely related to investment in the development and commercialisation of new technologies and the services*

[16] http://www.real-options.org/

based upon them. Investment in next generation broadband access, for example…

… In financial economics, "real option" is the term given to a possibility to modify a project at a future point … This concept is relevant to investment decisions made under uncertainty that may either create or destroy real options. For example:

• In making an investment, a firm will forego the option to defer investment and "wait and see" how demand for the new product will evolve. This option may have a significant value in cases where:

o there is significant uncertainty regarding the return on the investment (e.g. because demand for the products it will support is as yet unknown), that can be substantially mitigated by delaying the investment for a certain amount of time; and

o the investment is irreversible (i.e. it cannot be sold on "second hand" by the firm or put to another use)

• It may not be possible for a firm to enter, or compete effectively within, a market unless it already has a related presence – meaning that entering a market (e.g. by investing in marketing spend to create a brand) may confer real options on a firm …

6.12 … Some of the most important real options are described in the text below.

Wait and see (also known as "defer")

6.13 Investment can be deferred for a period of time, enabling the firm to learn from the investments of others and put capital to other uses.

6.14 If an investment can be reversed (e.g. equipment re-sold to other companies), then the value of wait and see options will not be significant. This is because the downside of a costly investment yielding a low return is effectively ruled out by the opportunity to reverse the investment. In the telecommunications industry, most investment is likely to be irreversible. …

Stage

6.16 Risk may be mitigated to some extent if the investment can be made in stages, during which the firm will be able to improve its ability to forecast demand and "operationalise" the technology. This might apply, for example to network roll-out that is carried out on an incremental basis, being staged to cover first one geographic area and then another.

Pilot

6.17 In some cases, investment can be made in a prototype or pilot product version, whereby expected payoffs and costs are limited, and can be scaled up if successful.

Future Growth

6.18 Investment in a technology now may create future investment options. …

6.20 … The wait and see option has a value, equal in this case to the difference between the return that the firm would expect on the investment if it invests now compared with the expected NPV if it delays …

6.21 … If the firm in question is a regulated incumbent and a regulator mandates that the incumbent grant access to the investment to its competitors, then access prices are usually set so as to reflect the costs incurred by the incumbent (including an opportunity cost of capital). …

6.27 … It is usually difficult to value real options in the absence of good estimates of the relevant parameters and a market in the underling asset that would ensure the type of "riskiness arbitrage" implied by Black and Scholes. …

… There may, however, be a number of advantages of investing early to a firm. These are:

- *Options to expand – as outlined above, in some cases it not be possible for a firm to enter or compete effectively within a market unless it already has a related presence. Investing therefore, confers real options on the firm, rather than (or possibly in addition to) using them up.*
- *First mover advantage – if a firm enters a market quickly, this may confer an advantage on it over other firms. For example, if a market is growing quickly, investing early may enable a firm to capture a large market share quickly.*

6.29 Ofcom's view is that these factors would need to be taken fully into account if the value of other types of real options were to be taken into account. Whilst the value of wait and see options that are given up when investments are made may be significant, for a balanced view to be taken it is important to consider their net value, taking into account the value of any other relevant options that may be gained by the incumbent. …

6.33 … in some such instances, wait and see options will have a limited net value, particularly in the case of well established products.

6.34 … investment in next generation Carriers has yet to take place, there is considerable uncertainty over demand (particularly in the case of next generation access, the demand for which is dependent on new and as yet undetermined applications), and, particularly in the case of NGN access, over technology. Although it is theoretically possible to pilot an investment in NGN – there are examples of Fibre to the Home access Carriers in Sweden and Amsterdam - bandwagon effects, combined with scale economies, mean that such pilots are unlikely to provide a reliable indicator of future market performance. However, particularly in the case of Next Generation Access, investment will confer a significant first mover advantage, making entry by other firms less likely. …

… 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"

5.3 Some respondents to Ofcom's consultation indicated that they were not in favour of the use of real options theory in the area of regulation as there are practical difficulties relating to its applicability, and a lack of consensus among regulators as to the need for the inclusion of real options. It was also argued that Ofcom may have overestimated the value of wait and see options in relation to next generation networks due to potential exaggeration of demand uncertainty, underestimated of the extent to which uncertainty could be eliminated through staging or piloting and, the fact that some aspects of the investment in next generation networks could be reversed. It was felt that BT should not be rewarded for demand or cost risks that related to a particular product as investors holding a diversified portfolio of stocks would not need to be compensated for such risks. Another contention was that the value of wait and see options would be negligible in cases where the company had significant market power (SMP)[17], as first mover advantage would be of considerable value. C&W [parent company] in particular "argued that the resource requirements inherent in assessing the value of real options, together with the informational asymmetries between regulators and incumbents, meant that there was a risk that, "real options would skew the measurement of risk in favour of the regulated firm". On this basis, C&W argued that the use of a real options analysis should be restricted to cases where there was, "real uncertainty in investment and measurable significant danger of stranding of assets"".

[17] In the Jamaican context SMP would be tantamount to dominance.

5.4 It has been shown that the option which is most valuable is the 'wait and see option'. This option is thought to be of greatest value in the case of 3G access and core networks. To date both Claro and LIME have deployed 3G Networks, with Claro trying to exploit any perceived first mover advantage but being the first to enter this segment of the market. However, neither 3G network is currently available island-wide, instead they are being rolled out on an incremental basis (that is, it is being staged). This lessens the risk of the investment as the company will be better able to forecast demand for the product, which reduces the value of the option foregone. 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 risk can be nullified by having a diversified portfolio.

5.5 Taking into account the findings of the analysis done by Ofcom in assessing the applicability of real options theory to the telecommunications industry, the responses to the aforementioned analysis, and our own Jamaican context, the OUR 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 OUR, also has serious concerns about the practical applicability of real options, there is as yet no consensus as to the need or method of applying real options to regulation.

CHAPTER 6: PARAMETERS AND RESULTS

PARAMETERS

Table 10

Parameter Summary	
Parameters	**Value**
US Risk-Free Rate	3.86%
Market Risk Premium	5.56%
Global Corporate Tax Rate	34.40%
Jamaican Corporate Tax Rate	33.33%
Currency Risk	9.03%
Sovereign Risk	4.36%
Sample Predicted Barra Beta	0.79
Gearing Ratio	45.67%
Jamaican Telecoms Cost of Debt US$	8.86%
Jamaican Telecoms Cost of Debt J$	17.88%
Jamaican Telecoms Cost of Equity US$	12.60%
Jamaican Telecoms Cost of Equity J$	21.63%
Global Telecoms Cost of Debt US$	6.42%
Global Telecoms Cost of Equity US$	8.25%
Revaluation Rate	5.63%

RESULTS

6.0 Based on the results of the analysis, Table 11 provides an estimate of the nominal after-tax WACC to be 17.20% and the nominal pre-tax WACC of 25.79% in Jamaican dollar terms for Jamaican telecommunications carriers.

6.1 The estimate for the real post and pre-tax WACC for Jamaican telecommunications carriers is 8.90% and 13.35%, respectively.

6.2 Tables 13 and 14 provide estimates of the nominal and real divisional WACC for Jamaican telecommunications Carriers. The real pre-tax WACC for the network interconnection and retail telephone business is 9.72% and 15.66%, respectively.

Table 11
ESTIMATES OF NOMINAL WEIGHTED AVERAGE COST OF CAPITAL

Nominal WACC in US$ Terms for Global Companies

Equity Ratio	Cost of Equity	Debt Ratio	Cost of Debt	**WACC**	**ATWACC**	**Pre-Tax WACC**
54.33%	8.25%	45.67%	6.42%	**7.41%**	**6.40%**	**9.76%**

Nominal WACC in US$ Terms for Jamaican Telecommunications Carriers

Equity Ratio	Cost of Equity	Debt Ratio	Cost of Debt	**WACC**	**ATWACC**	**Pre-Tax WACC**
54.33%	12.60%	45.67%	8.86%	**10.89%**	**9.54%**	**14.32%**

Nominal WACC in J$ Terms for Jamaican Telecommunications Carriers

Equity Ratio	Cost of Equity	Debt Ratio	Cost of Debt	**WACC**	**ATWACC**	**Pre-Tax WACC**
54.33%	21.63%	45.67%	17.88%	**19.92%**	**17.20%**	**25.79%**

Table 12
ESTIMATES OF REAL WEIGHTED AVERAGE COST OF CAPITAL

Real WACC for Global Companies

Equity Ratio	Cost of Equity	Debt Ratio	Cost of Debt	**WACC**	**ATWACC**	**Pre-Tax WACC**
54.33%	8.25%	45.67%	6.42%	**5.56%**	**4.84%**	**7.38%**

Real WACC for Jamaican Telecommunications Carriers

Equity Ratio	Cost of Equity	Debt Ratio	Cost of Debt	**WACC**	**ATWACC**	**Pre-Tax WACC**
54.33%	12.60%	45.67%	8.86%	**10.25%**	**8.90%**	**13.35%**

Table 13
ESTIMATES OF NOMINAL DIVISIONAL WACC

Nominal WACC for Network Interconnection

	Ratings	WACC	ATWACC	Pre-Tax WACC
Global Telecoms (in US$ terms)	14	5.40%	4.66%	7.10%
Jamaican Telecommunications Carrier (in US$ terms)	14	7.93%	6.95%	10.42%
Jamaican Telecommunications Carrier (in J$ terms)	14	14.51%	12.53%	18.79%

Nominal WACC for Retail Telephone

	Ratings	WACC	ATWACC	Pre-Tax WACC
Global Telecoms (in US$ terms)	22	8.69%	7.51%	11.45%
Jamaican Telecommunications Carrier (in US$ terms)	22	12.77%	11.19%	16.78%
Jamaican Telecommunications Carrier (in J$ terms)	22	23.36%	20.17%	30.25%

Table 14
ESTIMATES OF REAL DIVISIONAL WACC

Real WACC for Network Interconnection

	Ratings	WACC	ATWACC	Pre-Tax WACC
Global Telecoms	14	4.05%	3.53%	5.38%
Jamaican Telecommunications Carrier	14	7.47%	6.48%	9.72%

Real WACC for Retail Telephone

	Ratings	WACC	ATWACC	Pre-Tax WACC
Global Telecoms	22	6.52%	5.68%	8.66%
Jamaican Telecommunications Carrier	22	12.02%	10.44%	15.66%

APPENDIX A: CONSULTATION QUESTIONS

Question 2.1: **Do respondents agree with the proposed country risk premium? If no, state the reasons and provide data to support your response.**

Question 2.2: **Do respondents agree with the proposed market risk premium? If no, state the reasons and provide data to support your response.**

Question 3.1: **Do respondents agree with the estimated cost of debt for telecommunications carriers? If no, state why and provide supporting evidence.**

Question 3.2: **Which type of gearing do respondents recommend be used and what is the corresponding value of the gearing ratio? Explain and provide supporting data.**

Question 4.1: **Should the WACC be estimated in a range? If yes, state reasons and explain how it could be applied.**

Question 4.2: **Do respondents agree with the use of the yield on 10-year U.S. Treasury Bonds as a measure of the risk free rate?**

Question 4.3: **Do respondents agree with the estimated revaluation rate and the method used to arrive at the rate? If no, please explain why and provide an alternate rate and methodology.**

Question 4.4: **Do respondents agree with the value assigned to each criterion for the retail and interconnection divisions? If no, please provide alternative values with sufficient explanation for each.**

APPENDIX B: ESTIMATED GOJ 10-YEAR YIELD CURVE

Estimated GOJ Yield Curve and Sovereign Risk Premium			
Dates	**GOJ 10-Year Yield**	**10yr US Treasury**	**Sovereign Risk Premium**
31/01/2007	6.63	4.87	1.76
28/02/2007	6.62	4.55	2.07
30/03/2007	6.51	4.64	1.87
27/04/2007	6.74	4.68	2.06
31/05/2007	6.77	4.87	1.90
29/06/2007	7.00	5.09	1.91
31/07/2007	7.09	4.84	2.25
31/08/2007	7.04	4.54	2.50
28/09/2007	6.79	4.53	2.26
31/10/2007	6.75	4.41	2.34
29/11/2007	6.65	3.99	2.66
31/12/2007	6.57	4.05	2.52
31/01/2008	6.75	3.64	3.11
29/02/2008	6.76	3.61	3.15
31/03/2008	6.89	3.45	3.44
30/04/2008	6.80	3.80	3.00
30/05/2008	6.74	4.03	2.71
30/06/2008	7.43	3.98	3.45
31/07/2008	7.23	4.04	3.19
29/08/2008	7.28	3.77	3.51
30/09/2008	7.79	3.62	4.17
31/10/2008	10.40	3.89	6.51
28/11/2008	11.13	2.98	8.15
29/12/2008	11.32	2.11	9.21
27/01/2009	11.47	2.62	8.85
26/02/2009	11.31	2.98	8.33
31/03/2009	11.91	2.72	9.19
30/04/2009	11.90	3.14	8.76
20/05/2009	10.80	3.22	7.58
30/06/2009	10.03	3.49	6.54
31/07/2009	9.62	3.57	6.05
Average	**8.217**	**3.862**	**4.355**