Seminario sobre los aspectos econ**ó**micos y financieros de las telecomunicaciones
Grupo Regional de la Comisi**ó**n de Estudio 3 para Am**é**rica Latina y El Caribe (SG3RG-LAC)

Regional Seminar on the economic and financial aspects of telecommunications for Member Countries of the Study Group 3 Regional Group for Latin America and Caribbean (SG3RG-LAC)

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Document 6

Cost of capital (WACC) assessment for the telecommunication sector: Brazilian methodology

Peru, June (2009)

COST OF CAPITAL (WACC) ASSESSMENT

Brazilian regulatory framework

- Regulation requirements for the use of WACC

Theoretical premisses of the Brazilian WACC model

- Assumptions adopted for WACC construction
- WACC methodological aspects:
  - Cost of equity capital
  - Cost of debt capital
  - Capital structure

Wacc results 2007

- Preliminary results obtained from WACC

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BRAZILIAN REGULATORY FRAMEWORK: REGULATION REQUIREMENTS

- To set fixed network tariffs (tariff public regime)
    - It will be used in the Lric model context

- To set reference values
    - Mobile network prices (in a FAC model context)
    - Leased lines prices

- Tariff review
    -To set new retail tariffs in a financial-economical balance requirements.

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ASSUMPTIONS ADOPTED FOR WACC CONSTRUCTION

Correct economical signaling to investors...

Important assumptions for the WACC construction...

- Compliance to regulations (LGT)

- Methodological accuracy

- Specialized suport (consultancy needed – FGV/CPQD)

- Design transparency

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• **Wheighted Average Cost of Capital - Wacc**

$$WACC = \frac{E}{D+E}K_e + \frac{D}{D+E}(1-t)K_d$$

Minimum rate of return

• **Methodologies defined (three main parts)**

 - Cost of Equity Capital – (Ke)
   * Global CAPM modified (added local risk factors)

 - Cost of Debt Capital – (Kd)
   * Risk free rate (brazilian treasury bond) + Credit risk premium (spread)

 - Capital Structure – (D/D+E)
   *empiracally estimated, looking for a optimal debt level, considered as a regulatory capital structure)

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COST OF EQUITY CAPITAL (Ke)

- CAPM model

$$E(r_i) = r_f + \beta_i \, E(r_m - r_f)$$

  - $E(r_i)$: required return on equity (asset i);
  - r_f : risk free rate;
  - β_i : systematic risk associated with the firm's equity;
  - $(r_m - r_f)$: market risk premium

- Considered as one of the most important factor\Gentzoglanis:04

- The correct CAPM model choice becomes very relevant:
  - Representativity of investors
  - Market integration level

COST OF EQUITY CAPITAL (Ke)

- If the local market is all integrated to the global market...

- Major Brazilian telecomunication shareholders could have...

- Justifiable to use a Global CAPM model...

- All local risks in this situation are diversifible;

- Brazilian telecomunication investors are subject to non-diversifiable local risks.

COST OF EQUITY CAPITAL (Ke)

Global CAPM (Solnik version)

- Model description: One country *k* with a stock market globally integrated, the expected return on asset i is given by:

$$E(r_i^k) = r^k + \gamma_i^{GL}[E(r_m^{GL}) - r^{GL}]$$

Solnik (1974) showed that:

- Global specification (global market) model is less responsible to explaining the variance of asset returns than a CAPM with local specification (local market).

- There is another way of getting efficient estimates for the companies' beta

COST OF EQUITY CAPITAL (Ke)

Global CAPM modified

- Model description

  - Under the tradicional hypothesis of the CAPM, we can say that the following relations are valid:

$$Local\ Assets:\ E(r_i^k) = r^k + \beta_i^k[E(r_m^k) - r^k]$$

$$National\ Portfolios:\ E(r_m^k) = r^k + \beta_k^{GL}[E(r_m^{GL}) - r^{GL}]$$

- Replacing the second equation into the first, we get:

$$E(r_i^k) = r^k + \underbrace{\beta_i^k\,\beta_k^{GL}}_{\gamma_i^{GL}}[E(r_m^{GL}) - r^{GL}]$$

More efficient parameter (Gama)

- CAPM model for Brazilian Telecomunicações Sector:

$$K_e = r_{ex-RS}^{Br} + \beta_{Br}^i \times \beta^{Br} \times PRM^{GL}$$

COST OF EQUITY CAPITAL (Ke)

- CAPM model for Brazilian Telecommunication sector:

$$K_e = r_{ex-RS}^{Br} + \beta_{Br}^i \times \beta^{Br} \times PRM^{GL}$$

Where:

$$r_{ex-RS}^{Br} = YTM_{BRL\,16} - (EMBI + Brazil)$$

β_{Br}^i = Monthly asset returns from telecommunications shares traded in the Brazilian stock market vs. <u>MSCI Brazil</u> (company beta).

β^{Br} = Monthly returns from MSCI Brazil vs. <u>MSCI ACWI</u> (Brazil beta)

PRM^{GL} = Monthly returns from <u>MSCI ACWI</u> - *Treasury-bill* (5 years)

AVERAGE BETA

- <u>Hamada Formula</u>: Estimated beta was unlevaraged by the observed level of debt and re-levaraged by the level of debt statiscally estimated , according to the following relation:

$$\beta^U = \frac{\beta^{L_1}}{\left[1 + (1-T) \times \left(\dfrac{D}{E}\right)\right]}$$

$$\beta^{L_2} = \beta^U \times \left[1 + (1-T) \times \left(\dfrac{D^*}{E}\right)\right]$$

- Where D/E is the debt observed, β^U is the unlevaraged beta, β^{L_2} is the re-levaraged beta and D^*/E is the eficient debt estimated.

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COST OF DEBT CAPITAL (K$_d$)

• Interested rate a company is paying on all of its debt, such as loans and bonds.

• Model: K$_d$ =   Local Risk Free Rate   +   Credit Risk Premium

• Local Risk Free Rate: it was used a long term Brazilian treasury bond with duration equivalent to asset companies .

• Credit Risk Premium: it was used historically data of debentures issued by companies and the "rating" evolution issued by S&P.

It's calculated according to the following formula:

$$K_d^{R\$} = \{1 + [(1 + r^{Br})^{1/252} - 1] \times \% \text{ CDI}\}^{252} - 1$$

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THEORETICAL MODEL FOR CAPITAL STRUCTURE ESTIMATION

• Different types of financing employed by a firm to acquire resources necessary for its operations and growth

• Theorical model

• Some findings in WACC consulting process:

    - Capital structure policy (minimize WACC)

    - Efficient operator in WACC construction process.

• The optimal financing decisions from operators

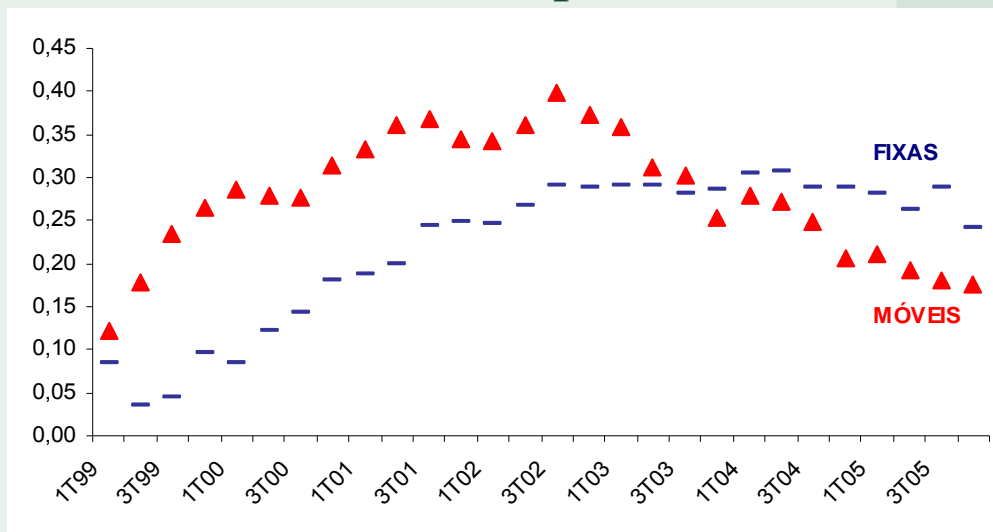# THEORETICAL MODEL FOR CAPITAL STRUCTURE ESTIMATION

Medium indebtedness Test of each 2 sub-groups

✓ <u>Objective</u>

  ▪ Testing the equality of the level of indebtedness among the operators (mobile and fixed companies)

✓ <u>Results</u>

  ▪ There is no statistical evidence that debt levels between mobile and fixed companies are different:

- Accounting data from mobile and fixed companies

- A unique debt level of operators

THEORETICAL MODEL FOR CAPITAL STRUCTURE ESTIMATION - PROXY

- ## Indicators to estimate the theoretical model

Factors	Formula	Reference
BOOK VALUE =	$\dfrac{\text{Total Gross Debt}}{\text{Total Assets}}$	Brito & Lima (2004)
TANGIBILITY =	$\dfrac{\text{Net Assets}}{\text{Total Assets}}$	Titman & Wessels e Perobelli & Famá (2002)
PROFITABILITY =	$\dfrac{\text{EBIT}}{\text{Total Assets}}$	Rajan & Zingales (1995), Gomes & Leal (2001) e Perobelli & Famá (2002)
RISK =	$\dfrac{\text{Standard Deviation (EBIT)}}{\text{Average (EBIT)}}$	Brito & Lima (2004)
GROWTH =	$\dfrac{\text{Total Assets - Equity + Market Value of Shares}}{\text{Total Assets}}$	Rajan & Zingales (1995) e Gomes & Leal
SIZE =	Ln (Net Operating Income)	Rajan & Zingales (1995)

THEORETICAL MODEL FOR CAPITAL STRUCTURE ESTIMATION

- Econometric model adopted (*Pooled Time Series and Cross-Section*)

$$\mathbf{BV} = \alpha + \gamma_{Tang}\mathbf{Tang} + \gamma_{Proft}\mathbf{Proft} + \gamma_{Size}\mathbf{Size} + \gamma_{Risk}\mathbf{Risk} + \gamma_{Growth}\mathbf{Growth} + \boldsymbol{\eta}$$

- OLS regression to estimate the coefficients

- Quarterly data from the latest 5 years

THEORETICAL MODEL FOR CAPITAL STRUCTURE ESTIMATION

- Get all company coefficients

- Estimate the ratio of debt capital based on the latest companies' balance sheet

$$\left(\frac{\hat{D}}{D+E}\right)_k = \hat{\alpha} + \hat{\gamma}_{Tang} \cdot Tang_k + \hat{\gamma}_{Proft} \cdot Proft_k + \hat{\gamma}_{Size} \cdot Size_k + \hat{\gamma}_{Risk} \cdot Risk_k + \hat{\gamma}_{Growth} \cdot Growth_k$$

- Ratio of debt capital used as capital structure in WACC model

- Arithmetical mean of "K" companies ratios of debt capital

$$\left(\frac{D}{D+E}\right)_{Optimal} = \frac{\sum_{k=1}^{K}\left(\frac{\hat{D}}{D+E}\right)_k}{K}$$

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PRELIMINARY RESULTS FOR WACC CALCULATION

Mobile	Final
Risk Free Rate (RF)	9,18%
Credit Risk Premium (*spread*)	127%
Cost of Debt Capital	12,36%
Debt Capital Ratio	31%
Mobile beta (β)	1,12
Brasil Beta (β)	1,93
Market Risk Premium (PRM)	3,83%
Cost of Equity Capital	15,46%
Equity Capital Ratio	69%
Tax Rate	34%
WACC (mobile companies)	13,19%
WACC (fixed companies)	11,06%

THANK YOU FOR YOUR ATTENTION