# A Seminar on the Cost of Capital in Regulated Industries

Time for a Fresh Perspective?

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## Lessons from the U.S. and Australia

Seminar on the Cost of Capital in Regulated Industries: Time for a Fresh Perspective?

Bente Villadsen

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#### Agenda

Cost of Capital Standards or Rules

Process

**Principles of Regulation** 

Cost of Capital Determination

- U.S. States
- U.S. Federal Agencies: FERC, STB
- Australian Regulators: AER, ERA, and QCC

Key Differences Between Jurisdictions

Appendix: Additional Details about the Determination of the Rate of Return in the U.S. and Australia

#### **Cost of Capital: Standards / Rules**

**US (and Canada):** Standards of fairness and reasonableness of allowed rate of return (are established by cases before the **Supreme Court**):

- Commensurate with returns on enterprises with corresponding risks
- Sufficient to maintain the financial integrity of the regulated company and
- Adequate to allow the company to attract capital on reasonable terms

**Australia:** National Electricity Rules & National Gas Rules promulgated by the **Australian Energy Market Commission**.

- Regard must be had to relevant estimation methods, financial models, market data and other evidence;
- In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds.
- The return on equity for a regulatory control period must be estimated such that it contributes to the achievement of the allowed rate of return objective.

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#### Process: U.S.

Mixed, but:

- In most states, the utility initiate a process by filing an application incl. Rate of Return testimony, followed by testimony from interveners, rebuttal testimony, and an oral hearing (Commission makes final determination)
  - Most states have integrated electric utilities (regulated generation)
- California\* (and some Canadian provinces) have periodic (e.g., every 3 years) reviews of the cost of capital and determine the allowed ROE using the process above.
- Federal Energy Regulatory Commission: utility or FERC staff initiate process and follow the process above (estimation methodology is well-determined)
- Surface Transportation Board (railroads), a few states (and Ontario) with performance-based mechanisms have an annual ROE updating mechanism

#### FINAL DECISION IS MADE BY THE COMMISSION (ELECTED OR APPOINTED)

\* CA reviews the ROE annually and updates if it long-term interest rates have changed more than a Prepatient and contarioeupdates the ROE annually based on long-term interest rates 4 brattle.com

#### **Process: Australia**

#### AER, ERA, QCC\*

- Periodic review
- Regulated entity, regulator, and possibly other interested parties submit expert reports
- Focus is on determining the WACC
- Australian energy markets are deregulated so regulators focus on distribution and transmission

#### FINAL DECISION IS MADE BY THE REGULATOR

\* Australian Energy Regulator, Energy Regulatory Authority of Western Australia, Oueensland Competition Commission Prepared at the Request of Counsel

#### Principles of Regulation: U.S. and Canada

- Utilities are regulated on stand-alone basis
- Most utilities are regulated using cost of service in the U.S.
- Rate base is based on original cost minus depreciation
- Cost of Debt is generally the embedded cost of debt incl. issuance cost
- Key focus is on the Allowed Return on Equity (and in Canada the equity percentage)
  - U.S.: equity thickness is usually the actual book equity
  - Canada: equity thickness is deemed
- The allowed Return on Equity is determined in nominal terms
- U.S. Federal regulators (FERC, STC) specify the methods used to estimate the Return on Equity
- U.S. states and Canadian provinces usually do not have a specific methodology to determine the allowed ROE

#### **Principles of Regulation: Australia**

- Draws on the national electricity rules / gas rules
  - Each regulator (AER, ERA, QCC) implement the rules differently
- Most utilities are regulated using a revenue cap
- Rate base (RAB) is adjusted annually for inflation
- Focus is on determining the after-tax WACC
  - The value of tax credits is considered
- Companies can propose any methodology they see fit to calculate the Return on Equity and Cost of Debt

#### **Prevalence of Performance-Based Regulation**

- Australia: Predominantly revenue cap
- **Canada**: Alberta and Ontario have performance-based regulation

U.S: Mixed

U.S. States that Currently or in the Recent Past Have Used Performance-Based Regulation or Caps



#### Cost of Capital Determination: U.S. States

Typically relies on experts submitting evidence from multiple models – approach is generally not specified:

- Capital Asset Pricing Model ("CAPM") Basic form:  $r_E = rfr + \beta \times (Market Risk Premium)$
- Discounted Cash Flow ("DCF") Model
  Simplest form: Cost of Equity = dividend yield + growth rate
   $r_E = D_1 / P_0 + g$
- Risk Premium Model

Simple form:  $r_E$  = interest rate + risk premium

risk premium typically determined using cross-section of allowed returns or realized accounting returns; e.g.

(1/N)  $\Sigma_{t=t, ...N}$  (Average Allowed ROE<sub>t</sub> – Yield on 20-Year Gov. Bond<sub>t</sub>)

#### Utility Allowed ROEs Have Declined In Recent Years Utilities Have Not Earned the Allowed ROE

Electric Allowed ROE has declined, as has the ability to earn it



Source: SNL/Regulatory Research Associates and Federal Reserve

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#### **Cost of Capital Determination: U.S. Federal**

**FERC**:  $r_E = D_1 / P_0 + g$ 

The calculation of each input is specified by the FERC, but the model is currently under review (by court order)

**STB:** 
$$r_E = \frac{1}{2} CAPM + \frac{1}{2} DCF$$

The calculation of each component and input is specified by the STB The STB's DCF model is not a dividend discount model but a cash flow model that takes "normalized" cash flow rather than dividend as an input

#### **U.S Cost of Capital Determination - Key Points**

- Consensus outside the FERC is to "use multiple models when you can"\* (Professor Stewart C. Myers)
  - State proceedings commonly involve many different models and inputs with a wide range of results the Commission then has to sort through
- Capital structure is typically the actual book capital structure
- Often there is no consideration of financial leverage (industry beta is applied to all)
- Cost of debt is the embedded cost of debt

\* Professor Stewart C. Myers, "On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment," *Financial Management*, Autumn 1978, p. 67.

#### **Cost of Capital Determination: Australia**

- AER determines the post-tax nominal weighted average cost of capital for a "benchmark efficient" utility.
  - The impact of tax credits is considered
  - Capital structure is deemed
- Most recently the AER relied on the CAPM, but ensured the outcome was supported by other evidence - most notably the Fama-French model
- Australian evidence focus on the exact determination of the risk-free rate, beta measurement, market risk premium, and the value of tax credits along with increasingly supplemental Fama-French and DCF methods

#### **Cost of Capital Determination: AER**

WACC: Nominal, post-tax

WACC =  $r_E \times E\% \times (1-t)/(1-t(1-\gamma)) + r_D \times D\% \times (1-t)$ 

 $r_{E}$ ,  $r_{D}$  cost of equity and debt

t is taxes and  $\boldsymbol{\gamma}$  is the value of tax credits

Return on Equity: Traditionally focused on the CAPM, but looking to collaborating evidence

Utilities and other present a wide range of estimates regarding the risk-free rate, betas, market risk premia, and the value of tax credits – ultimately the regulators decides

Cost of Debt: Most recently estimated as the rate at which a benchmark efficient entity with a BBB rating could issue 10-year debt (surveys, trading data from Australia and the U.S.) Privileged and Confidential Prepared at the Request of Counsel

#### Australia Cost of Capital Determination - Key Points

- Relies on the post-tax weighted nominal WACC taking tax credits into account
- Look to establish rate for "benchmark efficient" utility
- Cost of Equity is primarily estimated using the CAPM with a range for the risk-free rate, beta, and the market risk premium
- Cost of debt pertains to 10-year debt of BBB rated entity
- Differences across jurisdictions primarily pertains to the implementation of the CAPM and the estimation of the cost of debt

#### Key Differences: Approach to Setting CoC

	Who initiates proceeding	How frequently is CoC Updated	Process
U.S. FERC	Company	Infrequently	Company, Interveners submit testimony followed by hearing, Commission decides
U.S. STB	Regulator	Annually	Formulaic
U.S. States	Company (usually)	Infrequently; California has 3- year period	Company, Interveners submit testimony followed by hearing, Commission decides
AER	Regulator	Periodically	Company, regulator, possibly others submit evidence, AER decides
Canada: AUC, OEB	Regulator	AUC: 2-3 years OEB: Annually	AUC: Same as in the U.S. states except a process involve all companies OEB: Formulaic

#### Key Differences: Estimating the CoC

	ROE Estimation	COD	Capital Structure	Nominal or Real	Key Components of Return
U.S. FERC	DCF	Company Embedded	Actual Book	Nominal	ROE, Equity %
U.S. STB	DCF & CAPM (equal weight)	Industry Embedded	n/a	Nominal	ROE
U.S. States	Mixed; CAPM, DCF, risk premium	Company Embedded	Actual Book	Nominal	ROE, Equity %
AER	CAPM, Other	Market Based	Deemed	Nominal	WACC (Equity %)
Canada: AUC, OEB	DCF, CAPM, Other	Company Embedded	Deemed	Nominal	ROE, Equity %

# **QUESTIONS?**

# **APPENDIX: Details**

#### **Cost of Capital Determination: U.S. States**

- Capital Asset Pricing Model ("CAPM")  $r_F = rfr + \beta \times (Market Risk Premium)$
- rfr is current or forecasted 20-year or 30-year treasury rate
- beta is usually Blume adjusted (5 year weekly)
- Market Risk Premium is controversial; historical average, current, forecasted, surveys ...

ECAPM is not commonly used

#### **Cost of Capital Determination: U.S. States**

Single-State Discounted Cash Flow ("DCF") Model:  $r_E = D_1 / P_0 + g$ 

Controversy is the use of analysts' forecasts for g and the model itself

Multi-state DCF models are common and allow the growth rate to vary over time:

$$P_{0} = D_{1} / (1+r_{E}) + D_{2} / (1+r_{E})^{2} + ... + (D_{N} + P_{N}) / (1+r_{E})^{N}$$
$$P_{N} = D_{N} \times (1+g_{perpetual}) / (r_{E} - g_{perpetual})$$

There is substantial debate about which growth rate to use in perpetual and how to determine the interim growth rates; analysts' forecasts are commonly used in combination with GDP growth for the perpetual growth

#### **Cost of Capital Determination: Australia**

• Capital Asset Pricing Model ("CAPM"):  $r_E = rfr + \beta \times (Market Risk Premium)$ 

rfr is current 2-10 year government bond rate beta: substantial controversy over how to determine this exists horizon (2-10 years) frequency (daily, weekly) Market Risk Premium the AER has used a mixture of measures: historical average MRP over as long as possible a period forecasted MRP using market data Wright method

weight is given to non-Australian data

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#### **About the Presenter**



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Dr. Bente Villadsen a principal at The Brattle Group's Boston, Massachusetts office. She is an expert in regulatory finance with more than 18 years of experience in the utility regulatory matters.

She has experience in electric, gas, pipeline, railroad, and water regulatory matters and has testified on cost of capital as well as regulatory accounting and credit issues for regulated entities throughout the U.S. and Canada as well as authored or coauthored reports on cost of capital that were submitted reports to Canadian, European and Australian regulators. She is a frequent author and speaker on rate of return, capital structure and regulatory accounting issues and has co-authored the text, *"Risk and Return for Regulated Industries,"* (Elsevier 2017).

Much of her recent work has focused on the impact of asymmetric risk or capital spending as well as regulatory initiatives on cash flow, credit metrics and the cost of capital.

Dr. Villadsen also provides advice on regulatory accounting, finance as well as utility M&A and risk management. She holds a Ph.D. from Yale University's School of Management and joint degree in mathematics and economics from University of Aarhus in Denmark.



# What the ... WACC !

Increasing consistency of WACC calculations in European regulation of telecoms markets

Marco Vigetti Jordi Casanova-Tormo DG CONNECT 25



## The WACC in telecoms regulation

- Ex-ante regulation of dominant operators in a number of telecoms markets
- Remedies imposed to address dominant operator's market power
- Objectives: EU Digital Single Market, competition, EU citizens' welfare
- WACC key parameter in determination of cost-oriented rates that operators can charge

Typical remedies on dominant operators:

Wholesale network access

Wholesale fixed and mobile termination services

If WACC increases by 1pp



Regulated rate increases by 5-10%

Regulated rates have a strong impact on...

The investment decisions of network operators

Prices paid by end users of telecommunications services



#### National Regulatory Authorities & the WACC

• Periodicity of reviews varies between countries

• Most use the CAPM to estimate the cost of equity

- Different assumptions to estimate each parameter
  - at EU-level
  - at national level

• Some include a premium for "Next Generation Access" services (provided over fibre, upgraded cable networks, etc.)

Capital Asset Pricing Model (CAPM)

 $\begin{array}{l} \mathsf{K}_{e} \\ \mathsf{E}_{duity} \end{array} = \begin{array}{c} \mathsf{R}_{F} \\ \mathsf{R}_{ate} \end{array} + \left( \begin{array}{c} \mathsf{R}_{m} - \mathsf{R}_{F} \right) \times \begin{array}{c} \beta \\ \mathsf{F}_{ate} \end{array} \right) \\ \mathsf{K}_{eta} \end{array}$ 





## Recent nominal pre-tax WACCs in the EU (for fixed networks)

13.5%



Source: BEREC Report - Regulatory Accounting in Practice 2017 (published 5 October 2017)



#### What is the "true" Risk-free Rate?



Source: BEREC Report - Regulatory Accounting in Practice 2017 (published 5 October 2017)



#### **Equity Risk Premium**



Source: BEREC Report - Regulatory Accounting in Practice 2017 (published 5 October 2017)



#### Issue with consistency across **EU Member States?**

#### Risk-free rate

Notional or	65%
domestic value	domestic
Averaging period	21%
	1-year
Sampling period	55%
	daily
Averaging method	88%
	arithmetic
Bond maturity	83%
	10-years
Quantitative	87%
easing	no adj.
adjustment?	

#### Equity Beta

Notional or	52%
domestic value	notional
Averaging period	29%
	5-years
Sampling period	43%
	daily
Averaging method	25%
	"other"
Calculation	43%
adjustments	no adj.
Market index	62%
	European
Unlevering	71%
formula	Modigliani-
	Miller

Advanced consistency

> 60% of NRAS apply same approach

Moderate apply consistency approach

40 - 60% of NRAs Limited/ no same consistency

< 40% of NRAs apply approach

same



#### **EU-level differences**

CASE STUDY: WACC calculations by three <u>different NRAs</u>

	NRA 1	NRA 2	NRA 3
Risk-free rate	Domestic 10-Y bond, 15-Y avg period	Domestic 10-Y bond, 10-Y avg period	DE 10-Y bonds + country risk premium
Equity Beta	SMP op vs national index	STOXX Europe Telcoms vs STOXX Europe	Peer group average
Equity Risk Premium	Hybrid (historical, surveys, DGM, precedents)	Avg excess returns in DE, UK and US	DMS – average of EU markets
Cost of Debt	RFR + spread of SMP bonds and BBB benchmark index	RFR + notional debt premium of 10 largest EU telcos	RFR + Avg between EU telcos Credit Default Swaps and spread Iboxx-DE bunds
Gearing	Average of SMP's gearing levels in last 5/10 years	Peer group average	Peer group average
Taxes	Forward looking rate	Current statutory rate	Current statutory rate



## **Our work on the WACC**

NRAs choose their own WACC methodology in their ex-ante regulatory measures

- => Differences not always linked to market fundamentals
- => Risk of investment distortions across the EU

DG CONNECT to develop guidance to support NRAs

Objective: address inconsistencies in WACC calculation

**Public consultation** on the application of 4 regulatory principles







## **Relevant questions**

Today's focus on the most important questions:

- Should parameters be estimated using EU or national values? [RFR, ERP]
- Which should be the length of the averaging period?
  [all parameters]
- Should we rely on the SMP operator's beta or group benchmark? [beta]
- Which approach to differentiate the WACC: beta disaggregation or DCF models?



#### Relying on domestic values results in significant differences

Figure 1: Spreads of EU 10-year bond yields over German bonds for a selection of countries



Source: Brattle analysis of generic 10Y Government bond yields data from Bloomberg



- National parameter values may seem inconsistent with the principle of **diversification** underpinning the CAPM
- Does **country risk** justify using a national value?
  - Investors should be rewarded for systematic risk, not diversifiable country-specific risk
  - The yield on a Government's bond may not be the most appropriate to capture true country risk, specially of low-risk utilities → the company's beta against a EU/world index may be more appropriate
- Use of EU values is likely to reduce variability and ensure greater regulatory predictability



- Does **home bias** justify using national values?
  - Largest shareholders tend to be international, rather than national
  - Should regulation reward inefficient non-diversification?
- Do transaction costs or currency risks justify using national values?
  - In integrated capital markets, transaction costs are likely to be small and unlikely to outweigh the benefits of diversification
  - Currency risks can typically be hedged at relatively low cost



#### Which way forward?

	EU	National	Hybrid EU-Nat.
RFR	EU average	National	EU average
ERP	EU average	National	EU average
Beta	Average EU peer (against EU index)	National SMP op. (against Nat. index)	SMP op. (against EU index)
Cost of debt	Average EU peer	National SMP operator	National SMP operator



## Length of the averaging period

- Is it appropriate to use the **same averaging period** for all parameters: RFR, beta and cost of debt?
  - Ensure **consistency** in the sample window (eg as regards cycles)
  - Ensure **consistency** with CAPM (eg cost of debt = RFR + premium)
- Shorter averaging periods or spot rates are likely to better reflect latest market expectations
- But longer averaging periods ensure:
  - greater regulatory predictability and stability
  - consistency with business cycles (approximately 5 years on average)



## Company or benchmark beta?

- Benchmark approaches used to approximate a pure-play wholesale company may be ineffective
  - there are no pure-play wholesale telecoms companies in the EU
  - other companies' beta may not capture market dynamics inherent to the domestic market, as telecoms markets are still national (eg different demand conditions or network investment cycle)
- However, the use of benchmarks can still be justified
  - if domestic company's beta reflects inefficient financing decisions (eg financial risk due to heavy leveraging)
  - to increase robustness of statistical estimation of beta



## How to differentiate service WACCs?

- Two main approaches currently used to differentiate WACC (for NGAs):
  - Discounted Cash-Flow models
  - Beta disaggregation
- Beta disaggregation has some advantages over DCF models:
  - Simpler and less subject to uncertain long-term assumptions (eg future demand for the services)
    - Effectively, disaggregation relies on market expectations on these assumptions
  - Internally consistent: WACCs can be traced back to the company's beta



# Many questions... answers soon!

**DG CONNECT** 

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#### Autoriteit Consument & Markt

# Can we improve WACC setting in Europe?

Jarig van Sinderen, Chief Economist ACM

Brattle WACC Seminar, Brussels

24 October 2017

#### **Structure**

- Introduction ACM
- Main objectives ACM in setting the WACC
- Can setting the WACC in Europe be improved?
  - by applying "better" methods
  - by procedural change
- Conclusion

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Introduction ACM

Sectors where WACC is applied in regulating tariffs are: Energy (electricity, gas), Telecoms, Harbour Pilots, Airports, Rail and Water.

## **Objectives in setting the WACC**

- Setting a WACC that provides the **right investments** incentives
  - avoiding under and over investment and ensuring users pay a fair price
- Autoriteit Consument & Markt
- Well reasoned, well readable decisions
- Keep it as simple as possible (but not simpler than that)
- Insource the calculation when possible
- Combine it with an external review
- Consistent decisions

## **Challenge in securing consistency**

- Consistency does not mean one method
  - Different circumstances ask for different variants of the method
- Consistency is limited by
  - Laws specifying certain methods
  - Court rulings that overrule ACM's preferred method
- So multiple variants of the method exist within ACM
  - Each for different sectors
- Keeping track of all methods and their arguments is a challenge



#### Can setting the WACC be improved? By applying better methods

- Better than what?
- At outset we considered different methods
- We prefer CAPM because of its transparency
- EU default seems **standard CAPM** with ERP based on long-run historic return of certain markets

#### Alternatives

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- Empirical CAPM (see figure next slide!)
- Dividend Growth Model (DGM)
  - for individual firm WACC or for ERP
- Arbitrage Pricing Model

We do not think there currently are clearly better alternatives for CAPM

#### **Empirical CAPM** SML in practice flatter than in theory



#### Should we change the procedure? (in the Netherlands)

- Current Dutch procedure leaves ample room for input from the market
  - Regulator discusses issues with market parties -> Regulator calculates draft WACC -> Public consultation -> Final regulatory decision transparently taking account of all input -> Appeal possibility
- Appeals are extensively used

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- Ample room for input and proposals for better methods
- So we stick to present procedure



• Everything can always be improved

#### Autoriteit Consument & Markt However

- We see no merit in procedural change
- We currently see no methods that are clearly better than CAPM
  - But of course eager to learn more on this today

# Food for Thoughts on WACC COST OF CAPITAL SEMINAR

Dr. Francesco Lo Passo

Bruxelles, 24 October 2017



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#### Is the Regulatory Risk in the Details?

The straightforward calculation of the remuneration on invested capital is based on the CAPM/WACC methodology

#### WACC = Cost of Debt x D/(D+E) + Cost of Equity x (E/D+E)

Its practical implementation, however, is a source of potential concerns for investors which are worried of disallineament between market expectations and calculated parameters



#### Calculation of the WACC Parameters 1/2



Recognition of administrative costs of issuing debt

#### Calculation of the WACC Parameters 2/2



## Backup

#### **Risk Free Rate Volatility**



- Before of the Eurozone economic crisis, the RFR of most European countries, measured on the yields of European long-term government bonds, was stable equal to about 4%
- From 2010 onward the RFR has become volatile due to the economic crisis of the Eurozona initially, and subsequently to the Quantitative Easing (QE) which has disallineaded yelds of government bonds and country risk of European member states

#### **Real Risk Free Rate and Cost of Equity**



- The <u>Real Risk Free rate</u> applies in presence of a CCA RAB where inflation is applied to the assets, and expresses the *pure time value of money*, which is not influenced by investors' expectations on future inflation
- Future inflation expected by investors is embedded in the nominal yields of government bonds. It might differ from past inflation and target inflation rate set by governments
- Other risks can be adequately represented in a Market Risk Premium added to the Risk Free Rate

#### Risk Free Rate: Italian Energy Regulator Case Study



- In 2015 the Italian Energy Regulator (AEEGSI) reviewed its methodology to calculate the WACC of Electricity and Gas networks
- The Regulator has introduced a ceiling for the real RFR of 0.5% which has been calculated by taking into the account temporary depressive effects of the QE on bond government vields investment grade
- The real RFR is adjusted upward by the Country Risk Premium specific to Italy. It can be expressed in nominal terms by using forecast inflation rates

#### Measuring the Beta of Networks

#### **ROLLING TWO YEARS BETA OF TERNA, ENAGAS, REN AND NATIONAL GRID**



- The betas of European networks have decreased at the time of the Lehman Brother crisis to return to a higher value in the following years
- The betas of those networks have decreased at the time of the Eurozone crisis to increase in the following years due to higher market risk for those networks operating in the Eurozone and limited exposure to foreign markets

#### **WACC** Premiums for New Investments



- New investments on existing or new infrastructures can be riskier than investments on existing assets
- An empirical assessment can be made, for example with a stochastic business plan, which simulates different demand volatilities and construction risks
- Another approach would require to adjust the asset beta of the company by its operating leverage (ratio of fixed costs to variable costs)