Regulatory Cases: Cost of Capital and Price Reviews

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This summary is the result of a search to find cases of rate of return regulation, specifically cases in which regulators have reviewed prices and determined cost of capital. The reports included in this summary provide examples of the processes by which regulatory decisions are made. They were collected to provide the basis for creating a "generic" case study, but regulators and executives should find the sources a rich vein for studying the strengths and limitations of alternative methodologies and incentive programs. In many cases, the methodology regulators chose and the reasons for their decisions are as helpful as the explanations and details of the exact calculations. These nine cases are only a small sample of useful reports illustrating calculations of cost of capital and the regulatory review process.

I Gas Council of NSW (New South Wales) Report on Rates of Return Applicable to the Gas Distribution Network in NSW. By Pacific Road Securities, July 1996.

Summary

Pacific Road Securities was requested by the Gas Council of New South Wales to determine an appropriate rate of return and associated income measure to be applied to the asset base of AGL Gas Company.

The resulting report includes:

- Discussion of different pricing models: capital asset pricing model, dividend growth models, and other approaches to the assessment of an appropriate return on capital
- Determination of appropriate measures of income to be used in assessing return on capital given the options for the valuation of assets
- Analysis of adjustments to the assessment of the required rate of return to allow for income tax and dividend imputation
- Consideration of the range for risk factors to be used in assessing rate of return for a monopoly service provider.

The study includes an outline of the gas distribution industry in NSW and a summary of the AGL Gas Company including profits, market share, and large customer information.

Detail

AGL Gas Company operates under a state-based regulatory authority in which gas prices to tariff customers are regulated by a price control formula comprising a CPI-linked price cap.

Following is an outline of the main sections included in the report.

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1. The report considers the risk profile of the gas distribution system in NSW. Risk factors include supply, market, engineering/technical, regulation, and long asset life. Each of these risks is analyzed and a determination of the risk level is made. (All risks are determined to be low with the exception of regulatory risk, which is considered to be relatively high. Changes and uncertainty created by the regulatory system are cited as explanation.)

2. Alternative methods for determining the appropriate rate of return are considered, including:
   a. Capital Asset Pricing Model (CAPM)
   b. Dividend Growth Model
   c. Arbitrage Pricing Theory
   d. Empirical CAPM

   These models are thoroughly discussed before CAPM is chosen as the most appropriate for AGLGC. The CAPM model is explained, including formulas for both CAPM and WACC. Limitations and practical problems in using this method to determine the rate of return are addressed.

3. Practical benchmarks for determining the risk free rate of return are outlined. According to the report, the yield to maturity on 10-year Australian Commonwealth Government bonds is the commonly used proxy for the risk free rate. Actual yields are provided in a report annex. The nominal risk free rate range is determined.

4. The risk premium is determined based on historical premiums. This decision is explained using actual numbers.

5. The appropriate beta is determined. In this section of the report, details are provided on:
   - Historical beta. The past share price is used to calculate a historical beta
   - Gearing effect. The formula is provided and explained
   - Reference beta. An annex provides details of the beta factors computed

   This section concludes with the selection of an equity beta range, gearing beta range, and asset beta range.

6. A discussion on the treatment of company tax and imputation credits results in the decision that there should be no explicit adjustment made to the cost of capital. The discussion could be quite useful in itself though, simply for the information on company tax and credits.

7. The cost of debt and level of gearing briefly are considered.

8. Three main approaches to valuation of assets are considered: historical cost, current or replacement cost, and economic value. Asset valuation is one of the primary goals of the report, however no one manner is selected for AGLGC. Instead, the report recommends skill and judgement in determining values.

9. Measures of income including cash flow based measures, accounting rate of return, and appropriate, practical measures of income are explained with numbers in detail.

The report concludes that the "appropriate rate of return would be derived using the CAPM. This rate of return would then be applied to the asset value, to calculate the cash flows required from the assets. These cash flows would be added to forecast operating costs and capital expenditures, to determine the total revenue amount required to be recovered from customers" (page66). The acceptable rate of return range (before interest and taxation) is given as 14.7% to 17.0%.

This report seems to be appropriate for constructing a case study in which the final determination is a rate of return range for AGLGC. It could be useful in explaining how costing decisions are made and the various factors that should be considered. Rather than simply explaining how the numbers are used, this report explains why particular methods were selected and then uses the actual figures to illustrate the conclusions. The appendices have detailed figures for both AGLGC and the industry.

II Report to Independent Pricing and Regulatory Tribunal of New South Wales on Retail Marginal Analysis Applicable to Gas Distribution. By Greenwood Challoner, Feb. 11, 1997.

Summary

The purpose of this report is twofold:

- to determine the cost of providing unbundled gas distribution service to both contract and tariff market customers, and
- to determine the existence and magnitude of retail margin, monopoly rent, and cross-subsidy in AGLGC distribution network revenue requirement.

A potentially useful inclusion in this report is the total costs of AGLGC's business for the 1996 fiscal year.

Details

The first goal of the report was unable to be met due to AGLGC's documentation. Since activity based costing was not possible, the allocation of costs between the tariff and contract markets was based on cost drivers. For operations and maintenance and depreciation costs, they use MDQ. For other costs, the cost drivers are detailed in the report.

The report is separated by cost, and a detailed summary of each is presented. Sections include:

- Operations and Maintenance Costs
- Administrative and General Costs
- Regulatory Asset Value
- Financial Cost Summary
- Benchmarks. Benchmarks are explained using seven companies.
- Monopoly Rent Calculations

In general, this report may not have the detail necessary to construct a case study. It uses the results of calculations from other papers and reports and analyzes what others have done. It

might be useful as a guideline or background reading, but its reliance on other reports makes it difficult to learn details from this report on its own.

III Three papers on the measurement of cross-subsidy in AGL Gas Networks Limited. Taken together, these papers might make a useful and interesting lesson. The first paper is the initial study; the following two are critiques that find significant problems with the study. Each is briefly outlined below.

A. AGL Networks Limited Measurement of Cross-Subsidy. Prepared by R. J. Rudden Associates, Inc. Feb. 8, 1997.

Summary
The following overview is based on the Executive Summary.

The purpose of the report is to determine the level of cross-subsidy between AGL's contract and tariff markets. The plausible range of cross-subsidies was determined by using the stand-alone costs of the contract market. The Independent Pricing and Regulatory Tribunal (IPART) is cited as having a preference for using long-run avoided costs in the tariff market as a basis for measuring the level of cross-subsidy. R. J. Rudden Associates, Inc. (RJRA) acknowledges this but explains that their method produces the same results as IPART's preferred method. The reasoning is given.

Tables that explain RJRA's conclusions are provided.

Detail
The report first analyzes theoretical cost bases for measuring cross-subsidies. This brief discussion could be made into an interesting detailed discussion question and case study to determine if RJRA's assertions are correct (that the level of cross-subsidy paid by the contract market when measured by the stand-alone cost approach equals the level of cross-subsidy that benefits the tariff market when measured by the long-run avoided cost approach).

Given their choice of using stand-alone cost, the report proceeds to depict the costs of a multi-product firm. This is followed by an extensive discussion of fully distributed costing, and a discussion of economic principles including marginal, incremental, avoided, long-run, and short-run costs including tables and diagrams.

The final section outlines how costs were measured. The costs are extensively and well explained, but actual numbers are not derived in this paper, they simply are reported. The report is divided into the following sub-sections:

Costs assigned to the contract market
- stand-alone plant costs
- stand-alone depreciation reserve
- directly assigned O&M expenses

- depreciation, profit, interest and taxes

Overall cost level
- replacement costs
- written down replacement costs
- initial capital base
- return, depreciation and taxes
- O&M expense

The conclusion provides numerical cross-subsidy results, and the tables with figures illustrate RJRA's conclusions at each point. Overall, the paper is interesting and detailed enough in its theory that it might make an excellent discussion paper.

B. The Measurement of AGL's Cross-Subsidy, Commentary on R. J. Rudden Associates' Approach. By London Economics, April 1997.

Summary
The following overview is based on the Executive Summary.

This report seeks to demonstrate that RJRA's methodology is only valid under certain conditions and that RJRA did not provide supporting evidence as to whether the conditions hold. It introduces a different approach for determining costs and explains how that approach is better than that used by RJRA.

Details
London Economics (LE) finds that RJRA's method for identifying cross-subsidies assumes that AGL does not generate positive economic profits, however this has not been documented. Given this, LE states that it is not possible to conclude that a cross-subsidy exists between the contract and tariff markets based on the test used by RJRA, and that the only valid approach would be that suggested initially by IPART.

One concern with RJRA's report is that common and joint costs appear to both be treated as joint costs, and that this distinction is important to maintain. The other concerns are outlined paragraph by paragraph to parallel the initial report.

Following this critique, LE presents a framework of its own for measuring cross-subsidies. No actual numbers are provided but the insights might be useful. Combined with the original report and the other critique (description follows), an interesting discussion problem could be constructed.

C. Critique of R. J. Rudden Report to AGL Gas Networks Limited Regarding Measurement of Cross-Subsidy. By Reed Consulting Group, Inc., April 7, 1997.

Summary
The following overview is based on the Executive Summary.

Reed Consulting Group's (RCG) analysis of the RJRA report concludes that the methodology employed would produce rates that are not equitable, efficient or reliable. The determination of revenue responsibility is not consistent with generally accepted cost allocation principles; cross-class rate differentials are not the product of either marginal or embedded cost differences but of the application of different costing methodologies; marginal cost principles have been used to assign revenue responsibilities for some customers but these principles have not been consistently applied.

Details
The critique is organized into five sections. The sections are:

- The RJRA report should not be misinterpreted or misused
- Inconsistencies in principles supported by RJRA
- The authorities quoted prescribe pricing policy diametrically opposed to the results implied by the RJRA report
- The RJRA report methodology for examining cross-subsidies must not be used for cost allocation because it violates basic tenets set forth in the access code
- There is no basis in fact or theory for depreciating a particular portion of an integrated facility at a different rate than other portions of the same facility.

Each section is based on theoretical principles and conceptual frameworks; no numbers are used to illustrate key points.

IV OFWAT's "Prospects for Prices". Prepared by National Economic Research Associates (NERA), January 1999.

Summary
In response to a consultation paper on strategic issues affecting water companies' bills in 2000-2005, NERA conducted a survey of financial markets on key issues relevant to the UK water industry cost of capital over those years. This is a survey rather than a research paper. The survey results include overall comments about the future cost of capital, an outline of the risk factors facing water companies, comments on OFWAT's estimate of the cost of equity based on the CAPM, and views on the cost of debt, credit ratings and financial ratios.

Details
Section 2 deals with OFWAT's methodology for estimating cost of capital as a whole, and in individual components (cost of equity and cost of debt). There are no calculations to determine cost of capital; instead, the paper focuses on respondents' views on OFWAT's results, and includes respondents' reasons why they believe OFWAT's results to be incorrect. Comments and explanations could be useful.

Section 3 presents market participant's views on the main risks affecting the water industry.

Section 4 shows evidence on acceptable financial ratios that water companies would need to meet in order to be able to finance themselves. Questions asked of respondents could provide good discussion questions, for example: "We asked market participants to indicate which historic cost account financial ratios they attach most importance to." The possible choices include pre-tax interest cover, cash interest cover, book gearing, market gearing, dividend cover and cash dividend cover. Respondents of different types favored different measurements. Utilities analysts, capital markets, utilities banking and credit rating agencies show cash interest cover as the most important, but some attached weight to market gearing. Seeing how various types of respondents view OFWAT's estimates and figures, and the conditions and criticisms brought up, could be the basis for good discussions.

V The Periodic Review of Railtrack's Access Charges 2000. By Office of Rail Regulation, October 2000. Document available at www.rail-reg.gov.uk. Select Periodic Review of Track Access Charges.

Summary

This paper and associated documents include full text of the review of Railtrack's access charges, draft conclusions, accompanying consultants papers (including those by Booz-Allen & Hamilton, Europe Economics, NERA, Horton 4 Consulting, Symonds, and Halcrow Fox), extensive background documentation, and associated seminar proceedings and papers.

Details

The primary document is approximately 200 pages and a further 20 appendices are attached. The report is divided into four main sections.

Part I concerns revenue requirements. It explains the methodology for resetting price controls, efficiency, cost of capital and financial indicators, and the regulatory asset base, among other topics. Part II provides the incentive framework. It shows the structure of charges, operational performance, property allowance schemes, station charges, information reporting, and penalties. Part III is concerned only with the West Coast Main Line, and Part IV is the timetable and implementation process. These sections provide the necessary background for understanding decisions and calculations. Detailed information is contained in the appendices.

The technical appendix includes calculation of cost of capital and describes the Office of Rail Regulation's chosen methodology. In Volume I, reports and review documents are provided along with cost projections and revenue requirements. In Volume II all calculations are illustrated. These include among others: calculation of capacity charge, calculation of fixed charge, period review notice, track usage price list, incremental output statement price list, and station long term charges. There appears to be enough detail provided to construct a good case study that allows practice with calculations.

VI The transmission price control review of the National Grid Company from 2001, transmission asset owner, final proposals. September 2000. Document available at www.ofgem.gov.uk/docs/ngcpc02.pdf.

Summary

This document sets out the final proposals for a new price control to apply to the transmission of business of the National Grid Company. Results include figures for the controllable operating expenditure, capital expenditure, cost of capital, NPV of allowed revenues and X-factor. NGC had until Oct. 27, 2000 to indicate whether it would accept the proposals in the document. Explanations and calculations are included in both the body of the paper and the appendices.

Details

The paper outlines the objectives of the price control review, lists NGC's revenues, and explains the separation of price controls to cover transmission and system operation separately (in order to provide appropriate incentives for each). Explanations of the overall operations are extensive. Each section of the paper provides rationale for choices made regarding operating expenditures, capital expenditures, output measures, cost of capital, WACC, dividend growth model, and the valuation of assets.

Section 6 is titled "Price Control Calculations". It includes deriving a range for the price controls, operating expenditure, capital expenditure, regulatory value, cost of capital, allocating P_0 and X, other factors affecting the calculation of P_0 and X, and the responsibilities of each division of the NGC. Appendix 6 provides all price control calculations.

The entire document is approximately 70 pages long and contains enough financial information to construct a case study. There are explanations for choices of methodology, although the methods not chosen are not as deeply discussed as they are in some of the other papers mentioned above. This paper might be interesting also because there are a number of associated papers to which the website provides links. All the drafts to this paper are available, as are consultants' opinions and related news releases. If this one document is only useful in terms of practicing calculations, it might be interesting and useful to see how the final draft differs from the originals, or how opinions of consultants affected the final draft.

VII Review of Public Electricity Suppliers 1998 to 2000, Scottish Transmission Price Control Review, Draft Proposals Paper, October 1999. Document available at www.ofgem.gov.uk/docs/trans.pdf.

Summary

This paper is a price control review for the two Scottish transmission companies that are effectively monopolies within their designated areas. OFGEM is reconsidering the level of revenues sufficient to allow the companies to serve the population and to earn an appropriate return. Previously, the set level of revenues was converted into a price control by dividing it by a pre-ordained number of units. Here OFGEM is considering whether it would be fairer to present price controls in terms of allowed revenues only.

Details
At the time of the report, each of the Scottish transmission companies was subject to an RPI-X price control under which allowed revenue is related to a pre-set projection of the number of units transmitted. This was effectively a revenue control translated into a price control. The merits of this form of regulation are considered as part of the review.

After considering the form of the price control, the review paper presents details of the operating costs of each firm, and then presents details of the capital expenditure of each. These are used, along with a section on financial issues, as a basis for the price control calculations that are provided in the last section of the paper.

This paper is relatively short (54 pages), but it does contain calculations and explanations of the methods used to determine the type of regulation and the appropriate rates for the Scottish electricity suppliers. It also might serve well as background reading.

VIII Review of Transco's price control from 2002, initial consultation document, May 2000. Document available at www.ofgem.gov.uk/docs/maytranprice.pdf.

Summary
Transco's present gas transportation price controls will expire in March 2002. This paper is OFGEM's initial review of these price controls. It sets out the principal issues that the review needs to address. This process involves three separate initiatives: consideration of separate price controls for Transco's metering and meter-reading activities, consideration of Transco's connections business regulation, and consideration of long-term incentives for investment in transmission capacity. For each element of the National Transmission System subject to price controls, OFGEM wants to assess and propose: appropriate outputs; an efficient level of operating costs and capital expenditure related to those outputs; an appropriate asset valuation and an appropriate cost of capital.

Details
This initial report outlines the entire gas market and the Transco System and Transco's role in the market including its corporate structure and a breakdown of its costs. Currently the regulatory framework is an RPI-X price control where X = 2. This framework is explained along with the present price controls and developments over the current review period.

Regulatory and financial issues that are specifically considered in this document include:
- the form, structure and duration of the control
- whether there should be separate controls for separate activities
- how the price controls should evolve to include year-by-year incentives for efficiency and the maintenance of standards of service
- definition of the appropriate outputs for the price controlled businesses and setting the efficient level of costs to deliver the outputs
- the cost of capital and the appropriate value for the regulatory asset base
- incentive schemes

Sections of the document are devoted to standards of service (public standards of service and shipper services) and the form and structure of future controls. These sections are explanatory and provide information about the decisions OFGEM is making as it begins the review process.

In section five of the paper, Transco's allowed revenue is determined. There is an introduction, then an explanation of the present value approach, then OFGEM's efficiency study. Also, the cost of capital is calculated. In the next section, the regulatory asset value is determined. This section also includes an explanatory introduction, the opening regulatory value, details on transfers of assets out of Transco and the depreciation allowance.

This paper contains enough detailed figures and methodology explanations to construct a case study. It is also interesting in that the review is not required until March 2002, yet this process was begun in May 2000. A timetable is provided and views are requested so that all involved are aware of the status of the regulatory decision-making process and have an opportunity to voice concerns. This paper makes it apparent that regulatory decisions and the public acceptance of those decisions require that initial proposals be presented with ample opportunity for comments, questions and objections.

IX 2001 Electricity Distribution Price Review, Office of the Regulator-General, Victoria, Australia, September 2000. Document available at www.reggen.vic.gov.au/elec_13.htm

Summary

On September 21, 2000, the Office made a determination setting out new price controls for regulation of the charges for use of the electricity distribution network, and allowing for the recovery of transmission charges. The determination takes effect January 1, 2001 and is to be effective for at least five years. Consultation for this review began in June 1998. Various publications, comments and submissions leading up to this final document also can be found at the above listed website.

Details

The price review comprises two volumes. Volume 1 (360 pages) is the Statement of Purpose and Reasons. It provides the context for the review and outlines the key issues, the various comments and submissions received, and the Offices' analysis, reasoning and conclusions related to the establishment of the new price controls. Volume 2 (73 pages) is the Price Controls. It sets out the detailed price controls and the associated implementation mechanisms that give effect to those price controls. The price controls represent the translation of the Office's conclusions presented in Volume 1 into a document that will provide the basis for regulating the charges levied by the distributors. A separate copy of the Executive Summary (26 pages) is also available at the website.

In addition to the two volumes and Executive Summary, the website has transcripts of proceedings, draft details, and consultants' papers and summaries. There is enough detailed information to construct various types of case studies.