ACCC Fixed Line Services Access Pricing Model

Prepared for the ACCC

Ovum Project CYOC0700

Version 12

06 July 2010

Contents

1 Introduction

1.1 Purpose of this document

This document is an operations handbook for the ACCC's Fixed Line Services Access Pricing Model. The purposes of this document are:

- to provide some brief background to the model;

- to explain the workings and structure of the model;

- to provide guidance to facilitate operation of the model by users.

This document does *not* set out to justify the structure of the model. The model structure is driven by the ACCC's 2010 access pricing principles for fixed line telecommunications services.[1]

The model has been designed to meet the ACCC's requirements based on the ACCC's initial model and calculations supplied to Ovum on 28 April 2010. The initial version of this model was developed by Ovum for the ACCC. The final version of the model includes revisions made independently by the ACCC to ensure consistency with its pricing principles, which were still in development when Ovum completed its version of the model. Ovum has not independently studied the applicability of the ACCC's building-block approach to the costing of telecommunications services and does not express an opinion on this matter. The model described here takes a post-tax approach and includes tax calculations that have been supplied to Ovum by the ACCC.

This document is best read with the model open before the reader. The Model Operation chapter of this document is laid out in the same order as the model is implemented in the Excel workbook.

1.2 Purpose of the Model

The ACCC Fixed Line Services Access Pricing Model has been designed to facilitate the application of a 'building block' approach to set prices for declared fixed access services. The ACCC intends to release the model for comment by the telecommunications industry.
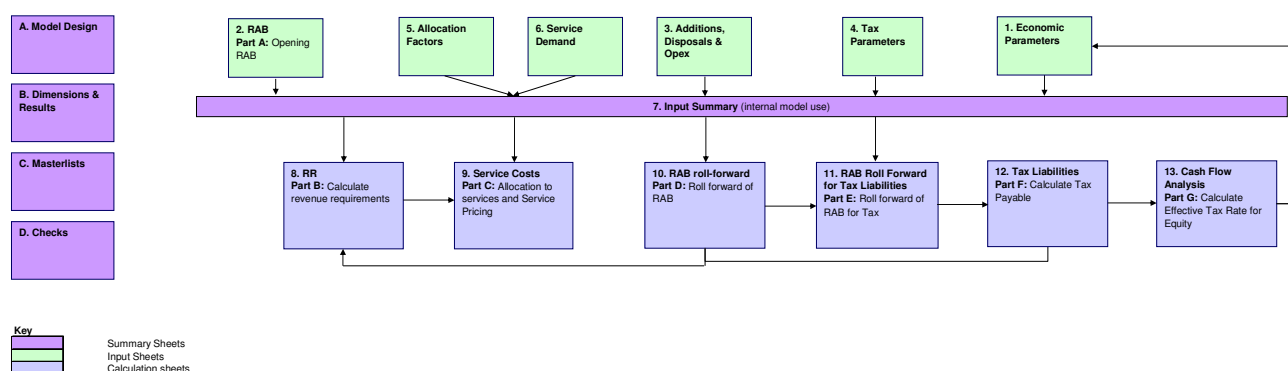
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[1] At time of writing these principles were being developed. Refer to the ACCC's website http://www.accc.gov.au for up-to-date information.

2 Model Design

2.1 Model schematic

An overview of the model is illustrated in Figure 2.1 below.

Figure 2.1: High-level structure of the model

Source: Ovum

Each box depicted in Figure 2.1 represents a separate worksheet in the model. The contents and calculations performed in each worksheet are as follows:

Figure 2.2: Model worksheets

Worksheet	Purpose
Cover	Title, date and other identifying information.
A. Model Design	Schematic of model for easy reference.
B. Dimensions & Results	Presents summary of results and includes control panel for setting relevant study parameters.
C. Masterlists	Input sheet for master lists used in model.
D. Checks	Provides a summary of the data checks implemented in the calculation sheets.
1. Economic Parameters	Input sheet for WACC parameters and inflation indices.
2. RAB	Input sheet for Opening RAB and RAB parameters.
3. Additions, Disposals & Opex	Input sheet for capital additions and disposals each year and annual operating costs and overheads.
4. Tax Parameters	Input sheet for Opening RAB for tax purposes, RAB tax parameters, and customer contributions for tax purposes.

Worksheet	Purpose
5. Allocation Factors	Input sheet for factors by which costs are allocated to services.
6. Service Demand	Input sheet for annual demands for each service.
7. Input Summary	Provides a summary of all the input data and creates a full dataset to be used by the model.
8. Revenue Requirement	Calculates the revenue requirement (RR).
9. Service Costs	Calculates the costs allocated to each service and the unit prices for each service.
10. RAB Roll-Forward	Calculates the RAB at the beginning and end of each year; and regulatory depreciation.
11. RAB Roll-Forward for Tax	Calculates the RAB for tax purposes at the beginning and end of each year; and tax depreciation.
12. Tax Liabilities	Calculates the tax payable.
13. Cash Flow Analysis	Calculates effective tax rate for equity from pre- and post-tax cash flows.

Source: Ovum

2.2 Model overview

The model has a building-block design to allocate capital charges and operating costs and overheads to services and hence calculate prices for declared wholesale services. The ACCC's 2010 access pricing principles for fixed line telecommunications services describe the way the building block model is to be implemented. Sources of the data used in the model will also be discussed by the ACCC.[2]

The model is designed to calculate the revenue requirement and then estimate prices, for a list of declared wholesale services. The default list of **Services** is:

- Unconditioned Local Loop Service (ULLS);

- Wholesale Line Rental;

- PSTN Originating & Terminating Access;

- Local Call Service.

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[2] At time of writing the ACCC's 2010 pricing principles and guidance on data sources were being developed. Refer to the ACCC's website http://www.accc.gov.au for up-to-date information.

The model makes provision for up to 7 services.

All calculations in the model are undertaken in real terms, i.e. at the price level for the first year of the estimation period (the base year), except for the calculation of tax liabilities, which must be undertaken in nominal terms. Real price estimates are inflated by the assumed inflation index to produce nominal prices.

The calculation of the revenue requirement begins from an opening Regulatory Asset Base (**RAB**). The assets in the RAB are divided into assets for the Customer Access Network (**CAN**) and assets for the Core network (**Core**).

CAN and Core assets are each divided into Asset Classes. An **Asset Class** is a group of related and similar assets. Typical Core Asset Classes, for example, may be:

- Switching Equipment – Local;

- Switching Equipment – Trunk;

- Switching Equipment – Other;

- Inter-exchange Cables;

- Transmission Equipment;

- Radio Bearer Equipment.

The model makes provision for up to 20 Asset Classes in each of CAN and Core.

The model assumes that all capital assets have the same real Weighted Average Cost of Capital (**WACC**) throughout the period under study. That is, the model assumes only one real WACC value. The real vanilla WACC is the particular WACC applied in the model.

The **Opening RAB** specifies the depreciated regulatory value of the assets in each asset class at the end of a given financial year (that is, at 30 June of the relevant year).

Additions to each asset class (through investments and asset acquisitions) and **Disposals** from each asset class may occur each year. The model assumes that additions and disposals occur in the middle of the financial year (that is, on 1 January of the relevant year). However the data for additions and disposals is stipulated at the beginning of the financial year (on 1 July) and is added to the RAB at the end of the financial year though is treated with a half-year WACC adjustment in the roll-forward of the RAB to account for the assumption that capital expenditure is incurred midway through the year.

 The model works with **Net Additions** (Additions less Disposals), since additions and disposals are assumed to occur at the same point in time.

The regulatory value for an asset class at the beginning of a financial year is the value from the end of the previous year plus the net additions in that asset class.

Net additions is added to the regulatory asset base at the end of the year in which it is incurred. Subsequently, a half WACC adjustment is made so that the timing of capital expenditure is duly accounted for.

The assets are then depreciated over the year and the depreciation is subtracted to provide the regulatory value of each asset class at the end of the financial year. This procedure is called **Rolling Forward the RAB**. It can be repeated for as many years as required. The model makes provision for 12 years of roll-forward.

Depreciation charges are calculated for each asset class using standard formulae. The straight-line method for depreciation is used throughout the access pricing model. However there is an option to use the diminishing value method for tax depreciation of new assets.

The model assumes that all Core asset classes use the same depreciation type; and similarly that all CAN asset classes use the same depreciation type.

Operating costs and **Overheads** are also incurred during the year. These costs may be specified for a specific asset class through the model inputs or a total amount may be input for each of CAN and Core operations, in which case the costs are allocated among asset classes in proportion to the capital values for each asset class at the beginning of the financial year. (For more details, see worksheet "8. Revenue Requirement".)

The revenue requirement generated from an asset class in a given financial year is taken to be the sum of the following items:

- The capital cost of the assets at the beginning of the year (that is, the regulatory value multiplied by the WACC);

- The depreciation charge for the asset class during the year;

- The operating costs and overheads allocated to the asset class in the year; and

- A proportion of the tax incurred in the year.

The revenue requirement is allocated to services using **Allocation Factors**. An Allocation Factor is the proportion of the revenue requirement for a specific asset class to be allocated to a service. That is, for each service there is an allocation factor (which is a fraction between 0 and 1, inclusive) for each asset class that specifies how much of the revenue requirement for that asset class is to be allocated to the service. The model allows for a single set of allocation factors to be used in all years; or for a different set of allocation factors to be input for each year.

For each service, the sum of the revenue requirement allocations from each asset class is the revenue requirement for that service. This value may be adjusted for inflation. The model allows for a single annual inflation rate to be applied in all years.

The **Service Price** (whether real or nominal) can then be calculated by dividing the revenue requirement allocation for the service by the **Annual Demand** for that

service. The annual demand is specified as an input. The model assumes that there is an annual demand for each service in each year.

For the *Local Call Service*, it is assumed that the annual demand is in minutes. The model converts the service price for this service to a price per call by multiplying the price per minute by the **Average Call Duration**. The model assumes that the average call duration is specified for each year.

2.3 Using the model

The user must provide a complete dataset in order for the model to provide correct results. The amount of data required depends on the choices the user makes in the "B. Dimensions & Results" worksheet. The aim of this section is to guide the user through an initial use of the model and a first exploration of the results. The user will then find that he/she can make more changes and examine other options. The detailed descriptions of the operation of the model are deferred to chapter 3.

Initial choices

In the first instance, the user should make appropriate choices in worksheet "B. Dimensions & Results". Once these choices are made, the formatting of the input worksheets (worksheets 1-6) will help guide the user as to which inputs are required. The choices are listed in the block labelled "Dimensions". They are as follows:

- **Period**: this is the number of years for which the calculations are to be performed. (The initial date is set in the input data.) The user should choose from the drop-down list.

- **Economic Parameters**: The real Weighted Average Cost of Capital (WACC) is specified according to the set of economic parameters listed.

- **Depreciation method**: Regulatory depreciation is limited to the straight-line method. However, the user can select the method by which tax depreciation for new assets is calculated for each of the CAN (Customer Access Network) and Core (Core Network) assets. The user should choose from the drop-down list. There are three choices:

    o *Straight-line*: straight-line depreciation is used;

    o *Diminishing value 150%*

    o *Diminishing value 200%*

  All existing assets use straight-line depreciation only.

- **Allocation Factors**: the allocation factors are used to allocate costs from asset classes to services. The user can choose to enter one set of allocation factors for all years; or a set of allocation factors for each year. The user should choose from the drop-down list. The choices are:

- o *Constant*: in this case, one set of allocation factors, specified in worksheet "5. Allocation Factors", will be used for all years;

- o *Yearly*: in this case, the user will be required to specify allocation factors for each year in worksheet "5. Allocation Factors". This choice involves substantially more input data.

- **Inflation indices**: the inflation forecast is the geometric average between the RBA's short-term forecasts for the next two years and the midpoint of the RBA target range (2.5%) for the remaining years in the regulatory period.

- **Operating cost and Overheads**: the user can choose to allocate operating costs (and overheads) directly to individual asset classes; or can specify only the overall level of operating costs (and overheads) for the CAN and Core. The user should choose from the drop-down list. The choices are:

  - o *CAN and Core categories only*: the user will specify the total operating costs (and overheads) for CAN and Core in worksheet "3. Additions, Disposals & Opex";

  - o *Individual Asset Class*: the user will be required to enter operating costs (and overheads) for each asset class in worksheet "3. Additions, Disposals & Opex".

Once these choices have been made, the user will be guided by the formatting in the input worksheets in filling out (or modifying) the input data.

Entering (or modifying) data

Economic parameters

In the table **1.1 WACC parameters** in worksheet "1. Economic Parameters", the real vanilla WACC is calculated at the bottom of the table from the numbers listed.

The user should ignore the button "Click here to update input value" next to **Effective tax rate for equity** in the first instance.

Data for rolling forward the RAB

The user may then turn to the **Opening RAB** in worksheet "2. RAB". The user will have the depreciated regulatory values for a number of asset classes for each of CAN and Core assets at a particular date (financial year end). The user should enter the valuation year in worksheet "2. RAB": this value sets the dates used in the model.

The user should also enter the numbers of actual CAN and Core asset classes, by choosing from the drop-down lists. If the asset classes do not correspond to the default values, the user should amend the lists in worksheet "C. Masterlists".

The user should then enter the depreciated regulatory values (**Depreciated Value**) in table **2.1 Regulatory Asset Base – Opening Value and Parameters** in worksheet "2. RAB". The depreciated regulatory values should be in million

AUD. The user must also specify **Average Asset Life** and **Remaining Asset Life** for each asset class.

The user may then complete the capital additions and disposals and operating costs (and overheads) in sheet "3. Additions, Disposals & Opex". Data is required for each year and all values should be in million AUD.

For operating costs (and overheads), the user must either specify the total operating costs (and overheads) for the CAN and Core network in table **3.1 Total Operating cost and Overheads for all asset classes**; or the allocation of operating costs (and overheads) to individual asset classes in table **3.2 Operating Cost and Overheads specified for each asset class**. The table that is not required is shaded out.

The user must give values for capital additions to and disposals from each asset class in each year in tables **3.3 Asset Class Additions** and **3.4 Asset Class Disposals**. All values should be in million AUD. The user can choose to enter just net additions in table 3.3 and leave table 3.4 blank.

At this point, all the data required to roll forward the RAB has been specified.

Tax Parameters

Worksheet "4. Tax Parameters" is used to enter values to be used for the tax calculations.

Table **4.1 Regulatory Asset Base – Opening Tax Value and Parameters** is the tax equivalent of table 2.1. In table 4.1, the user must specify the **Depreciated Tax Value**, the **Tax Remaining Life** and the **Tax Standard Life**. These may well be different from the regulatory values in table 2.1.

Any tax losses carried forward can be specified in table 4.2 as **Tax Loss Carried Forward**. Any tax losses should be entered as negative numbers.

Table **4.3 Additional taxable income** is used to enter any additional customer contributions that add to the income assessed for tax purposes. It may not be necessary in the first instance.

At this point, all the data required for the tax calculations has been specified.

Services

The user can then turn to services. If the default list is not adequate, the user should edit the list of **Services** in worksheet "C. Masterlists".

In worksheet "5. Allocation Factors", the user must either specify one set of **Allocation Factors** for all years in table **5.1 Constant Allocation Factors for each service**; or must specify a set of allocation factors for all relevant years in table **5.2 Allocation Factors for each year and service**. The table that is not required is shaded out.

In worksheet "6. Service Demands", the user should specify the annual demand for each service in table **6.1 Annual Demand for each Service**. The units of demand will normally be *Lines* or *Minutes*. For *Local Call Service*, the user must

complete table 6.2 with **Average Call Duration** for each relevant year. Years not used are shaded out.

This completes the initial dataset required for the model.

Model results

The user will see the results in terms of **Service Prices** displayed in worksheet "B. Dimensions & Results". The calculated prices are given in both real and nominal terms. More details of the results may be found in worksheet "9. Service Costs", tables 9.6 to 9.9.

The graph in worksheet "B. Dimensions & Results" can be used to display the calculated service prices for a particular service. The user should select the service from the drop-down list. If there have been changes but the graph has not been updated, the message "Graph is not updated" will be displayed. In this case, the user should click the "Refresh" button to update the graph.

Should there be errors in the data that cause a detectable error in the allocations, the message "ERROR IN CALCULATIONS – PLEASE REFER TO SHEET 'D. Checks'" will be displayed near the title of the "B. Dimensions & Results" worksheet.

When changing the choices in worksheet "B. Dimensions & Results", the user should ensure that the relevant data has been entered in sheets 1 to 6.

Layout

To aid understanding, the worksheets are laid out consistently. In particular, values for a specific financial year appear in the same column in every sheet. Years that are not used are shaded out. Cells whose values are copied directly from previous sheets are shown with a blue background. This and other model conventions are further specified in worksheet "A. Model Design".

Each of the calculation worksheets has several sections. The top section is labelled "Summary of inputs for calculation". This indicates the cost and other data to be used in the worksheet that has been provided or calculated in earlier worksheets. The next section shows the major calculations for the worksheet. In some worksheets, there is a final section labelled "Detailed Calculations" containing detailed calculations that are summarised and provided for in the previous section.

3 Model Operation

3.1 Introduction

This chapter describes the way the model operates and provides a detailed description of the calculations performed in each worksheet.

The model has a number of specific conventions to assist the user.

Input cells where data is to be provided by the user have **blue** fonts; input cells with values inserted by Ovum from information provided by the ACCC have **red** fonts; calculated cells have **black** fonts.

All asset values and operating costs (and overheads) are input in million Australian Dollars (AUD) in the base year's dollar value (i.e. real terms). Service prices are expressed in AUD per unit.

The model is comprised of a number of worksheets in a single Excel workbook. The purpose, operation and output of each sheet are explained in the following sections.

3.2 Worksheet Cover

The worksheet identifies the model name, version and date.

3.3 Worksheet A. Model Design

This worksheet provides a block diagram of the model design (*cf.* Figure 2.1) and a list of model conventions.

3.4 Worksheet B. Dimensions & Results

This worksheet provides some user controls and is used to view the final model results.

The user controls are located in a block labelled "Dimensions". The meaning of these controls is as follows.

Period

Select model calculation period (years)
The user may select a period from the drop-down list. This is the number of years that the RAB will be rolled forward and for which results will be provided. In the input worksheets and calculation worksheets, years that are not used are shaded out.

Economic Parameters

All the parameters in the **Basic parameters** column of table **1.1 WACC parameters** are required. From these values, a real vanilla WACC is calculated for use in the model.

In the *Economic Parameters* worksheet, an initial value for the effective tax rate for equity is one of the inputs. This value, however, can be calculated once the pre- and post-tax cash flows are known. The calculation is an iterative process, since the post-tax cash flows depend on the effective tax rate for equity. If the user presses the "Click to activate" button, the iterative calculation is performed and the effective tax rate for equity is updated. This leads to a recalculation of the real vanilla WACC.

Tax Depreciation method

Select Depreciation method for new CAN Asset Classes
Select Depreciation method for new Core Asset Classes
The user may choose a method from the drop-down list in each case. The choices are:

- o *Straight-line*: straight-line depreciation is used in rolling forward the RAB;

- o *Diminishing value 150% (allows for accelerated depreciation for new assets)*

- o *Diminishing value 200% (allows for accelerated depreciation for new assets)*

For all existing assets*, straight-line depreciation* is the only option.

Allocation Factors

Select allocation factor input method
The user may choose from the drop-down list. The choices are:

- o *Constant*: the allocation factors specified in table 5.1 are used for all years in which there is service demand;

- o *Yearly*: the allocation factors specified in table 5.2 for each year are used.

Inflation indices

The inflation forecast is the geometric average between the RBA's short-term forecasts for the next two years and the midpoint of the RBA target range (2.5%) for the remaining years in the regulatory period.

Operating cost and Overheads

Select Operating cost & Overheads input method
The user may choose from the drop-down list. The choices are:

- o *CAN and Core categories only*: the total operating costs and overheads for CAN and Core network assets are specified for each year in table 3.1.; and

- o *Individual Asset Class*: the allocations of operating costs and overheads to asset classes for each year are specified in table 3.2.

The two blocks labelled "Fixed Line Access Services" display the model calculated results in terms of service prices. The service prices are given in both real and nominal terms. The values are copied from tables 9.6 and 9.7.

The worksheet includes a graph to display the service prices for a particular service. The user can choose the service for which prices are displayed by selecting from the drop-down list under "Select service shown in graph". If a change in data or controls has been made, the graph, which is implemented through an Excel macro, may not have been updated. In this case, the message "Graph is not updated" appears. Clicking the "Refresh" button will update the graph.

The worksheet also has a block labelled "Selections". This should not be modified by the user: it is used for controls.

3.5 Worksheet C. Masterlists

The following master lists are maintained in this worksheet:

- CAN Asset Classes – the names of the CAN asset classes. The model provides for up to 20 CAN Asset Classes.

- Core Asset Classes – the names of the Core asset classes. The model provides for up to 20 Core Asset Classes.

- Services – the list of services for which service prices are to be calculated. The model provides for up to 7 Services.

- Years – the list of financial years used in the model. This list is calculated from the date entered in table 2.1. The model provides for up to 12 financial years (as specified in worksheet "B. Dimensions & Results").

- Depreciation methods – the list of depreciation methods provided in the model for new assets.

The user may change the CAN Asset Classes, Core Asset Classes and Services, if necessary, but should not change the other lists.

3.6 Worksheet D. Checks

This worksheet gathers together all the data checks performed in the model, to permit the user to see that model integrity has been maintained. It summarises the input costs, final costs after allocation, and allocated costs for each service. If there is a problem identified in this sheet, an error message is displayed next to the heading on worksheet "B. Dimensions & Results".

Also in this worksheet are sections indicating whether all costs are allocated appropriately in the various calculation stages of the model. In the calculation sheets of the model, data checks are performed to ensure consistent allocations of costs throughout the different sections. The data checks are related to the CAN and Core, and gathered from the following tables in the calculation sheets of the model:

- "10. RAB Roll-Forward":

    - 10.4 Net Additions;

    - 10.5 Opening RAB by asset class;

    - 10.6 Regulatory Depreciation;

    - 10.7 Closing RAB by asset class;

- "8. Revenue Requirement":

    - 8.7 Annual Revenue Requirement;

    - 8.8 Annual Revenue Requirement (excluding Tax);

- "9. Service Costs":

    - 9.11 Allocation of revenue requirement to each service.

- 13. Rate of return targets (from "13. Cash Flow Analysis"):

- 13.15 Checks (confirms that the cash flows implied by the model are consistent with the WACC inputs).

The values shown under these sections are then reconciled under Check Values with the costs summarised in the tables above. A Mastercheck summarises all the data checks gathered in this sheet and indicates to the user whether costs are allocated consistently or not.

3.7 Worksheet 1. Economic Parameters

This is an input worksheet to provide economic parameters to be used by the model.

Table 1.1 WACC parameters

In this table, the user enters the relevant WACC parameters in order to calculate the real vanilla WACC.

In all cases, a real vanilla WACC is used in the model's regulatory calculations.

The full list of input parameters is the following:

- Nominal Risk Free Rate – rate of return with close-to-zero default risk and zero liquidity risk (e.g. freely traded investment-grade government bonds);

- Debt ratio - portion of total capital financed by debt;

- Equity ratio (calculated) – portion of total capital financed by equity. (This value is automatically calculated from the Debt ratio input to ensure both values add to 100%.)

- Nominal Debt Risk Premium – the margin above the risk-free rate that a particular company must offer in order to attract debt funding, in nominal terms;

- Debt Raising Costs – costs of raising debt;

- Equity issuance costs – costs associated with issuing equity;

- Nominal Market Risk Premium - the expected rate of return for the national stock market as a whole minus the risk-free rate;

- Utilisation of Imputation (Franking) Credits– portion of company tax paid by a service provider that is reimbursed to investors through imputation credits attached to dividends;

- Expected inflation for bonds (Geometric Average) – the expected inflation for bonds is used to convert nominal input parameters into real.

- Corporate Tax Rate – company tax rate in Australia (currently 30%);

- Nominal effective tax rate for debt – effective debt shield;

- Nominal effective tax rate for equity – tax rate taking into account relevant cash flows. The user should enter an initial, preferred value. This parameter can be calculated, however, once the pre- and post-tax cash flows are known. This is an iterative calculation, since the post-tax cash flows depend on the effective tax rate for equity. The value given here can be updated by the calculation by clicking the button "Click here to update input value" after the first set of calculations have been successfully performed by the model.

- Asset beta – measures the risk associated with a particular stock compared with the market as a whole. This risk measure is de-levered to remove the financial risk component of the overall systematic risk borne.

- Debt beta – measures the risk factor assumed by debt providers.

Below the table of input parameters is the table with the calculations for the real vanilla WACC. It calculates the following parameters:

- Equity Beta - measures the risk associated with a particular stock compared with the market as a whole, taking into account leveraging and the effect of financial risk.

- Real Risk Free Rate – the risk free rate in real terms;

- Nominal Cost of debt – rate of return on debt in nominal terms;

- Real cost of debt – rate of return on debt in real terms;

- Real Debt Risk Premium – the debt risk premium in real terms;

- Effective tax rate for equity (calculated) – percentage difference between pre-tax and post-tax cash flows;

- Debt/Equity ratio - ratio of debt to the company value;

- Nominal cost of equity – rate of return on equity in nominal terms;

- Real cost of equity – rate of return on equity in real terms;

- Nominal vanilla WACC – the weighted average cost of capital without accounting for inflation with a geared interest tax shield and geared tax credits in the cash flow;

- Real vanilla WACC – the weighted average cost of capital accounting for inflation with a geared interest tax shield and geared tax credits in the cash flow.

Table 1.2 Inflation indices

Table 1.2 displays the inflation forecast which is the geometric average between the RBA's short-term forecasts for the next two years and the midpoint of the RBA target range (2.5%) for the remaining years in the regulatory period.

3.8 Worksheet 2. RAB

The full title of this worksheet is "Regulatory Asset Base". It is an input worksheet to provide the values for the Opening RAB and the depreciation parameters for each asset class in the RAB.

Table 2.1 Regulatory Asset Base – Opening Value and Parameters

Table 2.1 is used to enter the opening regulatory values for the Regulatory Asset Base (RAB) and related parameters.

At the top of table 2.1 the user should enter the applicable valuation year of the RAB: the model assumes that the valuation is at 30 June of the entered year (that is, at the end of the Australian financial year). All the dates in the model are set from this date.

The user should enter the numbers of CAN and Core asset classes for which she/he intends to enter data by selecting from the drop-down list.

The main body of the table is used to input for each asset class:

- The **Depreciated** (regulatory) **Value** at the specified date (in million AUD);

- **Average Asset Life**: the average of the (regulatory) economic asset lives for the assets in the asset class;

- **Remaining Asset Life**: the remaining average asset life for the assets in the asset class at the specified date.

In the last column of the table, the **Depreciated proportion** of the asset class at the specified valuation year is calculated.

3.9 Worksheet 3. Additions, Disposals & Opex

The full title of this worksheet is "Operating costs, overheads and capital expenditure". It is an input worksheet to provide the capital additions and disposals in the RAB for each year and to input the operating costs and overheads for each year.

Table 3.1 Total Operating Cost and Overheads for all Asset Classes

Table 3.1 is used for inputs for the operating costs and overheads for all asset classes (in million AUD) for each financial year only if the user selects the "CAN and Core categories only" input method in worksheet "B. Dimensions & Results".

Operating costs and overheads are treated in the same way in the model. The operating costs and overheads should be added together in the entries in this table.

Table 3.2 Operating Cost and Overheads specified for each Asset Class

Table 3.2 is used for inputs for the operating cost and overheads (in million AUD) that occur during each financial year for each asset class. It is used only if the user selects the "Individual Asset Class" input method in worksheet "B. Dimensions & Results".

Operating costs and overheads are treated in the same way in the model. Overheads should be added to the operating costs in the entries in this table. To do this, the user must allocate overheads to individual asset classes and then add the allocated overheads to the operating costs for each asset class.

Table 3.3 Asset Class Additions

Table 3.3 requires inputs for the capital additions (in million AUD) for each asset class at the beginning of each financial year. This is an important table: it indicates what new investments are made for the RAB each year.

Table 3.4 Asset Class Disposals

Table 3.4 requires inputs for the capital disposals (in million AUD) for each asset class at the beginning of each financial year.

Since the model assumes that the additions and disposals occur at the same point in time, the model uses net additions (additions less disposals). Hence the user could enter net additions in table 3.3 and leave table 3.4 blank.

3.10   Worksheet 4. Tax Parameters

This is an input worksheet to provide the values for the Opening Tax Value and the tax depreciation parameters for each asset class in the RAB. The tax values may be different from the regulatory values.

The valuation date is 30 June of the year specified by the user in table 2.1. This is the valuation date for the RAB regulatory values.

Table 4.1 Regulatory Asset Base -- Opening Tax Value and Parameters

In this table the user inputs for each asset class the relevant tax values. The required values are:

- **Depreciated Tax Value**: the tax value for the assets in the asset class at the date specified in table 2.1;

- **Tax Remaining Life**: the remaining average asset life at the valuation date;

- **Tax Standard Life**: the standard tax life of the assets in the asset class.

Table 4.2 Tax Losses Carried Forward

In this table the user specifies the tax loss at the **Valuation year** – i.e. the end of the opening financial year – to be carried forward to the next year. A loss should be entered as a negative number.

Table 4.3 Additional Taxable Income

In this table the user specifies for each asset class the additional contributions (in million AUD) in each year to be added to the income for tax purposes.

3.11   Worksheet 5. Allocation Factors

This is an input worksheet to provide the allocation factors by which costs associated with asset classes are allocated to services.

The user must provide data in either table 5.1 or table 5.2 (for each year).

Table 5.1 Constant Allocation Factors for each service

In table 5.1 the user inputs a single set of values between 0 and 1 for each asset class and service type if the user has selected constant allocation factors to be used in the model in worksheet "B. Dimensions & Results". The same allocation factors will be used in each year of the estimation period.

The required value is the proportion of the revenue requirement generated from an asset class to be allocated to the corresponding service.

Table 5.2 Allocation Factors for each year and service

In table 5.2 the user inputs annual values between 0 and 1 for each asset class and service type, if the user has selected yearly allocation factors to be used in the model in worksheet "B. Dimensions & Results".

The required value is the proportion of the revenue requirement generated from an asset class to be allocated to the corresponding service in the specific year.

This table has a section for each financial year. The user must complete the inputs for all years for which calculations are required.

Please note that the revenue requirement is allocated to services only where there is demand for the service in the relevant year. Hence, whatever the allocation factors for a service, there will be no allocation to the service in a year if there is no demand specified. The user should take care to enter demands for each service for which prices are required.

3.12 Worksheet 6. Service Demand

This is an input worksheet to provide the annual service demand levels by which the revenue requirement allocated to a service may be turned into a service price per unit.

Table 6.1 Annual Demand for each Service

In table 6.1 the user inputs the annual demand level in relevant units for each Service.

Table 6.2 Average Call Duration for Local Call Service

In table 6.2 the user inputs the average call duration in minutes for the *Local Call Service* for each year of the estimation period. This input is used in table 9.8 to calculate the service price per call instead of per minute.

3.13 Worksheet 7. Input Summary

This worksheet performs the calculations to turn the user inputs specified in worksheet B and worksheets 1-6 into a complete dataset to be used in the model calculations.

Table 7.1 Allocation Factors for each asset class and service

Table 7.1 returns the relevant allocation factors as selected by the user in sheet "B. Dimensions & Results" for each asset class, service type and financial year. If the user selects constant allocation factors to be used in the model calculations, the same allocation factors are shown for each financial year. If the user selects yearly allocation factors to be used, the table shows the relevant allocation factors for each year specified in worksheet "5. Allocation Factors".

All the allocation factors for a service are set to 0 in any year in which there is no demand (in table 6.1) for the service.

Table 7.2 Annual Demand for each Service

Table 7.2 simply reports the annual demand for each service and financial year from table 6.1.

Table 7.3 Average Call Duration for Local Call Service

Table 7.3 simply reports the average call duration for the *Local Call Service* in each financial year from table 6.2.

Table 7.4 Regulatory Asset Base

Table 7.4 reports the depreciated regulatory value and other values from table 2.1.

Table 7.5 Asset Class Additions

Table 7.5 simply reports the capital additions for each asset class during each financial year from table 3.3.

Table 7.6 Asset Class Disposals

Table 7.6 simply reports the capital disposals for each asset class during each financial year from table 3.4.

Table 7.7 Total Operating Cost and Overheads for all Asset Classes

Table 7.7 simply reports the total of operating costs and overheads during the year for all asset classes from table 3.1. This table will only be used if the user has specified *CAN and Core categories only* for Operating cost and Overheads in worksheet "B. Dimensions & Results".

Table 7.8 Operating Cost and Overheads specified for each Asset Class

Table 7.8 simply reports the operating cost and overheads directly allocated to the asset classes from table 3.2. This table will only be used if the user has specified *Individual Asset Class* for Operating cost and Overheads in worksheet "B. Dimensions & Results".

Table 7.9 Inflation indices

Table 7.9 calculates the cumulative inflation index for each year based on the inflation rate specified in the *Economic Parameters* worksheet.

Table 7.10 Cumulative Annual Nominal WACC

Table 7.10 reports the relevant WACC parameters from table 1.1. From the real vanilla WACC and the inflation indices in table 7.9, the **Cumulative nominal vanilla WACC** is calculated for each year.

Table 7.11 Opening Tax Value and Parameters

Table 7.11 reports the tax values and parameters from table 4.1. It adds the tax losses carried forward from table 4.2 as totals for CAN and Core asset categories.

Table 7.12 Additional Taxable Income

Table 7.12 reports the additional taxable income entered in table 4.3.

Table 7.13 Depreciation method

Table 7.13 reports the depreciation methods selected for new CAN and Core network assets in worksheet "B. Dimensions & Results". All existing CAN and Core assets use straight-line depreciation only.

3.14   Worksheet 8. Revenue Requirement

The full title of this worksheet is "Revenue Requirement". It calculates the revenue requirement to be generated from each asset class in each year.

For each asset class, the revenue requirement to be generated from it in any year is the sum of the following charges:

- The annual return on the capital base at the beginning of the year;

- The depreciation (return of capital) on the assets during the year;

- The operating cost and overheads allocated to each asset class: this may be directly allocated by the user or may be allocated by the model (see details below); and

- The tax payable allocated by the model to the asset class.

The model allocates all these components to asset classes because the allocation factors used to allocate the revenue requirement to services are also by asset class. This has the effect of allocating common costs (such as taxes) to services by a weighted average of the allocation factors for the service.

The first section of the worksheet is labelled "Summary of inputs for calculations".

Table 8.1 Opening RAB (beginning of year)

This table reports the results of the calculations in worksheet "10. RAB Roll-Forward". The values are the depreciated regulatory value of each asset class at the beginning of the financial year.

No additional calculation is performed in this table.

Table 8.2 Regulatory Depreciation

This table reports the results of the calculations in worksheet "10. RAB Roll-Forward". The values are the depreciation charges calculated for each asset class in each financial year.

No additional calculation is performed in this table.

Table 8.3 Inflation indices

This table reports the cumulative inflation indices for each year calculated in table 7.9.

No additional calculation is performed in this table.

Table 8.4 Tax Allowance

This table uses the tax allowance to be included in the revenue requirement for the CAN and Core asset categories in each financial year, calculated in worksheet "12. Tax Liabilities".

Because the tax allowance values are in nominal terms, they are converted to real terms in this table by dividing by the cumulative inflation index.

Table 8.5 Total Operating Cost and Overheads for all Asset Classes

This table reports the inputs on operating costs and overheads from table 7.7. This table will only be used if the user has specified *CAN and Core categories only* for Operating costs and Overheads in worksheet "B. Dimensions & Results".

No additional calculation is performed in this table.

Table 8.6 Operating Cost and Overheads specified for each Asset Class

This table reports the inputs on operating costs and overheads from table 7.8. This table will only be used if the user has specified *Individual Asset Class* for Operating costs and Overheads in worksheet "B. Dimensions & Results".

No additional calculation is performed in this table.

The next section is labelled "Calculation of Revenue Requirements". It calculates the revenue requirement to be generated from each asset class each year.

Table 8.7 Annual Revenue Requirement

This table calculates the annual return on capital and allocates operating costs and overheads, depreciation and tax to each asset class. There are four parts to the calculation:

- **Part 1: Return on capital**. This part calculates the annual return on cost of the capital investment in each asset class at the beginning of the year. It is just the opening RAB value multiplied by the weighted average cost of capital.

- **Part 2: Operating Costs and Overheads allocated to each Asset Class**. In this part, the operating costs and overheads are allocated to asset classes. The calculation is performed separately for CAN and Core

asset classes. There are two possibilities, depending on the user selection regarding operating cost and overheads in worksheet "B. Dimensions & Results".

If the user has selected *Individual Asset Class*, the values from table 8.6 are copied into this table.

If the user has selected *CAN and Core categories only*, then the costs from table 8.5 are allocated to the asset classes in proportion to the returns on capital amounts calculated in part 1. This is achieved by marking up the return on capital for each asset class by a fixed percentage. The percentage is the value from table 8.5 as a proportion of the total return on capital. If there are no capital amounts in a particular year, the operating costs and overheads are allocated equally to all asset classes.

- **Part 3: Return of capital (Depreciation).** This part simply copies the depreciation for each asset class and in each financial year from table 8.2 above.

- **Part 4: Tax payable less value of imputation credits (real).** In this part, the tax payable (less the value of imputation credits) is allocated to asset classes. The tax payable (less the value of imputation credits) comes from table 8.4. The calculation is performed separately for CAN and Core asset classes. The taxes from table 8.4 are allocated to the asset classes in proportion to the returns on capital amounts calculated in part 1. This is achieved by marking up the return on capital for each asset class by a fixed percentage. The percentage is the value from table 8.4 as a proportion of the total return on capital. If there are no capital amounts in a particular year, the taxes are allocated equally to all asset classes.

Table 8.8 Revenue Requirement (excluding Tax)

This table adds the results from parts 1, 2 and 3 of table 8.7 above.

There is a check at the end of table 8.8 to ensure that all costs have been allocated.

Table 8.9 Revenue Requirement (including Tax)

This table adds the results from parts 1, 2, 3 and 4 of table 8.7 above.

There is a check at the end of table 8.9 to ensure that all costs have been allocated.

3.15   Worksheet 9. Service Costs

The full title of this worksheet is "Service Costs and Prices". It allocates the revenue requirement for each asset class to services to give the revenue requirement for each service. It then turns the service revenue requirements into a (maximum) service price per unit of demand for the service.

The first section is labelled "Summary of inputs for calculations".

Table 9.1 Revenue Requirement

This table reports the results of the calculations from table **8.9 Revenue Requirement (including Tax)**. The values are the revenue requirement that can be generated from each asset class in each year.

Table 9.2 Inflation indices

This table reports the results of the calculation in table 7.9. This is used to adjust the calculated values for inflation.

Table 9.3 Annual Demand for each Service

This table reports the inputs on annual demand for each service from table 7.2.

Table 9.4 Average Call Duration for Local Call Service

This table reports the inputs on average call duration for *Local Call Service* from table 7.3.

The next section is labelled "Calculation of Service Revenues and Prices".

Table 9.5 RR Allocation to Services

This table shows the results of the detailed allocation calculations in the section below (from table 9.11). The values are the revenue requirement for each service each year. The units are million AUD.

Table 9.6 Service Prices

This table calculates the maximum service price for each service by dividing the values in table 9.5 by the annual demand figures from table 9.3. While the values in table 9.5 are in million AUD, the prices in table 9.6 are given in AUD per unit of demand.

Table 9.7 Service Prices (adjusted for inflation)

In this table, the values from table 9.6 are adjusted for inflation using the inflation indices from table 9.2. The prices are given in AUD per unit of demand.

Table 9.8 Local Call Service

This table converts the values in table 9.6 for *Local Call Service* into a service price per call (in units of AUD per call) by multiplying by the average call durations from table 9.4.

Table 9.9 Local Call Service (adjusted for inflation)

In this table, the values from table 9.8 are adjusted for inflation using the inflation indices from table 9.2.

The next section is labelled "Detailed Allocation Calculations". It shows the detailed allocations of the revenue requirement to each service in each year.

Table 9.10 Allocation of RR to each service

There is a calculation for each year in this table. The calculations follow the same structure for each year.

For the relevant year, the allocation factors calculated in table 7.1 are shown to the right of the main table. The RR, or revenue requirement, values from table 9.1 are multiplied by these allocation factors to give the revenue requirement contribution from each asset class to the revenue requirement of the service. The total of these contributions, shown at the top of the table for each year, is the revenue requirement for the service.

Table 9.11 Summary of cost allocation

This table summarises the total revenue requirement allocated to each service in table 9.10.

3.16   Worksheet 10. RAB Roll-Forward

The full title of this worksheet is "Regulatory Asset Base Roll-Forward". It calculates the RAB (regulatory) value in each asset class at the beginning of each financial year and the depreciation charges for the asset class during the year.

The basic roll-forward calculation has the following steps:

1. The RAB value at the beginning of the financial year is the value at the end of the previous financial year. (capital additions less disposals).

2. The depreciation charge for each asset class is calculated for the particular asset class.

3. The RAB value at the end of the financial year is the value at the beginning of the year less the depreciation charge plus net additions.

The RAB can be rolled forward for as many years as required (up to the model limit of 12 years).

The first section is labelled "Summary of inputs for calculation".

Table 10.1 Opening Regulatory Asset Base

This table reports the opening RAB values from table 7.4.

No additional calculation is performed in this table.

Table 10.2 Asset Class Additions

This table reports the inputs on asset class additions from table 7.5.

No additional calculation is performed in this table.

Table 10.3 Asset Class Disposals

This table reports the inputs on asset class disposals from table 7.6.

No additional calculation is performed in this table.

The next section is labelled "Roll-Forward of Regulatory Asset Base". In this section, the main calculation to roll forward the RAB occurs.

Table 10.4 Net Additions

In this table, the net additions are calculated by subtracting the values in table 10.3 from the values in table 10.2.

Table 10.5 Opening RAB by asset class

This table calculates the RAB value for each asset class at the beginning of each year. The value is the closing RAB value at the end of the previous year (calculated in table 10.7 below).

Table 10.6 Regulatory Depreciation

This table reports the results of the detailed depreciation calculations in the following section. The values are the depreciation charges for each asset class in each year. They are the sum of the deprecation charges from the assets in the opening RAB in each year. (Years that are shaded out because they are beyond the period specified by the user should be ignored.)

Table 10.7 Closing RAB by asset class

This table calculates the RAB value for each asset class at the end of each year. The value is the RAB value at the beginning of the year from table 10.5 less the depreciation charge from table 10.6 plus net additions from table 10.4.

The starting point (**Y00**) in table 10.7 is the opening RAB values from table 10.1.

The next section is labelled "Detailed Roll-Forward Calculations". In this section, each set of assets is rolled forward in time. This exhibits the details of the contributions to the total depreciation charge for each asset class in each year.

There is a table for the opening RAB and for the net additions in each year. The tables all follow the same structure.

Table 10.8 Roll-Forward of Opening RAB

This table rolls forward the asset values in the initial opening RAB. The table has 4 parts:

- **Regulatory Value at Beginning of Year**. This is just the regulatory value at the end of the previous year (from the third part below).

- **Regulatory Value at End of Year**. This is just the regulatory value at the beginning of the year less the depreciation. The starting point (**Y00**) is the initial opening RAB values from table 10.1.

- **Depreciation**. This calculates depreciation.

Tables 10.09 to 10.20 Roll-Forward Capital Net Additions in Year …

This series of 12 tables is used for rolling forward the net additions to the asset classes made in the relevant year. The model makes provision for 12 years but only the years for the period specified by the user provide useful results; the calculations for later years will be ignored.

Each table has the same structure, with 4 parts:

- **Regulatory Value at Beginning of Year**. For the initial year, this is zero. For later years the value is simply that calculated at the end of the previous year.

- **Regulatory Value at End of Year**. This is just the net additions during the previous year from table 10.4. These net additions are adjusted by the half-year WACC adjustment before being added to the end year value to reflect earlier timing of the capital expenditure.

- **Depreciation**. This calculates depreciation.

At the end of this series of tables, the full depreciation schedules for all asset classes have been calculated. The total depreciation for each asset class is summed up in table 10.6.

3.17   Worksheet 11. RAB Roll-Forward for Tax

The full title of this worksheet is "Regulatory Asset Base Roll-Forward for Tax". It calculates the RAB tax value in each asset class at the beginning of each financial year and the tax depreciation charges for the asset class during the year. It is the equivalent of worksheet "10. RAB Roll-Forward" for tax values.

The basic roll-forward calculation has the following steps:

1. The RAB value at the beginning of the year is the value at the end of the previous year plus net additions. (capital additions less disposals).

2. The depreciation charge for each asset class is calculated.

3. The RAB value at the end of the year is the value at the beginning of the year less the depreciation charge.

The RAB can be rolled forward for as many years as required (up to the model limit of 12 years).

The first section is labelled "Summary of inputs for calculation".

Table 11.1 Opening Tax Value and Parameters

This table reports the initial RAB tax values from table 7.11.

No additional calculation is performed in this table.

Table 11.2 Net Additions

This table reports the net additions to asset classes calculated in table 10.4 for the previous year but the real value is escalated by the inflation index of the previous year to reflect the fact that tax depreciation is based on actual, or nominal, expenditure.

The next section is labelled "Roll-Forward of Regulatory Asset Base for Tax". In this section, the main calculation to roll forward the RAB occurs.

Table 11.3 Opening RAB by asset class (tax purposes)

This table calculates the RAB tax value for each asset class at the beginning of each year. The value is the closing RAB value at the end of the previous year (calculated in table 11.5 below) plus the net additions from table 11.2.

Table 11.4 Tax Depreciation

This table reports the results of the detailed depreciation calculations in the following section. The values are the depreciation charges for each asset class in each year. They are the sum of the depreciation charges from the assets in the opening RAB and from the net additions in each year. (Years that are shaded out because they are beyond the period specified by the user should be ignored.)

Table 11.5 Closing RAB by asset class (tax purposes)

This table calculates the RAB tax value for each asset class at the end of each year. The value is the RAB value at the beginning of the year from table 11.3 less the depreciation charge from table 11.4.

The starting point (**Y00**) in table 11.5 is the opening RAB values from table 11.1.

The next section is labelled "Detailed Roll-Forward Calculations for Tax". In this section, each set of assets is rolled forward in time. This exhibits the details of the contributions to the total depreciation charge for each asset class in each year.

There is a table for the opening RAB and for the net additions in each year. The tables all follow the same structure.

Table 11.6 Roll-Forward of Opening Tax Value

This table rolls forward the asset tax values in the initial opening RAB. The table has 3 parts:

- **Tax Value at Beginning of Year**. This is just the tax value at the end of the previous year (from the third part below). (For the first year, the values are the open RAB tax values from table 11.1, as noted for the **Tax Value at End of Year** below.)

- **Tax Depreciation**. This is the calculation of depreciation for the assets each year. The **Life** column shows the tax remaining asset lives from table 11.1. The straight-line depreciation charge is the tax value at the beginning of the year divided by the remaining asset life in that year.

- **Tax Value at End of Year**. This is just the tax value at the beginning of the year less the depreciation charge. The starting point (**Y00**) is the initial opening RAB tax values from table 11.1.

Tables 11.7 to 11.18 Roll-Forward Capital Net Additions in Year …

This series of 12 tables is used for rolling forward the net additions to the asset classes made in the relevant year. The model makes provision for 12 years but only the years for the period specified by the user provide useful results; the calculations for later years will be ignored.

Each table has the same structure, with 3 parts:

- **Tax Value at Beginning of Year**. For the initial year, this is zero. For later years it is simply the residual value at the end of the previous year from table 11.2.

- **Tax Depreciation**. This is the calculation of depreciation for the assets each year. The **Life** column shows the tax standard asset lives from table 11.1. The straight-line depreciation charge is the tax value at the beginning of the year divided by the remaining asset life in that year. The diminishing value method is the straight-line rate (as a percentage) multiplied by the accelerator factor (150% or 200% depending on the option chosen).

- **Tax Value at End of Year**. This is just the tax value at the beginning of the year less the depreciation charge.

At the end of this series of tables, the full depreciation schedules for all asset classes have been calculated. The total depreciation for each asset class is summed up in table 11.4.

3.18   Worksheet 12. Tax Liabilities

This worksheet calculates the tax values payable in each asset category and financial year. The taxes are added to the revenue requirement (excluding tax) in worksheet "8. Revenue Requirement". All calculations in this worksheet are performed with nominal values.

The basic tax calculation has the following steps:

1. The nominal profit is calculated from the revenues (i.e. the Revenue Requirement) less operating costs and overheads less tax depreciation less interest payments.

2. Tax is calculated on the profit adjusted for any tax loss carried forward or any additional taxable income.

3. The tax payable is reduced by the value of imputation credits. Under a vanilla WACC framework the value of imputation credits is included in the cash flows. Excluding imputation credits from the cash flow building blocks would require an adjustment to the WACC under a post-tax framework.

The tax liabilities can be calculated for as many years as required (up to the model limit of 12 years).

The tax calculations do not depend on asset classes. Hence, the calculations in this sheet are performed only on the total values related to CAN and Core asset categories.

All calculations in this worksheet are performed on nominal values. To emphasise this, real values that are inputs to the worksheet are converted to nominal values and the cumulative inflation index that is used to convert the input values to nominal ones is repeated at the top of every table where it is used.

The first section is labelled "Summary of inputs for calculation".

Table 12.1 Inflation indices

This table reports the inflation indices from table 7.9. These indices are repeated at the top of every table where they are used to convert real values into nominal values.

Table 12.2 Opening Tax Value and Parameters

This table reports the opening tax losses carried forward from table 7.11.

Table 12.3 RAB (regulatory values) at Beginning of Year

This table calculates the nominal values of the total RAB regulatory values for CAN and Core asset categories at the beginning of each year from table 10.5. These values are used to calculate interest payments below.

Table 12.4 Revenue Requirement

This table calculates the nominal values of the total RR, or revenue requirement, real values (including tax) from table 8.9.

Table 12.5 Revenue Requirement (excluding Tax)

This table calculates the nominal values of the total RR, or revenue requirement, real values (excluding tax) from table 8.8.

Table 12.6 Total Operating Cost and Overheads for all Asset Classes

This table calculates the nominal values of the total operating costs and overheads from table 7.7. This table will only be used if the user has specified *CAN and Core categories only* for Operating cost and Overheads in worksheet "B. Dimensions & Results".

Table 12.7 Operating Cost and Overheads specified for each Asset Class (Totals only)

This table calculates the nominal values of the total operating costs and overheads from table 7.8. This table will only be used if the user has specified *Individual Asset Class* for Operating cost and Overheads in worksheet "B. Dimensions & Results".

Table 12.8 Return of Capital (Tax Depreciation)

This table calculates the nominal values of the total tax depreciation charges in each year from table 11.4.

Table 12.9 Additional tax income

This table calculates the nominal values of the additional taxable income for each year from table 7.12.

The next section is labelled "Calculation of Tax Expenses". It calculates the tax payable in each year.

Table 12.10 Debt

This table calculates the debt values as the **Debt ratio** of the values in table 12.3, the opening RAB values.

Table 12.11 Tax Expenses

This table calculates the tax-related expenses in nominal terms to be used for the tax calculation. There are 4 parts:

- **Part 1: Operating Costs and Overheads (nominal)**. This part selects the relevant operating cost and overheads totals from tables 12.6 or 12.7.

- **Part 2: Tax Depreciation (nominal)**. This part repeats the tax depreciation values from table 12.8.

- **Part 3: Interest (nominal)**. This part calculates the interest payable on debt. The debt from table 12.10 is multiplied by the **nominal cost of debt** to give the interest payable.

- **Part 4: Total tax expenses (sum of parts 1, 2 & 3)**. This part, the total tax expenses, is the sum of the values in the other 3 parts.

Table 12.12 Pre-tax Income (excludes carry-over amounts)

This table calculates the pre-tax income, which is the revenue requirement from table 12.4 plus any additional income from table 12.9 less the total expenses from table 12.11, part 4.

Table 12.13 Tax Loss Carried Forward

This table calculates any tax losses to be carried forward to the next year. The values for the initial year (**Y00**) are those reported in table 12.2. For subsequent years, the tax losses are any negative values generated in table 12.12.

Table 12.14 Taxable Income (includes carry-over amounts)

This table calculates the taxable income, which is the pre-tax income from table 12.12 plus any tax loss (a negative number) carried forward from the previous year.

Table 12.15 Tax Payable

This table calculates the tax payable. If the taxable income in table 12.14 is positive, then the tax payable is the taxable income multiplied by the **Corporate Tax Rate**. If the taxable income is 0 or negative, no tax is payable.

If table 12.15 were used directly to calculate the revenue requirement including tax, it would create a circular calculation: the tax would be included in the revenue requirement, which would then be used to calculate the tax. In order to avoid this, the model performs an alternative calculation in tables 12.16, 12.17 and 12.18 to derive the tax allowance that should be included in the revenue requirement.

Table 12.16 Intermediate Tax Calculation

This table calculates the tax payable in an alternative way. It uses income without tax: the RR, or revenue requirement, excluding tax from table 12.5 plus any additional income from table 12.9 plus any tax loss (a negative number) carried forward in table 12.13 less tax expenses from table 12.11, part 4. It multiplies this result by a factor depending on the **Corporate Tax Rate** and the **Value of Imputation Credits** to give the tax payable. Tax is only payable on positive amounts.

This calculation will yield the same tax payable as in table 12.15. The check at the bottom of table 12.15 verifies that the total values in table 12.15 and 12.16 are the same.

Table 12.17 Total Value of Imputation Credits

This table calculates the total value of imputation credits by multiplying the tax payable from table 12.16 (the intermediate tax calculation) by the **Value of Imputation Credits**.

Table 12.18 Tax Allowance in RR (Intermediate Tax Calculation less Total Value of Imputation Credits)

This table calculates the tax allowance to be included in the revenue requirement. The tax allowance is the tax payable from table 12.16 (the intermediate tax calculation) less the total value of imputation credits from table 12.17.

The values calculated in this table are used to add tax to the revenue requirement. They are reported in table 8.4 (where they are converted to real values) for use in worksheet "8. Revenue Requirement".

Worksheet 13. Cash Flow Analysis

The main purpose of the cash flow analysis in this worksheet is to confirm the internal consistency of the model. That is to check that the cash flows indicated by the revenue requirement would actually deliver investors with the rate of return assumed by the inputs of the model specified in the *Economic Parameters* worksheet.

This worksheet is used to calculate the effective tax rate for equity by calculating the internal rate of return for the pre-tax and post-tax cash flows. This calculation can be used to update the initial value given in the inputs.

All calculations in this worksheet are performed on nominal values. To emphasise this, real values that are inputs to the worksheet are converted to nominal values and the cumulative inflation index that is used to convert the input values to nominal ones is repeated at the top of every table where it is used.

The first section is labelled "Summary of inputs for calculations".

Table 13.1 Inflation indices

This table reports the inflation indices from table 7.9. These indices are repeated at the top of every table where they are used to convert real values into nominal values.

Table 13.2 Regulatory Asset Base (end of year)

This table calculates the nominal values of the total RAB regulatory values for CAN and Core asset categories at the end of each year from table 10.7.

Table 13.3 Net Additions

This table calculates the nominal values of the total net capital additions for each year from table 10.4.

Table 13.4 Revenues (RR including tax)

This table calculates the nominal values of the RR, or revenue requirement, including tax in table 8.9. This is the nominal revenue.

Table 13.5 Operating Cost and Overheads

This table reports the total operating costs and overheads calculated in table 12.11, part 1. These values, because they come from worksheet "12. Tax Liabilities", are already in nominal terms.

Table 13.6 Tax Payable

This table reports the total tax payable calculated in table **12.15 Tax Payable**. These values, because they come from worksheet "12. Tax Liabilities", are already in nominal terms.

Table 13.7 Interest

This table reports the interest payable on debt from table 12.11, part 3. These values, because they come from worksheet "12. Tax Liabilities", are already in nominal terms.

Table 13.8 Debt (end year)

The value of debt is given by the end of year RAB from table 13.2 multiplied by the debt ratio.

The next section is labelled "Nominal Cash Flow Analysis."

Table 13.9 Capital Expenditure

This table shows the capital expenditures in nominal terms. For the initial year (**Y00**), the values are the total capital values from table 13.2. For subsequent years, the values are the net additions from table 13. 3.

Table 13.10 Repayment of Debt

This table calculates the differences in debt levels between years from table 13.8. In the twelfth year (**Y12**), if it is used, it is assumed that all the debt is repaid.

Table 13.11 Residual value of equity

This table calculates a residual value to be added to the cash flows for the calculations of internal rate of return in table 13.14.

There is a value for the equity remaining at the end of the period. This is calculated from the closing RAB value at the end of the period (in table 13.2) multiplied by the **Equity ratio** (or 1 minus the **Debt ratio**).

This is the residual value to be added to the cash flows. It is shown in table 13.11 at the end of the last year.

Table 13.12 Pre-tax cash flows

This table calculates the pre-tax cash flows. The pre-tax cash flow is just the revenue (table 13.4) less the operating cost and overheads (table 13.5) less the interest payments (table 13.7) less capital expenditures (table 13.9) less debt repayments (table 13.10). The first part of table 13.12 performs this calculation.

Table 13.12 lays out the cash flows to be used in the IRR calculation in table 13.14 in the row *Pre-tax cash flows + residual*. This is just the pre-tax cash flows calculated above with the residual value of equity added to the cash flow in the last year. For any years beyond the last year, the cash flow is zero.

Table 13.13 Post-tax cash flows (excludes value of imputation credits)

This table calculates the post-tax cash flows from the pre-tax cash flows. The calculation is the pre-tax cash flows from table 13.12 less the tax payable from table 13.6.

Table 13.13 lays out the cash flows to be used in the IRR calculation in table 13.14 in the row *Post-tax cash flows + residual*. This is just the post-tax cash flows calculated above with the residual value of equity added to the cash flow in the last year. For any years beyond the last year, the cash flow is 0.

Table 13.14 Post-tax cash flows including Imputation Credits

This table calculates the sum of the post-tax cash flows given in Table 13.13 and the value of attached imputation credits. The value of the imputation credits is given as the tax payable multiplied by the specified value for gamma.

Table 13.15 Regulatory Term Cash Flows to Equity including the Value of Imputation Credits and Residual

This table calculates the internal rate of return of the post-tax cash flows encompassing the residual value of equity and the value of imputation credits.

The IRRs implied by these cash flow streams are compared to the rates of return of equity specified by the model as a reconciliation and a cross check that the model is performing correctly.

Table 13.16 Effective Tax Rate for Equity

This table calculates the effective tax rate for equity. It uses the Excel function **IRR** to calculate the internal rate of return of the pre-tax and post-tax cash flows.

The currently used value of the **Nominal effective tax rate for equity** is shown at *Nominal effective tax rate for equity input*. This will be either the user input value or a previously calculated and used value.

The IRR of the pre-tax cash flows (plus residual value of equity) is calculated from the cash flows in table 13.12. The IRR of the post-tax cash flows (plus residual value of equity) is calculated from the cash flows in table 13.13. The results of these calculations are reported in the *Calculated* column. Because the **IRR**

function may fail in various ways (see Excel documentation for details), the *Used* column reports the calculated value, if **IRR** has succeeded, or 0 if it has failed. This ensures that any failure of the **IRR** function does not propagate through the model.

The **Nominal effective tax rate for equity** is then one minus the ratio of the IRR post-tax to IRR pre-tax. This is shown in the *Used* column. If there has been any failure, this value is set to the input value: that is, the **Nominal effective tax rate for equity** is unchanged.

The result of this calculation is reported also in table **1.1 WACC parameters** as *Nominal effective tax rate for equity (calculated)*.