CHAPTER 6
RATE ADJUSTMENT - CALCULATIONS

6.1 INTRODUCTION

This chapter deals with calculation methodology and implementation issues associated with the annual rate adjustment mechanism underlying the price cap plan. After a brief overview of how the price cap formula works, the derivation of an utility's IPI and its components is described, thereby providing the utility with sufficient information should it wish to calculate its own utility-specific IPI. In addition, the application of Z factors to transition and extraordinary costs, as well as deferred revenue to move to MBRR is discussed, as is calculation of over-earnings and sharing. The calculations and data used in this chapter are examples only, and should not be construed as reflecting actual values of any individual utility's IPI or cost structure, or the actual industry IPI for 2000 and 2001.

6.2 PRICE CAP ADJUSTMENT MECHANISM

The formula for the price cap adjustment mechanism, as outlined in formula [5-1] is:

$$\%\Delta P^t_j = \%\Delta IPI^t_{LDC} - \%\Delta PF + \%\Delta Z^t_j \qquad [6\text{-}1]$$

where:

$\%\Delta P^t_j$ = the percentage change in the $j^{th's}$ utility's price ceiling in year t;

$\%\Delta IPI^t_{LDC}$ = the percentage change in Ontario utilities' input prices from year *t-1* to year *t* which the Board will issue on February 15 of 2001 and 2002;

$\%\Delta PF$ = the PF or index expressed as a constant percent change each year. For 2001 and 2002 this has been set at 1.50 by the Board; and

$\%\Delta Z^t_j$ = the extraordinary event adjustment factor expressed as a percent change from prices in year *t-1* to prices in year t for the j^{th} utility.

For utility j, this means that their distribution prices in each service class will be capped to the percentage change in industry IPI ($\%\Delta IPI^t_{LDC}$) minus the required annual 1.50 per cent productivity offset ($\%\Delta PF$) plus any Z factor adjustments for transition or extraordinary event costs or MBRR deferral account disposition, expressed as an annual percentage change in rates. This price cap adjustment formula will apply as of March 1, 2001, for the 2001 rate adjustment, and March 1, 2002, for the 2002 rate adjustment. It is up to the discretion of the utility as to whether any or all of a price increase is implemented. However, if a price decrease is called for, the utility must implement the full price decrease.

For example, suppose utility j had the following rate schedule in place for November 1, 2000:

Residential class distribution rates::

Monthly service charge = $10.00; Distribution kWh charge = .62¢/kWh

General service class distribution rates, demand metered:

monthly service charge = $55.00, demand (kW) charge = $1.34/kW

On or before February 15, 2001, the Board will publish the industry IPI which will reflect the *typical* utility's experience with input prices during the year 2000. As an example, suppose the following industry IPI numbers were published based on information available for the years 2000 and 2001:

Table 6-1

Sample Industry IPI[1]		
Date	IPI (IPI_{LDC})	Per Cent Change ($\%\Delta IPI_{LDC}$)
March 1, 2000	102.4	2.4%
March 1, 2001	104.1	1.6%

Also, suppose that utility j has demonstrated that it has valid transition costs which warrant a rate increase of 0.3 per cent for all rate classes. Further, this utility did not find it necessary to defer a portion of its revenue requirement from year 2000 in order to move to the MBRR.

According to the formula for the price cap adjustment mechanism, the allowable annual change in utility j's rates on or after March 1, 2001, would be calculated as follows:

% Change in Price = 1.6% - 1.50% + 0.3% = 0.4% [6-2]

Therefore, utility j can increase its prices by up to 0.4 per cent as of March 1, 2001. The new rate schedule may look as follows:

Residential class distribution rates:

Monthly service charge = $10.04; Distribution kWh charge = .62248¢/kWh

General service class distribution rates, demand metered:

Monthly service charge = $55.22, demand (kW) charge = $1.34536/kW

[1] Note: This is a sample for illustrative purposes only and does not represent the actual IPI that will be used.

6.2.1 The IPI

6.2.1.1 General Formula for IPI

The basis for the IPI calculation is a price index which compares the prices of the factors of production (inputs that the utilities consume in order to produce their output) in any given year to a base year. The IPI is based on a three factor model; the factors of production are capital, labour, and materials. In general, the IPI formula for any given utility *j* in time period *t*, can be expressed as:

$$IPI_t = \frac{\sum_{i=1}^{n} P_{it} e_i}{\sum_{i=1}^{n} P_{i0} e_i} \cdot 100 \qquad [6\text{-}3]$$

Where P_{it} represents the price of the three factor inputs: $P_{1t} = P_{Kt}$, the price of capital services in time *t*; $P_{2t} = P_{Lt}$, the price of labour in time *t*; and $P_{3t} = P_{Mt}$, the price of materials in time *t*. The base period prices are represented by P_{i0} and are 1999 prices. 1999 will be the first year for which all utilities complete a PBR data filing as well as the base period for initial rates. The term e_i represents the cost shares of the three factors: e_K is the cost share of capital, e_L is the cost share of labour, e_M is the cost share of materials. For any utility that wishes to calculate its specific cost shares, it should be noted that capitalized labour is not included in the labour cost share to avoid double counting. In analysis conducted by Board staff and its consultants on 1988-1997 data, it was found that, for the typical utility, capital accounts for about 51 per cent of costs, labour accounts for about 34 per cent of costs, and materials accounts for about 15 per cent of costs[2].

If an individual utility desires to calculate its own utility-specific IPI, the above general formula for the IPI (formula [6-3]) can be broken down to the constituent components, which are the three factors of production - capital, labour, and materials:

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[2] In calculating these shares, the Board has adopted a fixed-weight approach. The weights utilized are 1993 weights. See Board Staff report, "Productivity and Price Performance for Electric Distributors in Ontario," OEB, July 16, 1999 for details.

$$IPI_t = \frac{\sum_{i=1}^{n} P_{it} e_i}{\sum_{i=1}^{n} P_{i0} e_i} \cdot 100 = \left\{ \frac{P_{Kt} \cdot e_K + P_{Lt} \cdot e_L + P_{Mt} \cdot e_M}{P_{K0} \cdot e_K + P_{L0} \cdot e_L + P_{M0} \cdot e_M} \right\} \cdot 100 \qquad [6\text{-}4]$$

Calculation of the constituent price indexes (the price of capital services, labour, and materials) is dealt with below.

The industry IPI used for the price cap is determined by the *typical* utility's experience with input prices during the previous year. Thus, if an individual utility's own input prices rose less than the input prices of the typical utility, that utility would increase its earnings if it chose to adjust its own price cap by the full amount allowed by the Board. On the other hand, a utility whose own input prices rose more than those of the typical utility would experience a reduction in earnings due to the allowed adjustment.

6.2.1.2 Price of Capital Services

The capital portion of the IPI is calculated based on a user-cost of capital approach. Generally, it is conceptually easier to assign a price to goods, such as materials or labour which are consumed in the period they are purchased, than capital, which has a long life and is "*consumed*" over a long period of time. Essentially, the cost of capital is determined by looking at the change in the cost of acquiring capital assets (i.e., acquisition cost) as well as the opportunity cost of making the capital investment. In simple terms, the opportunity cost is the return that an investor has forgone in order to make the capital investment. In addition, the rate of depreciation of the capital stock is also a cost of using capital. For utility "j" in the example in 6.2.1.1, we assume a depreciation rate of 5.39 per cent.

The cost of using capital is defined as the opportunity cost plus depreciation times the acquisition price. For purposes of calculating the IPI, the opportunity cost of capital has been defined as the 10 year Canada Long Bond yield (r_t), as reported by the Bank of Canada[3]. The acquisition price is represented by the Price Index for Electric Utility Distribution Systems Construction as reported by Statistics Canada[4] ("*CAP"*). The

[3] Statistics Canada CANSIM databank number B 14071.

[4] Statistics Canada CANSIM databank number P219188.

depreciation rate (*d*) is calculated from utility specific data on level of capital stock and capital stock retirement.

Therefore, capital service price index for any given utility *j* in time *t* is given by:

$$PK_t = (r_t + d) \cdot CAP_t \qquad [6\text{-}5]$$

The index is an annual number with a base year of 1999. In order to calculate the index, the monthly series on long bond yields reported by the Bank of Canada (B 14071) needs to be annualized by taking a simple average of the monthly values. For 1999, this value is 5.5 per cent. The price index for electric utility distribution systems construction (P219188) is an annual index reported by Statistics Canada. In 1998, the value was122.8. The following table provides an example of how the price of capital services component of the IPI for utility "j" is calculated:

Table 6-2

Sample calculation of capital price index for utility "j"						
Year	10yr bond yield	Depreciation	CAP	P_K	P_K (1999=1.0)	% chg
1999	5.5%	5.39%	123	0.133947	1	2.0%
2000	5.9%	5.39%	124.6	0.140673	1.05	5.0%
2001	6.15%	5.39%	125	0.14425	1.077	2.5%

However, for the purposes of calculating the IPI for the first generation PBR, the Board has limited the change in the capital portion of the IPI to one half of the observed change. Therefore, the above index needs to be modified before the IPI is calculated. Starting in the base year of 1999, the capital price index (P_K) is restricted to one half of the observed change, as noted in Table 6-2. Table 6-3 illustrates the modified index:

Table 6-3

Modified sample capital price index for utility "j"		
Year	PK (1999=1.0)	% chg
1999	1	
2000	1.025	2.5%
2001	1.038	1.3%

6.2.1.3 Price of Labour

The price of labour for any given utility *j* in time *t* (P_{L_t}) is represented by the utility's line crew wage rate. These data are compiled by the Municipal Electric Association (MEA). The position taken is that the year-to-year change in the line crew wage rate is a good proxy for the year-to-year change in labour costs in general, as the line crew wage rate moves, either formally or informally, with wage changes of other utility employees. For consistency, this index should be revalued to 1999=1.0, by dividing the entire series by the 1999 index value.

6.2.1.4 Price of Materials

The price of materials (P_{M_t}) is represented by the Industrial Producer Price Index (IPPI)[5] published by Statistics Canada. This monthly series is converted to an annual series by averaging the 12 monthly observations. As above, this index should be revalued to 1999=1.0 by dividing the entire series by the 1999 index value.

[5] All finished goods industrial product price index, CANSIM databank number P1295.

6.2.1.5 Calculation of Utility's IPI

The IPI is calculated from the above components according to formula [6-4]. The only remaining information needed is the cost shares of each factor. For illustrative purposes, assume that utility j has the cost structure of a ″typical″ utility:

Capital (e_K): 0.51 or 51%

Labour (e_L): 0.34 or 34%

Materials (e_M): 0.15 or 15%

The following table illustrates utility "j's" IPI calculation using the capital price index from Table 6-3 above and assumed values for materials and labour:

Table 6-4

Sample Calculation of IPI								
Year	P_K	e_K	P_L	e_L	P_M	e_M	IPI	% chg
1999	1	0.51	1	0.34	1	0.15	100.0	
2000	1.025	0.51	1.025	0.34	1.019	0.15	102.4	2.4%
2001	1.038	0.51	1.05	0.34	1.029	0.15	104.1	1.6%

6.2.2 The Z Factor

The Z factor in the PBR formula is a mechanism whereby approved transition and extraordinary event costs can be incorporated into rates. In addition, the Z factor can be used to spread revenue requirement in order to implement a MBRR over an additional year or two, in order to mitigate rate shock. To apply the Z factor mechanism, the incremental revenue associated with the transition cost or extraordinary event cost, or deferred revenue requirement, must be converted into a percentage change to rates. If a particular extraordinary or transition cost is identified to be assigned (to a greater or lesser degree) to a specific rate class, the utility must provide the Board with sufficient justification before rate class specific Z factors are applied. In the case of deferred revenue from the MBRR,

this adjustment must be applied to rates within the Z factor mechanism as it would have been if it had been included in initial rates.

% Change in Price = 1.6% - 1.50% + {0.3% + 1.92%}= 2.32% [6-6]

The rate schedule for the utility (from page 6-2) can then be adjusted accordingly:

Residential class distribution rates:

Monthly service charge = $10.23; Distribution kWh charge = .634384¢/kWh

General service class distribution rates, demand metered:

monthly service charge = $56.28, demand (kW) charge = $1.371088/kW

Note, that the procedure for incorporating transition and extraordinary event costs would follow the same method as outlined above for deferred revenue requirement resulting from a move to MBRR.

It is important that two properties of the Z factor be noted. First, the Z factor is a transitory adjustment to rates, not a permanent adjustment. The Z factor is in place only for the period of time necessary to recover the costs for which it was invoked. Once the costs have been recovered, rates revert to what they would have been had no Z factor been applied. On-going costs will be examined and considered at the time of rebasing. Thus, following on the example in formula [6-6], if the utility has no Z factor costs to be recovered in the following year of the price cap (March 1, 2002), the price cap would be calculated based on the IPI and formula [6-1]. However, the rates to which the new price cap would apply would be 2001 rates without the Z factor adjustment. For example, suppose industry IPI for 2002 were calculated to be 1.5 per cent and the utility had no Z factor costs for 2002. The rate adjustment formula would be:

% Change in Price = 1.5% - 1.50% = 0.0% [6-7]

Thus, there would be no change in rates. However, this would apply to the 2001 rate schedule calculated exclusive of the Z factor, that is, equation [6-2] without the 0.3 per cent Z factor. Therefore, the rate schedule effective March 1, 2002 would be:

Residential class distribution rates:

Monthly service charge = $10.01; Distribution kWh charge = .62062¢/kWh

General service class distribution rates, demand metered:

monthly service charge = $55.06, demand (kW) charge = $1.34134/kW

The Z factor is intended to recover only the costs and deferred revenue that have been approved by the Board. If, as a result of fluctuation in total revenue, a utility recovers an amount greater (or less) than the cost approved for recovery, a balance in the appropriate deferral account must occur. Therefore, the utility must track the revenue it is receiving as a result of implementing the Z factor mechanism.

Finally, any over-earnings (see section 6.2.3 below for a discussion of earnings sharing and over earnings) that may accrue to the account of the customer should be applied to any approved Z factor costs and deferred MBRR. Any approved costs and deferred revenue which remain will then be eligible for inclusion in a Z factor for the next rate period.

6.2.3 Over-earnings and Sharing

The earnings sharing mechanism, as outlined in Chapter 5, allows the utility to retain earnings up to the Board specified rate of return on common equity, which for 2000 is set at 9.88 per cent. This rate will be updated annually in accordance with the Board's guidelines for determining ROE. Any earnings (after-tax) in excess of the Board specified rate, is shared between customers and the utility's shareholder(s) on a 50/50 basis.

The test to determine whether over-earnings have occurred annually is:

Utility Actual Net Income / Deemed Equity ≤ Board Specified ROE [6-8]

where:

Deemed Equity = Deemed CER x Utility Rate Base[6] [6-9]

Deemed CER varies by the size of the utility, and is outlined in Chapter 3 of the Handbook.

If the condition in formula [6-8] is not met, the utility has over-earned. The amount of over-earnings is defined as the amount by which annual net income would need to be reduced so that the condition in formula [6-8] would be met. The utility will be able to retain 50 per cent of the after taxes (PILS) over-earnings. The remaining 50 per cent will be returned to customers.

If the utility has any approved transition or extraordinary event costs or deferred revenue requirement related to MBRR to be included in a Z factor, the over-earnings would be first used to reduce these additional costs. If there are no such costs, or if there are any remaining over-earnings after reducing existing Z factors, then the over-earnings will be returned to ratepayers as a one-time rebate at the end of the year. The amount rebated to each customer would be proportional to each customer's annual distribution charges. Where actual data is available, the amounts rebated can be determined according to cost causality.

[6] Rate base defined in Appendix D.