

**LOW-INCOME PROGRAMS
AND THEIR IMPACT ON
REDUCING UTILITY WORKING CAPITAL ALLOWANCES**

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This memo explains the working capital savings that are generated by the implementation of a low-income discount rate.¹¹ It has been argued that a discount rate directed toward low-income households who cannot afford to pay their bills will generate certain cost savings for the utility offering the rate. Whether or not these savings are sufficiently large to offset the costs of the discount is a question on which there is disagreement. Nonetheless, the existence of the savings cannot be disputed.

One of those savings is a reduction in the working capital allowance required by the utility offering the savings. The working capital allowance takes into consideration the fact that low-income households who do not pay their bills in a full and timely fashion force the utility to pay its own debts prior to the receipt of revenue from its customers.

DEFINING WORKING CAPITAL

One utility financial text has explained "working capital" needs as follows:

A part of the rate base is not for investment in property but for investment in working capital. Working capital allowance in the rate base includes any investor-contributed capital needed for cash balances to meet expenses as they come due, prepayments such as insurance premiums, materials and supplies inventories, and minimum or compensating bank balances.¹²

According to this text, "cash working capital is the amount of money necessary to meet bills as they come due between the rendition of service and the receipt of revenues therefrom."¹³

It makes no difference for purposes of calculating the working capital impact of low-income arrears whether a utility uses its own dollars or borrows money to pay its bills. If the utility does not fund its working capital allowance out of cash-on-hand, the working capital is made part of the company's rate base. The return on the working capital is thus the utility's weighted rate of return (debt, equity, preferred

¹¹ The same savings will arise from targeted low-income DSM, from direct vendoring programs (such as with Section 8 housing), and the like.

¹² Eugene Rasmussen and Keith Howe (1983), *Public Utility Economics and Finance*, at 92-93, New York: Prentice-Hall.

¹³ *Id.*, at 93.

equity). In contrast, if the company is so "cash rich" that it does not have a working capital allowance, the prepayment of bills and the like discussed above will impose an opportunity cost on the company, denying it the return on investment that it *would have received* had it not been required to use some portion of its cash to prepay bills for which it had not yet received revenue from its customers.

THE REVENUE REQUIREMENT IMPACT OF WORKING CAPITAL

The fact that working capital becomes part of a utility's rate base is significant in that its revenue requirement impact exceeds the actual dollars of working capital required. This increased revenue requirement results from the tax impact associated with the equity return received on the working capital. Let me explain through use of an illustration.

Assume that the company needs \$1000 in working capital. Accordingly, there is an addition to rate base of \$1000 on which the company will earn a return the same as any investment in property. Assume that the company has a 50/40/10 equity/debt/preferred equity split. This means that 60 percent (\$600) of the working capital will receive an equity return. Assume finally that the annual cost of equity for the company is 12 percent (simply to make the calculation easier). The equity return on the working capital will thus be \$72 ($\$600 \times .12 = \72). The debt return, given an assumed weighted interest rate of nine percent (9%), will be \$36 ($\$400 \times .09 = \36). As is thus apparent, the total return on investment associated with this \$1000 working capital is \$108 ($\$72 + \$36 = \108).¹⁴¹

The *revenue requirement* impact of this return, however, is quite different. The reason for this can be attributed to the tax effect on the equity return. A utility's equity return, of course, is its "profit" (or net income). As such, there will be both a federal and state income tax levied upon it. A generally accepted combined federal/state income tax rate today is 42 percent. What this means is that 42 percent of all net income generated by a utility will be paid to the state and federal governments in income taxes. In order for the utility to generate one dollar (\$1) to distribute to investors as dividends, therefore, the utility must collect something *more* than one dollar in rates. In fact, what that "something more" involves a dollar amount such that once the 42% tax is subtracted, what is left will be the one dollar. The easy way to determine what the dollar amount is involves simply dividing the desired return by (1 minus the tax rate). In the case of a \$1 return, and a 42% tax rate, the calculation would be $\$1 / (1 - .42) = \$1 / .58 = \$1.72$.¹⁵¹ What this means is that $\$1.72 - (.42 \times \$1.72) = \$1$.

¹⁴¹ The same result would have been obtained by calculating the weighted cost of capital. The three assumptions for this analysis include: (1) a capital structure of 60/40 (equity/debt); (2) an equity return (common plus preferred) of 12%; and (3) an interest rate of nine percent (9%). The weighted cost of capital would thus be: $(60\% \times .12) + (40\% \times .09) = .072 + .036 = .108$. The weighted return would thus be $\$1000 \times .108 = \108 .

¹⁵¹ If the combined federal/state tax rate is only 35 percent, the calculation would be $\$1 / (1 - .35) = \$1 / .65 = \$1.54$. What this means is that $\$1.54 - (.35 \times \$1.54) = \$1$.

To go back to our working capital discussion, in order to generate sufficient *pre-tax* dollars to provide an after-tax profit of \$72, therefore, the company must charge \$124.14. This involves the \$72 profit *plus* a tax effect of \$52.14. Remember, the tax is *not* 42 percent of the profit; simply multiplying \$72 by .42 will give a tax of \$30.24, which understates the tax liability by more than \$20. Instead, the tax is 42 percent of the total billed revenue such that the profit is left after the 42 percent is subtracted.

In sum, the annual working capital requirement of \$1000 will yield a total rate impact of more than \$160 for the associated rate of return. This includes:

Interest on debt	\$ 36.00
Return on equity	\$ 72.00
Tax on equity return	\$ 52.14
Total	\$160.14

THE SIGNIFICANCE OF WORKING CAPITAL RETURN

In order to calculate the impact of this working capital analysis on a discount rate, it is necessary to convert the annual cost of capital into a daily cost of capital. An annual weighted rate of return of 10.8 percent will translate into a daily weighted rate of return of .02959 percent ($10.8\% / 365 = .02959\%$).

This daily rate is then multiplied times the dollar lag days associated with low-income arrears. A 30-day arrears of \$100 thus translates into 3,000 dollar lag days ($30 \times 100 = 3,000$). When multiplied by the daily rate of return of .02959%, we find that the working capital associated with this arrears is \$0.89. The tax effect for the working capital associated with this arrears is \$0.43.¹⁶¹ The total working capital

¹⁶¹ The tax effect must be calculated separately. This will involve multiplying the lag days times the percent funded by equity. This must be multiplied by the daily equity return ($12\%/365$) and divided by .58. This gives the entire revenue requirement associated with the equity return. To isolate the tax impact, one then subtracts out the equity return itself. Hence, for purposes here, the equation would be:

revenue requirement impact of the \$100/30-day arrears is \$1.32. This total revenue requirement has three components as laid out in the Table below:

Interest on debt	\$0.30
Return on equity	\$0.59
Tax on equity return	\$0.43
Total	\$1.32

It is possible to project this analysis out to the entire company LIHEAP population.¹⁷⁾ While to do so now for illustration will require some specific assumptions, it should be possible to collect the actual empirical data to make quite specific determinations. The primary information that is unavailable now is the rate at which LIHEAP households pay over time. For the sake of illustration, therefore, I will take actual data from a Philadelphia utility and assume for our purposes now that this data will accurately reflect a range of actual conditions on other utility systems.

The calculation below considers the rate of payment for the residential class. It begins by tracking the age of arrears for each month.¹⁸⁾ An average lag day value is then assigned to each aging category. This average lag day is simply the mid-point of the range.¹⁹⁾ The lag days are multiplied times the average bill for the particular month to obtain a total number of revenue lag days associated with that age of arrears. A

(. . continued)

$$((3000 \times .60 \times (.12/365)) / .58) - (3000 \times .60 \times (.12/365)).$$

In this equation, the revenue lags days equal 3000. The .60 is the portion of the working capital funded by equity. The .12/365 is the daily rate of return. The .58 is the factor needed to generate the total revenue requirement that includes the tax effect.

¹⁷⁾ This is simply using the LIHEAP population as a surrogate for "low-income."

¹⁸⁾ In fact, it takes an 18-month average calculated for the Philadelphia utility and applies it to individual months. In an actual empirical study, it would be possible to determine the aging process for each month. The high bill heating months, in other words, could reasonably be expected to have slower payments. These slower payments are not reflected in this analysis.

¹⁹⁾ Thus, the average lag days assigned to arrears 61 - 90 days old is 75 days.

working capital requirement for bills rendered in each month is then obtained using the procedure discussed above.¹⁰⁾ The residential rate of payment is set forth in Table A below.¹¹⁾

I will assume a total LIHEAP population of 19,000 households. I have a collection scheme for only one month. Again, clearly, to do this for an entire year will be relatively easy with actual data. The method of calculation for a single month is set forth in Table B below.

As can be seen, the total revenue requirement associated with the working capital return for this one month, given the collection scheme for the Philadelphia utility, will be in excess of \$100,000. This is for billed revenues in that month of \$3.8 million. This does not include the working capital associated with arrears carried over from any other month, only that associated with the revenue billed in this particular month. Of course, this is only the return component of working capital. There will be depreciation on this component of rate base, as well.

SUMMARY

The elimination or reduction of arrears attributable to a low-income program will have a significant effect on a utility's working capital needs. For every dollar of arrears that a utility can eliminate, the utility will reduce its working capital needs by reducing its revenue lag days. In addition to the carrying cost savings that will be generated by this effort, there will be an expanded revenue requirement savings, as the combined federal/state income tax effect on the equity portion of the cost of capital for the working capital is eliminated or reduced as well.

This memo, however, has a limited purpose. It is not intended to quantify the extent of working capital savings for any particular utility. Instead, the actual numbers to run through this procedure, at this time, are not so important as recognizing and agreeing upon the appropriate procedure.

¹⁰⁾ See, notes **Error! Bookmark not defined.** - **Error! Bookmark not defined.**, *supra*, and accompanying text.

¹¹⁾ This includes the *total* residential class. It would be reasonable to expect that the low-income population would be somewhat slower in paying.

TABLE A	
AGE OF ARREARS	PERCENT OF RESIDENTIAL ACCTS
0 - 30 days	47.10%
31 - 60 days	14.40%
61 - 90 days	4.45%
91 - 120 days	3.89%
121 - 240 days	8.79%
241 - 360 days	4.74%
361 - 480 days	1.71%
481 - 600 days	0.46%
601 - 720 days	0.06%
Remainder¹²⁾	6.79%

¹²⁾ Since uncollectibles are funded in advance by creation of a reserve, there is no working capital associated with uncollectibles.

**TABLE B
ONE MONTH WORKING CAPITAL**

AGE OF ARREARS	PCT RES CUSTS	MEAN LAG DAYS	DAILY WKG CAP	AVG BILL	LIHEAP CUSTS	TOT DOLLAR LAG DAYS	TOT WKG CAP RETURN	WORKING CAPITAL COMPONENTS		TAX EFFECT	TOT. WKG. CAP. REV. REQRMT
								WKG CAP. INT. RETURN	WKG CAP. EQUITY RETURN		
0-30	47.10%	15	0.02959%	\$200	19,000	26,847,000	\$7,944	\$2,648	\$5,296	\$3,835	
31-60	14.40%	45	0.02959%	\$200	19,000	24,624,000	\$7,286	\$2,429	\$4,857	\$3,517	
61-90	4.45%	75	0.02959%	\$200	19,000	12,682,500	\$3,753	\$1,251	\$2,502	\$1,812	
91-120	3.89%	105	0.02959%	\$200	19,000	15,521,100	\$4,593	\$1,531	\$3,062	\$2,217	
121-240	8.79%	180	0.02959%	\$200	19,000	60,123,600	\$17,790	\$5,930	\$11,860	\$8,588	
241-360	4.74%	300	0.02959%	\$200	19,000	54,036,000	\$15,989	\$5,330	\$10,659	\$7,719	
361-480	1.71%	420	0.02959%	\$200	19,000	27,291,600	\$8,075	\$2,692	\$5,384	\$3,898	
481-600	0.46%	540	0.02959%	\$200	19,000	9,439,200	\$2,793	\$931	\$1,862	\$1,348	
601-720	0.06%	660	0.02959%	\$200	19,000	1,504,800	\$445	\$148	\$297	\$215	
TOTALS:							\$68,667	\$22,889	\$45,778	\$33,150	\$101,817