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Witness: Stephen G. Hill

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.** **Respondent.**	**DOCKET NO. UE-060266** **DOCKET NO. UG-060267**

EXHIBIT TO DIRECT TESTIMONY OF

STEPHEN G. HILL

ON BEHALF OF STAFF OF WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

The Impact of Decoupling on Electric Utility Operating Risk
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THE IMPACT OF DECOUPLING ON ELECTRIC UTILITY OPERATING RISK

STEPHEN G. HILL

NARUC FOURTH NATIONAL CONFERENCE ON INTEGRATED RESOURCE PLANNING

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The Impact of Decoupling On Electric Utility Operating Risk

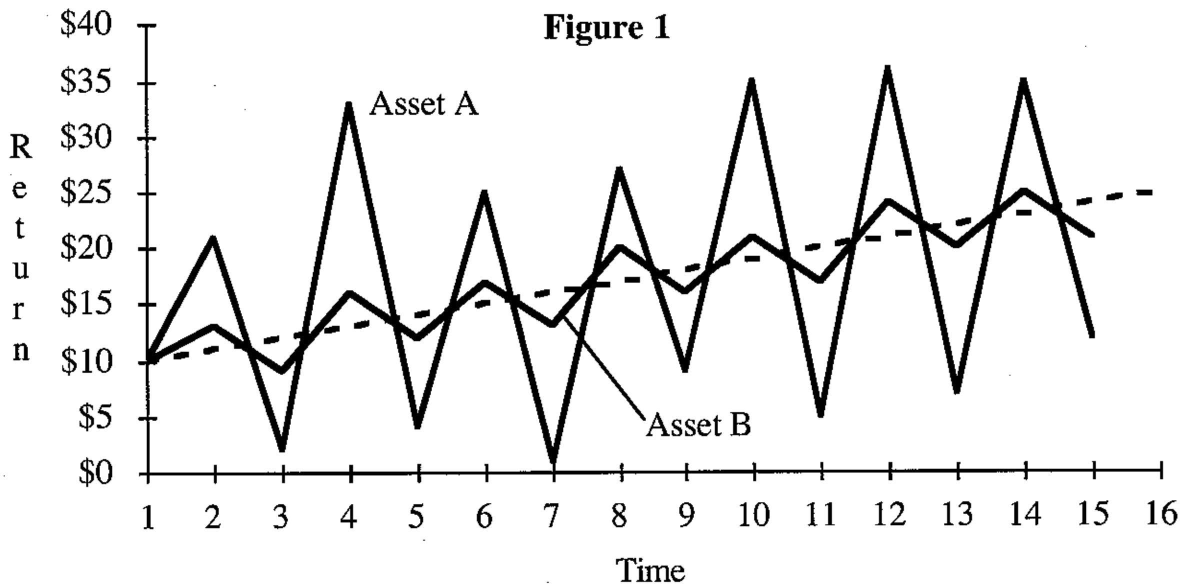
Stephen G. Hill

Because decoupling utility revenues from sales has the effect of reducing the utility's exposure to revenue stream volatility caused by weather and economic conditions, it lowers the operating risk of the utility. Lower operational risk for the utility equals lower risk for investors, which calls for lower allowed rates of return on equity. This paper offers an analytical framework through which that risk reduction imparted by decoupling can be assessed and the equity capital cost impact quantified.

VOLATILITY AND RISK

A financial asset is purchased by an investor with an expectation that the asset will produce a future stream of income, generating an expected rate of return. The risk of investing in any asset is directly related to the possibility that actual returns will deviate from expected returns, and the degree of those potential fluctuations determines the degree of risk. The greater the potential for actual returns to deviate from expected returns, the higher the risk. Conversely, the more certain an investor can be that the returns expected will be realized, the lower the risk.

A measure of the risk of a financial asset, then, is the volatility or variability of the income stream or return it generates. Figure 1, below, shows the income streams generated by two financial assets, "A" and "B." Both of the assets have, over time, provided a trend of increasing returns. In fact, the trend line of the returns (shown as the dashed line in Fig. 1) for both investments is the same. Therefore, given that conditions in the future can be expected to resemble those of the past, investors would, on average, expect that the income produced by each investment to be the same in future periods.



However, the risk of investing in the two financial assets is not the same. Asset "A" has shown much wider swings in return, much greater volatility, than has asset "B." Therefore, even though, asset "A" has the same expected future income stream as asset "B," there is a much lower probability that the actual return realized from an investment in asset "A" will equal the expected return. Asset "A," then, is a riskier investment than asset "B" whose actual return will, in all probability, more closely approximate the expected return.

When an investor purchases a share of utility stock he or she is purchasing an expected future stream of income in the form of dividends and growth in that dividend or capital appreciation when the stock is sold. That dividend expectation is, in turn, dependent on the earnings of the utility. If the earnings are steady and show little fluctuation, the dividend is more secure and the utility is seen by the investor as less risky than an otherwise similar investment whose dividend is based on a volatile earnings stream. The fact that the income stream volatility of a financial asset is directly related to its investment risk is neither controversial nor difficult to comprehend, but that concept is fundamental to assessing the risk impact of decoupling. Decoupling works to reduce the income stream volatility of utility operations and, thus, operating risk.

DECOUPLING AND VOLATILITY

Decoupling is intended to promote energy conservation by separating utility revenues from aggregate unit sales and targeting, instead, some measure of customer consumption. A target of per customer consumption is set and, ideally, if conservation occurs, the resulting per customer consumption will be below the target level. The utility is allowed to raise its rates to recover enough revenues to raise the realized revenue level to the target level of revenues per customer. If, on the other hand, conservation does not occur, and per customer consumption exceeds target levels, the utility is required to return to its ratepayers those revenues which exceed that target level.

However, in a decoupling regulatory regime, there is no mechanism for discerning the source of the change in energy use per customer. The reduction in usage may come from conservation, or it may come from lower customer usage due to other factors completely unrelated to conservation, i.e., warmer winters or a downturn in the regional economy of a utility heavily dependent on commercial and/or industrial sales. Because there is no practical way to distinguish the various factors which may affect per customer usage, all factors which impact per customer usage are necessarily included in the decoupling, make-whole process. Therefore, the decoupling process acts as a buffer for the utility, sheltering its stockholders from fluctuations in revenues and, ultimately, moderating swings operating earnings which might arise from unfavorable weather or economic conditions.

As regulators are well aware, those two factors -- weather and the economic condition of the utility's service territory -- are often important determinants of the revenue requirements of an electric utility operation. If, through a decoupling process, the utility is made whole for revenue under-recoveries due to unseasonable weather or economic downturns, the potential for revenue and income volatility is greatly reduced. Investors and investor advisory services are quite aware of the fact that a reduction in the income stream volatility reduces the overall investment risk of a utility operation. Subsequent to one Northeastern public service commission's approval of a trial decoupling experiment with an electric utility operating in its jurisdiction in 1991, the Value Line Investment Survey was quick to point out to its subscribers that the new regulatory plan would reduce that utility's exposure to fluctuations in revenues due to weather and economic conditions. Therefore, removal of the income volatility and risk associated with those factors indicates that a utility's "pre-decoupling" allowed return on equity should be reduced.

Decoupling lowers a utility's operating risk and, unless that lower operating risk is recognized in rates through the allowance of a lower authorized rate of return, decoupling will produce a windfall for the utilities which operate under that regime. Instituting a decoupling program for utilities without a downward adjustment to the allowed equity return, then, would create utility rates which exceed costs and encourage inefficient allocation of utility resources. Therefore, the allowed return on equity for a utility that is entering a regulatory framework in which revenues are decoupled from sales must be lower than that appropriate for the same utility under "traditional" regulation -- but how much lower?

An analytical process through which the impact of decoupling on allowed returns can be estimated is presented below, however, it is intuitively obvious that the more dependent the utility's revenues are on weather and economic fluctuations, the greater the risk reduction caused by decoupling and the lower the allowed equity return should be. If, for example, 100% of the revenue variations of a utility were due to weather and economic conditions, the implementation of decoupling would eliminate volatility in the utility's revenue stream and effectively turn a utility equity investment into a bond-like financial instrument. In that extreme instance, the level of uncertainty regarding the expected return which normally accompanies a utility equity investment would be substantially reduced by decoupling and an appropriate equity return would fall toward that appropriate for utility debt capital.

RISK QUANTIFICATION

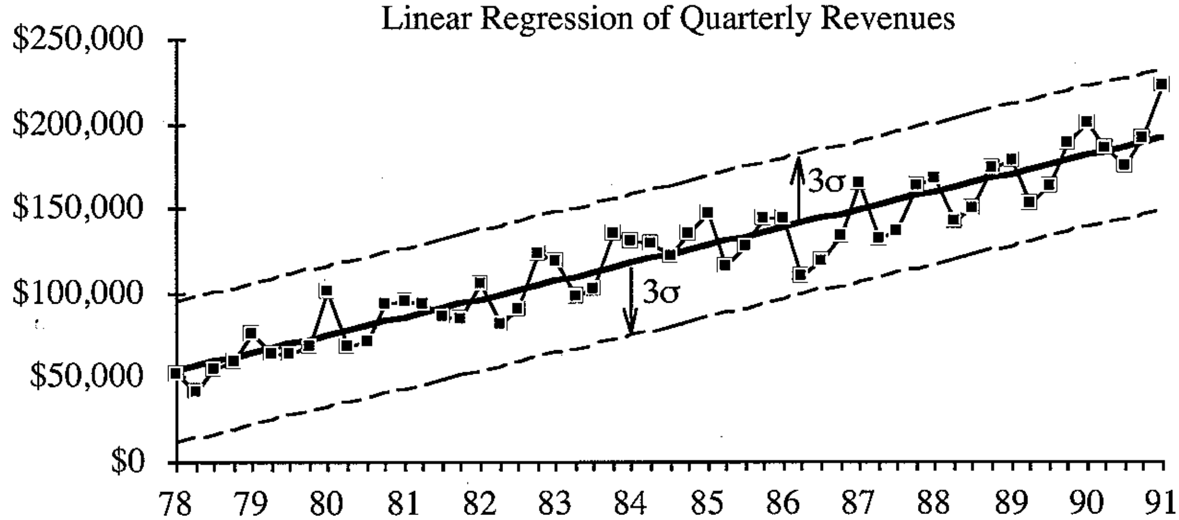
Quantifying the change in operating risk of a utility operation due to a reduction in revenue volatility caused by a decoupling is a two step process. First, the degree to which fluctuations in utility revenues are dependent on weather and economic conditions must be measured and, second, the revenue volatility that normally exists with the utility operation must be quantified.

Measuring the degree to which fluctuations in utility revenues are dependent on changes in weather and economic conditions is accomplished through multi-factor regression analysis. In such an analysis, variables which represent weather (e.g., degree days) and economic conditions (e.g., a state or regional economic index) as well as other factors which affect utility revenues (e.g., number of customers) are regressed against the utility's revenues over a relatively long period of time (10 - 15 years). Through such an analysis (which is quite similar to analyses used to project utility revenue requirements in regulatory jurisdictions which utilize future test years), it can be determined to what degree revenues are affected by weather and economic conditions.

Regression analysis also plays a part in quantifying the revenue volatility that normally exists with the utility operation. Figure 2 shows the revenue stream of a utility operation over the past fifteen years, by quarter. Also shown on Figure 2 is the least-squares regression line which represents the trend in revenues over that time period. In addition, the variance and standard deviation of the revenues around the trend line can be calculated. That process gives a quantitative measure of the volatility of the utility's revenues around the revenue trend or regression line.

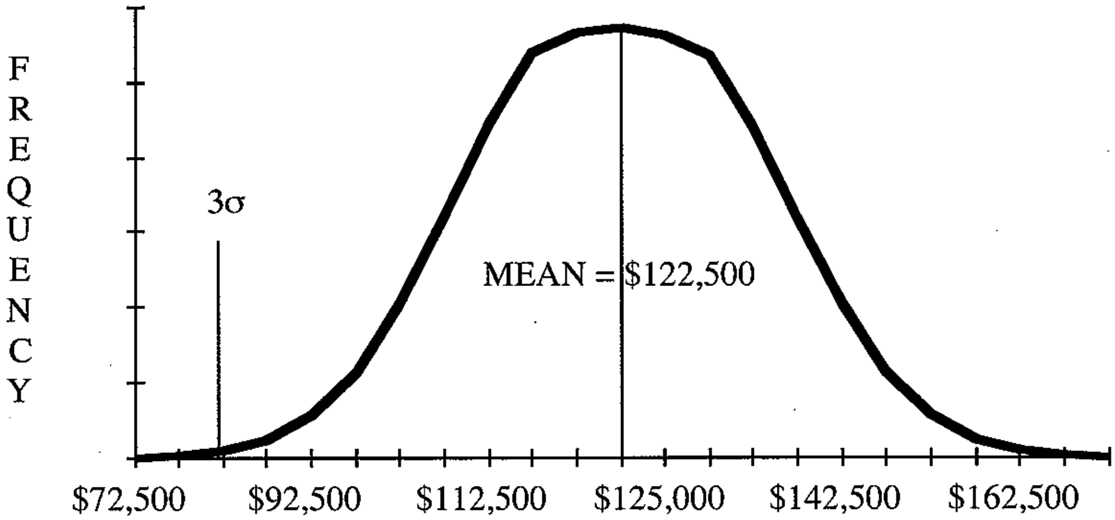
Figure 2

Linear Regression of Quarterly Revenues



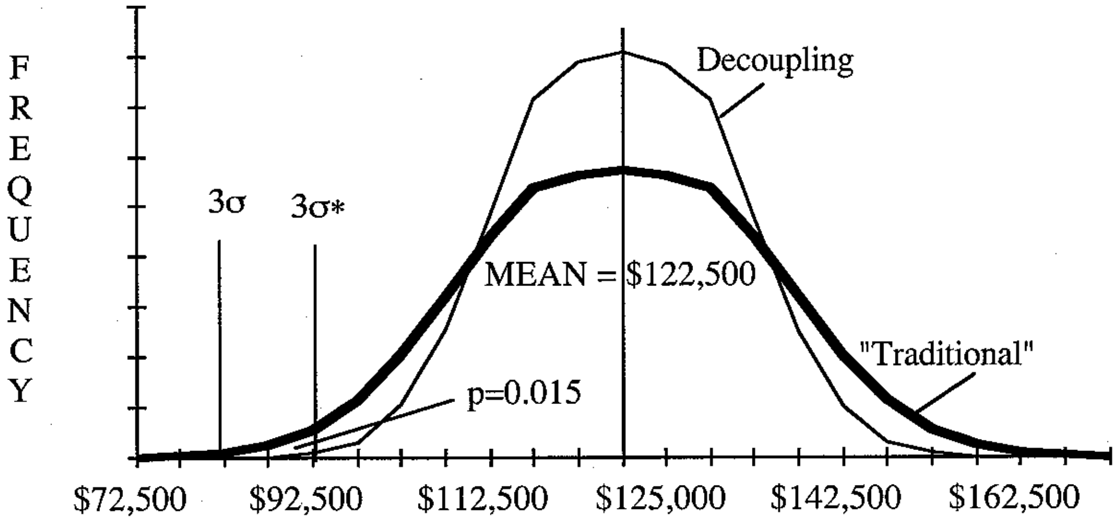
Once the standard deviation of the revenues about the trend line is established, a zone ±3 standard deviation units (σ) above and below that revenue trend line can be established. Assuming the utility's revenues are normally distributed about the revenue trend, a zone ±3σ above and below the revenue trend line establishes a range within which the utility's revenues will fall 99.9% of the time. The distribution of quarterly revenues about the utility's revenue trend line can also be represented as the familiar bell-shaped curve shown in Figure 3.

Figure 3
Revenue Distribution



When the volatility of the revenue stream is reduced, the variance of the revenues about the trend line shown in Figure 2 is reduced and the width of the zone ±3σ above and below the revenue trend line narrows. In other words, as the volatility of the utility's revenue stream is reduced, the possibility that the actual revenue (which will fall within ±3σ)will more closely approximate the expected revenue (represented by the trend line) is increased and, therefore, the utility's operating risk is reduced. Further, as the volatility of the utility's revenues around the revenue trend line is reduced, the shape of the "bell curve" graph of the revenue distribution changes. As shown in Figure 4, while still centered on the average revenue value, the "bell" formed by the distribution of utility revenues under decoupling becomes taller and thinner.

Figure 4
Revenue Distribution



It is through this change in the shape of the distribution of possible revenue outcomes, shown in Figure 4, that we are able to quantify the cost of equity capital impact of decoupling. When the variance of revenues about the trend is reduced, the possibility of more extreme outcomes, both negative and positive, are eliminated. To the investor, the risk-reducing aspect of this change is the elimination of the possibility of extreme negative outcomes. Under "traditional" regulation it is possible that the utility could experience revenues at the extreme lower left corner of the original revenue distribution (-3σ). This would represent a risky outcome to the investor. Under a decoupling scenario, where revenue volatility is reduced, the revenue distribution is narrower and the most negative outcome ($-3\sigma^*$ on the new bell curve) is a higher revenue value and, thus, represents less risk to the investor. The pertinent difference in the probable outcomes under the "traditional" and decoupling scenario is quantified as the difference in the area under the curves between -3σ and $-3\sigma^*$. This area between the original bell curve and the new (decoupling) bell curve represents the reduction in the probability of extreme negative outcomes that existed prior to decoupling. If, as shown in figure 4, the probability differential represented by the reduction in revenue volatility equals 0.015, which represents 1.5% of revenues, then investors would be indifferent between "traditional" regulation and decoupling if the equity return under decoupling produced a revenue requirement 1.5% less than that under "traditional" regulation.

EXAMPLE

Let's assume that a multiple factor regression analysis reveals that weather and economic conditions in a utility's service territory account for 50% of the fluctuation in the quarterly revenues of the utility. [Note: The author's research on the dependence of revenue volatility on weather and economic conditions indicates that those factors may be determinative of as much as 85% of revenue volatility, therefore, 50% is a conservative estimate.] In our example, reducing the variance in the utility revenues by 50% produces the taller, narrower bell-shaped curve shown in Figure 4. The difference in the area under the original bell curve and the new decoupling bell curve represents a probability of 0.015, or 1.5% of average revenues.

Continuing this example, assume our utility has a $1 Billion rate base, average annual revenues of $500 Million, an equity ratio of 45%, an allowed equity return of 12% under "traditional" regulation and a prospective tax rate of 40%. The "traditional" regulatory scheme would call for an equity return component in revenues of $90 Million (45% x 12% x (1/(1-40%)) x $1 Bill.). Using the 1.5% revenue probability differential between "traditional" regulation and decoupling hypothesized above, investors would be indifferent between the $90 Million pre-tax equity return produced by "traditional" regulation and an equity return under a decoupling regime which produced a pre-tax revenue requirement of $82.5 Million ($90 Mill. - ($500 Mill. x 1.5%)). The equity return which would satisfy that requirement, that is, the equity return which would produce an $82.5 Million equity component in revenues in this example is 11.00% [$82.5 Mill./ (45% x $1 Bill. x (1/(1-40%)))]. Therefore, under this example, the utility's allowed return on equity capital should be reduced from the "pre-decoupling" level of 12% to 11%.

SUMMARY

Due to the nature of decoupling and the inextricability of the impact of weather and economic conditions on per customer usage from the impact of any conservation which may occur, decoupling will reduce utility operating risk. Reduced operating risk translates to lower investment risk and lower allowed returns to the investor. Regulators are able to quantify the impact of decoupling on equity capital costs by 1) determining the degree to which weather and service territory economic health determine revenue volatility and 2) calculating the degree to which the removal of that volatility will reduce the probability of extreme negative outcomes. That percentage by which the probability of extreme negative outcomes is reduced, multiplied by the average annual revenues provides an estimate of the amount by which the pre-tax equity return requirement can be reduced to account for the reduced risk of decoupling. This reduced pre-tax return requirement can then be translated into an appropriate return on equity to be utilized under a regulatory framework which employs decoupling.