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When Revenue Decoupling Will Work… and When It Won’t

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Overview

Revenue decoupling will be highly effective in removing the disincentive for utilities to promote energy efficiency in certain situations, but completely ineffective in others. Since the effectiveness of decoupling depends on particular details, it is best viewed as a tactical tool to be used for *some* utilities rather than a strategic instrument that can be used effectively on *all* utilities.

- When Decoupling Will Work*:* If a regulator keeps allowed rates of return close to a utility's cost of capital, increasing the earned rate of return will be the primary driver of the utility's stock price. Decoupling mechanisms prevent energy efficiency activities from lowering the earned return and prevent sales promotion from increasing it. Under this condition, decoupling will make the utility largely indifferent between sales promotion and energy efficiency.

- When Decoupling Won't Work*:* If a regulator sets rates of return in excess of a utility's cost of capital, increasing investment scale will be the primary driver of the utility's stock price. In that case its investors will prefer an expanding rate base to a more-stable one, even if the utility earns the same rate of return on both. Decoupled or not, a utility operating under this condition will prefer to promote sales because so doing will increase its investment scale more rapidly over time.

I. BACKGROUND

The Financial Foundation of Revenue Decoupling

Under traditional ratemaking practices, when a utility promotes energy efficiency, the revenue it loses is greater than the variable cost it avoids. This lost net revenue affects the utility's bottom line, reducing its earned rate of return. Revenue decoupling mechanisms are ratemaking devices that restore those lost net revenues to the utility. Many suggest that in so doing, decoupling mechanisms necessarily eliminate the disincentive for the utility to promote energy efficiency.

The decoupling concept rests on the notion that a utility's investors are indifferent between alternatives that produce the same rate of return. Yet, a basic tenet of finance is that any rate of return or profitability index fails to reflect the all-important differences in investment scale across the various expansion paths, as Higgins notes in *Analysis for Financial Management*:

> The problem with the PI [profitability index] and the IRR [internal rate of return] is basically that they are insensitive to the *scale of investment.*[1] (Emphasis added.)

Finance textbooks are full of examples demonstrating that investors will be better off if the firm selects a large-scale investment with a *low* rate of return over a small-scale investment with a *high* rate of return.[2] As Higgins puts it rhetorically, but convincingly:

> Would you rather earn an 80 percent return on $1, or a 50 percent return on $1 million?[3]

Note that you would not need $1 million of idle cash to take advantage of the second option. As long as you can raise capital at a cost rate that is less than 49.99992 percent, you will prefer the investment with the larger scale. Similarly, as long as a utility is allowed to earn a return that exceeds the cost rate at which it obtains capital, its present investors, too, will be better off if the utility invests in large-scale capital assets rather than smaller ones. The fact that the utility must issue new shares of stock to expand its system does not change that conclusion, nor does the fact that its rate of return might be the same across the varying expansion paths.

The Fair Rate of Return

Setting the fair rate of return is a public policy decision. I use the modifier "fair" in the previous sentence because that is how the U.S. Supreme Court labeled the rate of return in *Smyth v. Ames*:

> What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience.[4]

While economics and finance can inform us about the cost of capital, those fields have little to say about fairness as set forth in legal constructs, as financial experts freely admit.[5] Therefore, we should not expect economic concepts, such as the cost of capital, to be the regulators' exclusive guide in setting fair rates of return.

As noted at the outset, whether the regulator sets the rate of return at the cost of capital plays an important role here because it determines whether the foundation exists for an effective decoupling mechanism. In abstract neoclassical economic theory, a case can be made for setting the rate of return equal to the cost of capital. As Kahn notes, however, in a dynamic institutional environment, the cost of capital can be viewed only as a "bottom limit" for the fair rate of return.[6] In a pragmatic sense, regulators can set the rate of return at the cost of capital or *higher*. It is not surprising then to find that *some* regulators set allowed returns above the utilities' costs of capital.

This is more than an academic discussion. For example, consider the following 2007 decision from the Wisconsin commission:

> The cost of equity, which is the minimum acceptable return, is a starting point. It would drive utility market values to book value, which eliminates the economic incentive for utilities to expand their systems. Under normal economic conditions, the fair return on equity lies above that minimum rate.[7]

In this decision, the regulator found the cost of equity to be 9.0 percent; it set the return on equity at 10.8 percent in order to achieve a multitude of public policy objectives. It is well-reasoned regulatory decisions like this one that nevertheless make decoupling mechanisms ineffective.

If such a utility can raise capital at a cost rate of 9 percent, but is allowed to earn close to 11 percent returns on all invested capital, it can deliver gains to its present investors by adding capacity. As I will demonstrate, those gains flow to the present investors, even though the present investors supply none of the new capital necessary for that expansion. The utility doesn't have to earn a return higher than 11 percent to generate those gains; it just has to expand the investment base to which that 11 percent return will apply.

A decoupling mechanism would not eliminate this incentive to expand. It would, in fact, reinforce it. By driving the earned rate of return to the allowed level, the decoupling mechanism ensures that this utility will earn a return in excess of its cost of capital. That sends a clear signal to the utility to expand.

The Importance of Investment Scale in the Utility Industry

The notion that regulators often set rates of return in excess of the cost of capital, and that such a condition creates the incentive for the utility to expand, is not a new one. In 1962, Averch and Johnson published a seminal piece in the *American Economic Review* setting forth what most regulatory economists consider to be the overarching utility incentive structure. Their well-known conclusion, shown below, has since that time been referred to as the A-J effect:

> The firm has an incentive to acquire additional capital if the allowable rate of return exceeds the cost of capital.[8]

Note that the A-J incentive structure suggests nothing about increasing the rate of return—it assumes that the rate of return is fixed at the allowed level. Just as we discussed above, to create wealth for its present investors, the utility merely needs to get larger, and that alone propels its stock price upward. As Gordon notes, to take full advantage of the A-J effect, the utility, as a regulated entity, must create a *need* to expand its capacity:

> Stockholders benefit if the allowed rate of return exceeds the firm's cost of capital *and if an expansion of capacity is required to meet demand*.[9] (Emphasis added.)

A utility creates a need for capacity expansion by encouraging customers to use *more* energy, not *less*.

Empirical Evidence of the A-J Effect

Finance principles can help us determine whether the A-J effect holds for a particular utility. If investors expect that a utility will be allowed to just earn its cost of capital, no more or no less, there will be parity between its stock price and its book value:

> If the return on book equity is pushed back toward the cost of capital, then the stock price will be pushed back to book value.[10]

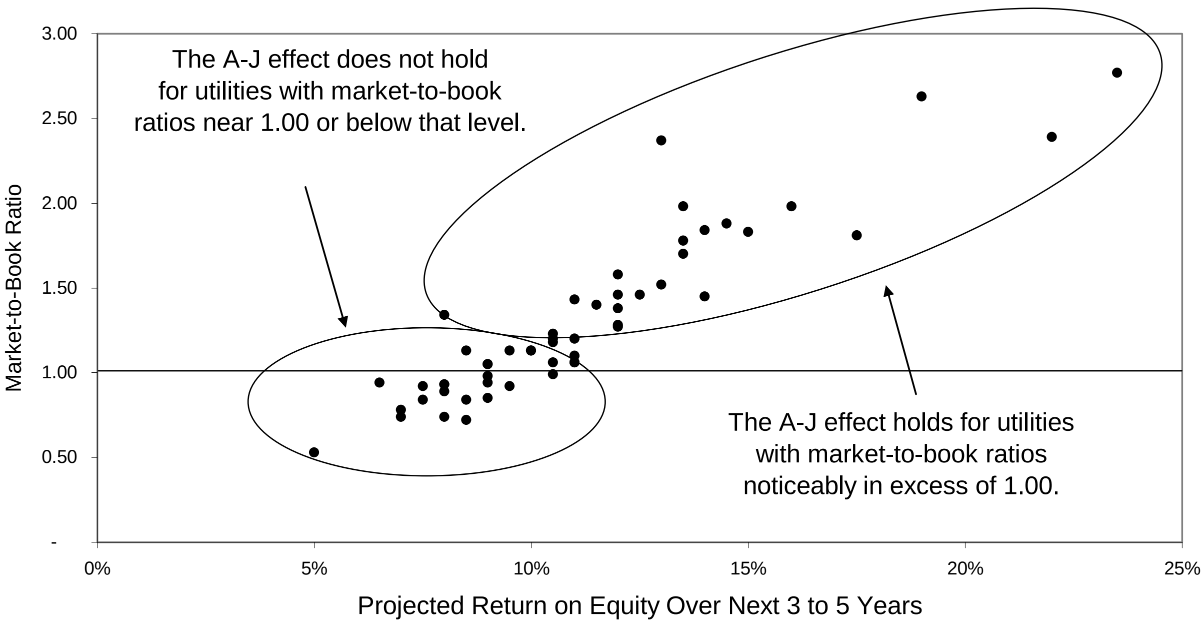
Conversely, if the expected rate of return is in excess of the cost of capital, the utility's stock price will trade above its book value. This relationship is typically expressed via the stock-price-to-book-value ratio, or market-to-book ratio. A result in excess of 1.00 indicates that the A-J effect holds.

Over the past half century, on average, the typical utility stock has traded at a substantial 50 percent premium to its underlying book value (i.e., the long-run average market-to-book ratio equals 1.50).[11] Even in today's challenging financial markets, about half of the electric utilities followed by the *Value Line Investment Survey* have stock prices trading *significantly* in excess of their book value.[12]

Utilities subject to the A-J effect will tend to have higher expected rates of return than their counterparts. We see a strong relationship between a utility's expected rate of return and its market-to-book ratio in Figure 1.

Fig. 1

Value Line Electric Utilities



Even though the A-J effect does not influence all utilities today, it does affect a large number of them, and we need to be cognizant of its powerful impact on those companies. Some of the utilities operating under the influence of the A-J effect suggest that the preferred path to a low-carbon future is one that involves building large-scale nuclear generating units.[13] Without prejudice as to the public policy implications of such a choice, from a financial perspective that proposal makes sense.

If the utilities that earn high rates of return can successfully implement this nuclear strategy, they will deliver greater per-share stock price gains to their present investors than they would under any other resource strategy. The rate-of-return incentive is firmly in place for those utilities; questions about the financial risk of such a strategy have been mitigated to a large extent by recent government loan guarantees.[14] Whether nuclear power represents the best resource choice for ratepayers or for the public in general is a matter of disagreement. A discussion of that issue, however, is beyond the scope of this article. We are focusing here on corporate finance.

If the A-J effect holds, the utility has a strong incentive to proceed along this path, and it is not surprising to see such utilities headed in that direction. As I will demonstrate in a moment, decoupling such utilities will have no effect on their expansion plans because they are attempting to increase their stock prices primarily by creating a need for greater investment scale, not by earning higher rates of return.

II. FINANCIAL ANALYSIS

Maximizing Market Value for the *Present* Investors

To determine whether an action is good or bad for utility shareholders, we need an explicit objective function. Gordon provides one. It is the standard perspective in corporate finance:

> The objective of a utility management in its investment and other decisions is to serve the company's owners—its *present* stockholders.[15] (Emphasis added.)

Put another way, the objective of utility management is to maximize the market value of the utility stock held by the present investors.

Gordon's dividend discount model (DDM) can be used to illustrate the key points that bear on this issue. It determines the stock price by calculating the net present value of cash flows to the present investors, which is the standard financial construct. He develops several variants of the DDM with differing degrees of complexity, but which all reflect the same fundamental financial concept. Readers interested in a thorough treatment of utility finance should refer to his classic text, *The Cost of Capital to a Public Utility*.

The version of the model that allows us to demonstrate the point in question in the most straightforward manner is the following. It assumes an all-equity financed firm that pays out all of its earnings as dividends. This makes the analysis more transparent without any loss of mathematical generality:

$$P = \frac{NBx + (x-\rho)I}{N\rho}$$

In the model, P is the stock price per share, N is the number of shares held by the present investors, B is the book value per share, x is the rate of return, ρ *is* the cost of capital, and I is the amount of new investment that the utility will finance.

Let us use Gordon's model to demonstrate first that expanding investment scale is attractive to the present investors when the rate of return exceeds the cost of capital, i.e., when the A-J effect holds. Then let us use it to show that such is not the case if the rate of return equals the cost of capital, i.e., when the A-J effect is absent. Finally, we can use it to show how decoupling would affect the utilities in both scenarios.

Case 1: The Rate of Return Exceeds the Cost of Capital (A-J Effect Holds)

Assume that our hypothetical utility has 1,000,000 shares of stock in the hands of its present investors. Its book value is \$20.00 per share. Its allowed return is 12 percent, and its cost of capital is 10 percent. At this point it has no plans to add capacity. Its stock price is then:

$$P = \frac{(1{,}000{,}000)(\$20.00)(0.12) + (0.12-0.10)(\$0)}{(1{,}000{,}000)(0.10)} = \$24.00$$

Because the utility earns a rate of return that exceeds its cost of capital, its stock price lies above its book value. Next we consider two expansion alternatives. The first requires $10 million of new capital; the second requires $30 million of new capital.

Since the utility pays out all of its earnings as dividends, and since the utility uses only equity financing, it must issue new shares of stock to finance this expansion. These new shares will have an effect on the per-share stock price. Where, though, in Gordon's model is the variable that represents the new shares to be issued? His model is the solution to a series of equations that solve *simultaneously* for not only the stock price, but also for a host of other variables. The number of shares to be issued is determined not only along with the new stock price, but the new book value per share, and the new earnings per share, as well. The interested reader should refer to Gordon's text for a full discussion of this comprehensive simultaneous financial solution.

Returning to the example, let us calculate the new stock prices that would result if the utility made the $10 million or the $30 million capital investments:

$$P_{\$10M} = \frac{(1{,}000{,}000)(\$20.00)(0.12) + (0.12 - 0.10)(\$10{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$26.00$$

$$P_{\$30M} = \frac{(1{,}000{,}000)(\$20.00)(0.12) + (0.12 - 0.10)(\$30{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$30.00$$

What happens to the present investors when the utility expands? *Note that those investors did not supply any of the new capital.* They still hold their original 1,000,000 shares. So under the three possible scenarios, the market value of their investment is:

<u>No New Investment</u>

$$MV_{present-investors} = 1{,}000{,}000 \times \$24.00 = \$24{,}000{,}000$$

<u>New Investment = $10 Million</u>

$$MV_{present-investors} = 1{,}000{,}000 \times \$26.00 = \$26{,}000{,}000$$

<u>New Investment = $30 Million</u>

$$MV_{present-investors} = 1{,}000{,}000 \times \$30.00 = \$30{,}000{,}000$$

The market value of the present investors' stock increases as this utility adds capacity, which is a manifestation of the A-J effect. As the firm moves from a no-new-investment position to a $30 million new investment, the present investors provide no new capital, yet the market value of their holdings increases by $6 million (from $24 million to $30 million). Not a bad result for putting no new money into the game.

If this looks like a windfall gain to the present investors, it is. Myers makes that very point:

> Note that an opportunity to invest in a project offering more than the cost of capital generates an immediate capital gain for investors. This is a windfall gain, since it is realized *ex ante*.[16]

New investors cannot act fast enough to capture any of the excess return (that is why it is an *ex ante* gain), making expansion quite attractive to the present investors. This critical point is missed by some who analyze utility incentives. Rate base expansion is not done for the benefit of the new investors who provide the capital. Those investors enter into a business transaction in which they supply funds in exchange for shares of stock, operating at arms' length to the utility. Utility managers want those new investors to pay as much as possible for a share of stock. *Managers expand the utility to create gains for the present investors*. It would be asking a lot of utility managers operating under the A-J effect—managers whose primary responsibility is to represent the interests of the present investors—not to pursue such opportunities.

Case 2: The Rate of Return Equals the Cost of Capital (A-J Effect Absent)

Now let us retrace our steps, retaining all assumptions from the prior example, except that we will set the rate of return equal to the cost of capital. When we do, we find that for the no-investment scenario, the stock price drops to book value, as it should according to finance principles:

$$P_{\$0M} = \frac{(1{,}000{,}000)(\$20.00)(0.10) + (0.10 - 0.10)(\$0)}{(1{,}000{,}000)(0.10)} = \$20.00$$

Now let us calculate the new stock prices that would result if the utility made the $10 million or the $30 million capital investments. When we do, we observe an interesting result:

$$P_{\$10M} = \frac{(1{,}000{,}000)(\$20.00)(0.10) + (0.10 - 0.10)(\$10{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$20.00$$

$$P_{\$30M} = \frac{(1{,}000{,}000)(\$20.00)(0.10) + (0.10 - 0.10)(\$30{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$20.00$$

If the rate of return equals the cost of capital, a utility looking out for its present investors has no inherent incentive to expand. The stock price remains at the $20.00 book value per share in all cases. So under the three possible scenarios, when the rate of return equals the cost of capital, the market value of the present investors' stock is the same—$20 million. If the rate of return equals the cost of capital, from the perspective of the present investors, we are in a growth-for-growth's sake situation. Under this condition, the present investors obtain no benefits from expansion.

Energy Efficiency, Decoupling, and the A-J Effect

Instead of holding the earned rate of return constant across all expansion paths, we introduce the following relationships:

1. Strategy 1—Encourage energy efficiency: For the utility to avoid making a new capacity investment, it must promote energy efficiency aggressively. If it does, without decoupling its earned rate of return will decline by 50 basis points relative to its allowed rate of return.
2. Strategy 2—Business as usual: If the utility continues on its business-as-usual path, it will need to build the $10 million facility. It will earn its allowed rate of return.
3. Strategy 3—Promote sales: If the utility promotes sales, without decoupling it will increase its earned rate of return by 50 basis points relative to its allowed rate of return. It will need to build the $30 million facility.

In the case where the *allowed* return is 12.00 percent (i.e., where the A-J effect holds), this produces *earned* rates of return of 11.50, 12.00, and 12.50 percent, respectively. Let us calculate the utility stock prices under the three scenarios:

$$P_{encourage-EE} = \frac{(1{,}000{,}000)(\$20.00)(0.1150)+(0.1150-0.10)(\$0)}{(1{,}000{,}000)(0.10)} = \$23.00$$

$$P_{BAU} = \frac{(1{,}000{,}000)(\$20.00)(0.1200)+(0.1200-0.10)(\$10{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$26.00$$

$$P_{promote-sales} = \frac{(1{,}000{,}000)(\$20.00)(0.1250)+(0.1250-0.10)(\$30{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$32.50$$

With no decoupling mechanism in place, the utility's present investors are best off if the utility promotes sales. This is manifested by the higher per-share stock price. Now, let us decouple the utility. That restores the rate of return to 12.00 percent in all cases, but does not affect the investment scale changes, as merely implementing decoupling does not prevent the utility from pursuing any strategy it wishes. This will then return us to the prices we calculated initially for this utility. Table 1 presents the results:

Table 1
Impact of Decoupling on Utility Stock Prices
Rate of Return > Cost of Capital (A-J Effect Holds)

	No Decoupling		With Decoupling	
Strategy	Earned Rate of Return	Stock Price	Earned Rate of Return	Stock Price
Encourage Efficiency	11.50%	$23.00	12.00%	$24.00
Business as Usual	12.00%	$26.00	12.00%	$26.00
Promote Sales	12.50%	(optimal result) $32.50	12.00%	(optimal result) $30.00

Table 1 shows why, in a strategic sense, the presence or absence of a decoupling mechanism is irrelevant when the A-J effect holds. With or without decoupling, sales promotion is the optimal strategy. Even though under decoupling the earned rate of return is the same under all scenarios, since the A-J effect is operating, the stock price varies directly with the change in investment scale.

Capitalizing Energy Efficiency Investments Won't Help if the A-J Effect Holds

Since energy efficiency deprives the utility of investment scale, why not allow the utility to create some scale by capitalizing energy efficiency investments? Say the regulator of our hypothetical utility allows it to capitalize \$5 million of energy efficiency expenditures. Assume that is the level of spending required to eliminate the need for the utility to construct either supply-side facility.

Under decoupling, the rate of return is restored to 12 percent, and the utility now gets to add \$5 million to the rate base. Under these conditions, the stock price will be:

$$P_{encourage-EE} = \frac{(1{,}000{,}000)(\$20.00)(0.1200) + (0.1200 - 0.10)(\$5{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$25.00$$

By allowing the decoupled utility to also earn a return on its energy efficiency expenditures, we add one dollar to the stock price. Nevertheless, this falls far short of the \$30.00 per share stock price that we expect to obtain if the decoupled utility avoids energy efficiency altogether, promotes sales, and builds the large supply-side facility.

This has extremely negative consequences for those of us interested in encouraging all utilities to pursue energy efficiency opportunities. If the utility is operating under the A-J effect, and if promoting energy efficiency programs would allow the utility to avoid a \$10 billion nuclear plant, if we decouple the utility, what level of energy efficiency expenditures would we then need to allow the utility to capitalize just to make its present investors *neutral* to energy efficiency?

The answer is \$10 billion! If the A-J effect holds, anything less leaves the present investors worse off than they would be if the utility built the nuclear plant.

Where Decoupling Works

If the A-J effect is absent, which is the case for some utilities, then decoupling alone will make the utility indifferent between promoting energy efficiency and promoting sales. Returning to our hypothetical utility, recall from our earlier discussion that if the utility promotes energy efficiency aggressively, without decoupling it lowers its earned rate of return by 50 basis points; if it operates under business-as-usual conditions, it earns its allowed rate of return; and, if it promotes sales, without decoupling it increases its earned rate of return by 50 basis points relative to the allowed return. The new investment requirements are again \$0, \$10 million, and \$30 million, respectively, for these scenarios. If the allowed rate of return is 10 percent, then without a decoupling mechanism in place, we obtain the following stock prices under the various scenarios:

$$P_{encourage-EE} = \frac{(1{,}000{,}000)(\$20.00)(0.0950) + (0.0950 - 0.10)(\$0)}{(1{,}000{,}000)(0.10)} = \$19.00$$

$$P_{BAU} = \frac{(1{,}000{,}000)(\$20.00)(0.1000) + (0.10000 - 0.10)(\$10{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$20.00$$

$$P_{promote-sales} = \frac{(1{,}000{,}000)(\$20.00)(0.1050) + (0.1050 - 0.10)(\$30{,}000{,}000)}{(1{,}000{,}000)(0.10)} = \$22.50$$

Again, it is not surprising that absent decoupling, the utility's stock price is the lowest if it promotes energy efficiency aggressively, and the highest if it promotes sales. Implementing a decoupling mechanism restores the earned rate of return to 10 percent in all cases, and restores the stock prices to their former level. Recall that when the rate of return equals the cost of capital, expansion creates no additional value for the present investors. The stock price is $20.00 in all expansion scenarios under that condition. Table 2 shows this result.

Table 2
Impact of Decoupling on Utility Stock Prices
Rate of Return = Cost of Capital (A-J Effect Does Not Hold)

	No Decoupling		With Decoupling	
Strategy	Earned Rate of Return	Stock Price	Earned Rate of Return	Stock Price
Encourage Efficiency	9.50%	$19.00	10.00%	(optimal result) $20.00
Business as Usual	10.00%	$20.00	10.00%	(optimal result) $20.00
Promote Sales	10.50%	(optimal result) $22.50	10.00%	(optimal result) $20.00

The result in Table 2 is the one that decoupling advocates intend. When the rate of return equals the cost of capital, under decoupling, the utility management that looks out for its present investors is truly indifferent between promoting energy efficiency aggressively and promoting sales. The problem is that not all utilities operate under this condition.

The Uphill Climb for Energy Efficiency under the A-J Effect

So what can we do if we want a utility to make energy efficiency its preferred resource option when the A-J effect holds? If we take rate-of-return policy as a given, as I do in this article, in terms of ratemaking adjustments, not much can be done. Decoupling won't help; nor will capitalizing energy efficiency expenditures, unless we match the scale of the avoided supply-side assets on a *dollar-for-dollar* basis, a policy that in many ways would be self-defeating.

A structural approach may be more productive. One option that some states have implemented is to have independent third parties deliver statewide energy efficiency programs. This allows the utility to focus on the supply-side, which it likely will do anyway if the A-J effect holds. That proposal, though, raises its own set of issues, a discussion of which is beyond the scope of this article. It might be appropriate in some instances, but not in others.

If we step back for a moment and use history as our guide, we can see that the big drivers of utility resource policy could be external factors (e.g., changes in macroeconomic conditions, state and Federal initiatives, fuel availability). If we reflect upon what happened during the previous nuclear construction cycle, it was cost escalation that led to the cancellation of many plants. Notwithstanding the current government loan guarantees, the cost of nuclear power today may rise to a level where a utility cannot make a reasonable case to build such a facility. In addition, if recent events are indicative of changing public attitudes, it may be quite difficult to site coal-fired units, even those that include carbon capture technology. If nuclear plants are too expensive, and utilities can't site coal-fired plants, the list of resource options starts looking quite short. That may leave energy efficiency as a much more attractive resource option, if by default if nothing else.

If such external events do not obtain, however, as long as the A-J effect continues to hold, which it likely will for many utilities, I see little possibility of encouraging many of those utilities to abandon large-scale supply-side construction plans in favor of aggressive promotion of energy efficiency. The incentive to add plant is simply too strong when the A-J effect holds.

Since decoupling mechanisms do not address energy-efficiency-related investment scale impacts, implementing such devices cannot alleviate this concern. Implementing decoupling mechanisms for utilities not subject to the A-J effect is likely to be more productive. Those utilities focus heavily on the earned rate of return, which is the target of the decoupling concept.

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[12] Market-to-book ratios are as of June 19, 2009.

[13] For example, see Southern Company, *2008 Summary Annual Report,* p. 11.

[14] Morningstar, "Southern Company: U.S. Offers Nuclear Loan Backing," June 18, 2009.

[15] Gordon, p. 3.

[16] Myers, p. 80.