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Decoupling and the Cost of Capital

The policy of decoupling in regulated ratemaking has been adopted in many state jurisdictions since 2007, but that adoption often was associated with an unresolved dispute over the effect of decoupling on the cost of capital. Because decoupling has the effect of reducing the volatility of the utility's revenues, many assumed that there must be a corresponding decrease in the COC. The basis for this assumption is that volatility is related to risk. If volatility is reduced, then the COC must automatically fall. Although no empirical evidence was provided, a minority of regulatory decisions reduced the company's allowed return on equity in conjunction with approving decoupling.

Joe Wharton and Michael Vilbert

I. Introduction to the Goals of Decoupling

Decoupling is an important alternative ratemaking policy to the traditional general rate case for regulated electric utilities. By ''alternative'' we do not mean a replacement but rather a supplement that makes cost-of-service regulation work in a more timely and effective manner. Decoupling is a regulated ratemaking approach that:

> Severs the direct link and relationship between level of unit sales (''kilowatt-hours'' or ''kWh sales'') to consumers and the level of base

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revenues[1] that are approved for collection through volumetric rates.[2]

At the national level and also in the majority of states, there exist explicit policies to reduce and even reverse the growth of electricity sales. Those explicit policies, as well as other factors like climate concerns and changing consumer tastes for new energy efficient products, have been successful not only in slowing the growth of kWh consumption per capita but also in reducing overall consumption for the country as a whole.[3] This is shown in Figure 1.

Under traditional general rate case regulation, recovery of and return on a company's capital investment arises largely through margins on unit sales. A decline in sales means that a regulated company has more difficulty recovering its full cost of service and may not expect to earn its allowed ROE unless rates are set through a forecast of sales and costs that closely match actual sales and costs. Also, if fixed costs are increasing, the regulated company has to file general rate cases more frequently to keep pace with the increase, imposing additional stress upon the regulatory system. Decoupling policies address the increasing mismatch in the modern era between declining sales, increasing fixed costs, and earning reasonable returns on investment.[4]

The link that decoupling intentionally severs is in some ways a deliberate result of the long historical tradition of designing volumetric (per kWh) rates to collect a significant portion of the fixed costs, especially those fixed costs of the distribution network that serves residential and small commercial customers having simple analog meters. Some experts suggest that following the cost causation principle in rate design for these customers, more or all fixed costs should be collected in fixed charges and/or in demand charges, as they often are for larger customers. However, volumetric recovery of significant fixed costs has a long history. Recently it has clearly supported energy efficiency. During much of the last century, increasing sales meant that volumetric recovery of fixed costs did not cause lost base revenues, but rather just the opposite. Unit sales generally grew substantially except during economic recessions, as shown above. This often meant that sufficient base revenue was provided through fixed volumetric rates. General rate cases could often be delayed until after a major increase in investment, for example, to deal with major generation plants coming on line. The situation has materially changed in the last decade. To deal with climate change concerns, high bills, and goals to save customers money in the long run, energy efficiency (EE) is now a deliberate and pervasive social policy that slows or eliminates unit sales growth through explicit energy efficiency policies, codes and standards, and other policy means.

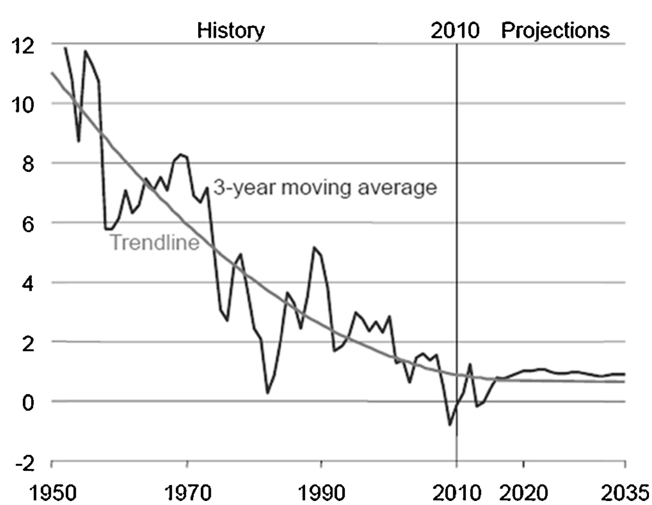

Figure 1: Historical Arc of Energy Efficiency: Historical and Projected Growth in Electric kWh Sales
Source: EIA, 2012 Annual Energy Outlook.

Stemming from this ''low or no growth policy,'' today there are three goals for decoupling as defined above. First, decoupling aligns the short-run profit incentives of the electric utility with the aggressive pursuit of energy efficiency programs or, more recently, the expansion of distributed generation (DG) under net energy metering.[5]

Well-designed decoupling resolves the throughput disincentive by allowing the utility to recover its fixed costs in spite of reduced sales. For example, in 1982, California introduced the first decoupling policy to facilitate their utilities conducting aggressive energy efficiency programs, which continue to the present.[6]

Second, decoupling wards off earnings erosion from other influences at work behind declining sales independently of the specific impacts of utility energy efficiency or DG programs. In the current ''utility of the future'' discussions, technology investments are discussed to strengthen and enhance the grid as a platform of distributed generation and storage, regardless of declining sales growth. Decoupling can help solve earnings attrition as volumetric sales margins are required to compensate a larger investment base. For example, Hawaii is an island economy with high electric prices driven in part by imported diesel fuel. Starting in 2008, Hawaii implemented binding renewable resource and energy efficiency portfolio standards, with goals of 40 percent renewables and 30 percent energy efficiency by 2030.[7] KWh sales had already peaked in 2004 and have fallen annually ever since. In 2010, Hawaii approved a comprehensive decoupling policy, along with a reduction in the allowed return on equity by 50 basis points. This decoupling policy included an annual revenue adjustment mechanism (RAM) because the grid still needed significant investment to support widespread growth in utility-scale and distributed renewables.[8]

Third, when facing erosion in revenues, the utility can respond by filing general rate cases. However, general rate cases are often slow, resource-intensive, and costly for both the utility and the commission and its staff. Stagnant or falling unit sales with ongoing investment needs can result in serial general rate cases as the utility attempts to catch up. This is not an effective environment for creating a long-term commitment to energy efficiency. For example, the Washington Utilities and Transportation Commission authorized implementation of decoupling mechanisms for both electric and gas operations of Puget Sound Energy in June 2013. The synopsis of the Order says:

> The Commission in this Order implements several innovative ratemaking mechanisms that, together, fulfill the Commission's policy goal of breaking the recent pattern of almost continuous rate cases for Puget Sound Energy, Inc. (PSE). . . . This pattern of one general rate case filing following quickly after the resolution of another is overtaxing the resources of all participants . . .[9]

II. Decoupling in Practice

Decoupling ratemaking approaches can be divided into three categories: (1) true-up decoupling of base revenues; (2) fixed-variable rates (FVR) on mandatory basis[10]; and (3) lost revenue adjustment mechanisms (LRAM) for energy efficiency program. Today, these three forms of decoupling all have found considerable acceptance in utility regulatory policy. Figures 2 and 3 show the number of states identified as using one or more of the policies for the electric utility industry and for the natural gas delivery industry. **Figure 4** shows the number of individual state-regulated gas and electric utilities identified as having these policies.

The three policies are very different in structure and mechanisms in spite of all achieving a similar decoupling (severing the tie) of base revenue from unit sales. Table 1 explains

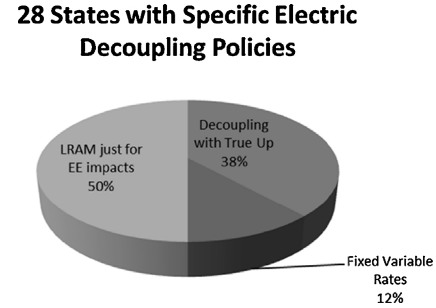

Figure 2: Decoupling Broadly in Electricity

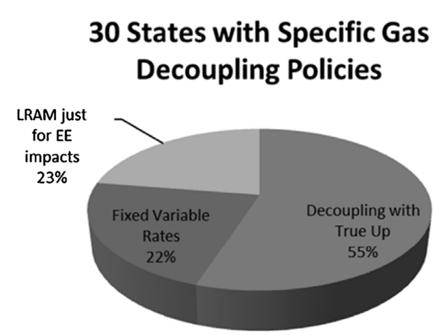

Figure 3: Decoupling Broadly in Gas Delivery

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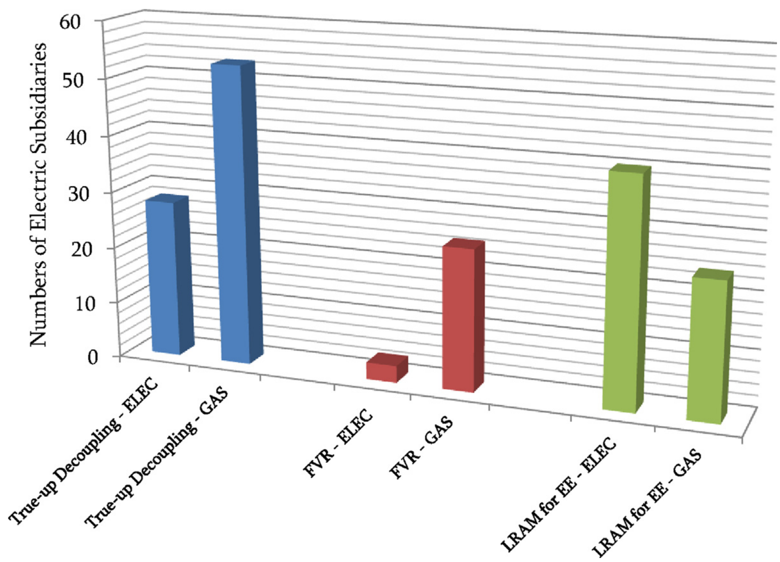

Figure 4: Count of State-Regulated Utility Subsidiaries with Decoupling
Sources: Lowry, M.N., Makos, M., Waschbusch, G., 2014 Alternative Regulation for Evolving Utility Challenges: An Updated Survey. Prepared by Pacific Economics Group Research LLC for the Edison Electric Institute, January 2013 with additional analysis by The Brattle Group.

two key differences among the decoupling categories.

The two differences address:

- First, how broad a set of causal ''factors of change'' are reversed?

- Second, are all customers in the class charged when unit sales go down, or are individuals responsible for their individual changes?

The right-hand column shows the first key difference in the policies. True-up decoupling recovers lost revenue from all customers in the rate class involved.[11] Bill savings from the EE measures installed by an individual customer are higher when strongly volumetric rates are in effect. Fixed-variable rates recover nearly all fixed costs through the customer's fixed charge. No lost revenues from the individual customer are generated. This has the issue of reducing bill savings from energy efficiency measures or DG. Fixed-variable rates reduce but do not eliminate bill savings, because the participating customer would still get all variable cost savings, including fuel and purchased power in vertically integrated utilities and generation service in restructured situations. However, the price signal for energy conservation would be substantially reduced compared to the case in which volumetric charges include recovery of fixed costs.

The second key difference is in the middle column of Figure 5. LRAM policies are unique in only addressing the smaller source of lost base revenue arising from actual utility EE program impacts. True-up decoupling and fixed-variable rates protect against wider causes of sales variability, although a few LRAM schemes include DG installations. This article is ultimately about whether there is an impact on the cost of capital from reducing revenue volatility. By design, LRAM policies do not

Table 1: Key Differences in Decoupling Policies.

	Decoupling Policy	What are ''Causes'' of kWh Sales and Revenue Change that Are Reversed?	How are Fixed Revenues Returned to Distribution Utility?
1	True-up decoupling of base revenues	All causes up or down[a]	kWh surcharge or rebate to all customers
2	Fixed variable rates with lower volumetric charges	All causes up or down[a]	No return necessary to extent individual does not pay fixed costs in volumetric charges
3	Lost base revenue adjustment mechanism	Exclusively reductions from EE and some DG programs	kWh surcharge or rebate to all customers

[a] Causes include EE program impacts, codes and standards, business cycles, price response, and weather. A few exclude weather impacts, under view that utilities should be subject to that.

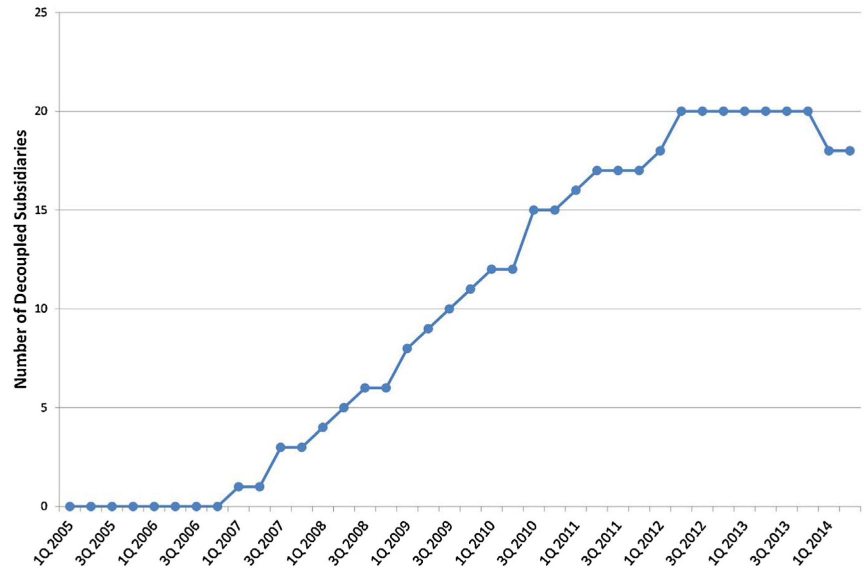

Figure 5: Growth in the Decoupled Subsidiaries of Electric Holding Companies in the Sample

address revenue variation from business cycles, price response, weather, and other sources. The narrow LRAM is excluded from our empirical tests because it is expected to have a smaller effect on revenue volatility. Our study focuses on the true-up and fixed variable rates categories of decoupling. In our sample of electric utility holding companies discussed below, there are 22 utilities with at least one of these two policies.

III. The Effect of Decoupling on Risk and Cost of Capital

Decoupling is designed to break the link between revenues for fixed costs and unit sales. Since several random factors affect unit sales, this will reduce the short-term volatility[12] of a regulated company's base revenues. Depending upon the details of the decoupling policy, true-up decoupling results in full recovery of forecast revenues albeit with a potential lag that may include the time value of money, i.e., interest. The true-up with a lag could result in rates to customers that are more volatile, holding all else fixed.[13] In some decoupling discussions, concern is expressed over the size of the price changes that might result from revenue decoupling with true-up. The study by Pamela Morgan collected data on the size of the $ per kWh true-up decoupling factor for a large sample of electric utilities with decoupling as well as natural gas utilities.[14] Her conclusion is that the price volatility created by the true-up decoupling is small compared to the volatility in the rate levels arising from fuel clauses, purchased power clauses, and other riders.

Fixed variable rates limit the volatility of revenue to that which is left in the volumetric charge. In financial theory, volatility is related to risk. Risks of specific kinds are related to both the cost of equity and the cost of debt. So some theorize that reduced revenue volatility will result in reduced risk and therefore in a reduction in the cost of capital for a utility with an approved decoupling policy. Decoupling may also reduce the cost of new debt, so debt rating agencies generally approve of the policy in assessing a utility's financial situation. Lower volatility of revenue can also (perhaps only marginally) reduce a company's likelihood of bankruptcy and credit default. However, to demonstrate the connection of decoupling to the cost of equity and debt requires care and attention to detail. In the end, financial theory alone cannot prove it. Rather we must resort to an empirical study to see if financial markets for utility stocks do or do not show such a connection.

First, the cost of capital is defined as the expected return on comparable risk investments. Cost-of-capital analysts rely upon a study of market prices and market returns for their estimates. Base revenue is an accounting variable, not a market variable. Net income is base revenue *minus* fixed costs (assuming variable costs and riders are trued up independently). Decoupling each year does not address changes in costs, so net income is more variable than revenue. Even net

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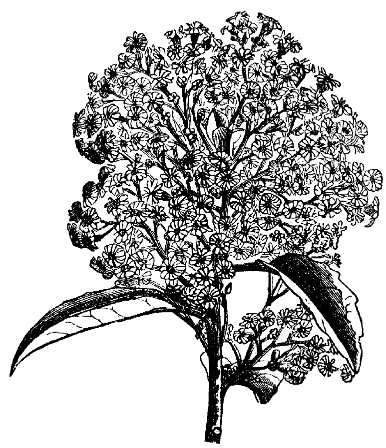
income, an accounting variable, is not precisely related to market returns. So, the linkage is complicated and not direct. Simply introducing decoupling and reducing the volatility of revenues does not imply there will be a similar reduction in the volatility of market returns.

Second, the cost of capital is a function of risk, but it is important to distinguish the type of risk that affects the cost of capital from risk that does not. Financial theory specifies that the overall cost of capital of a publicly traded company is a function of the business risk of the assets owned by the company. When assets such as utilities are partly financed with debt, the business risk of the assets is divided between the equity investors and the debt holders. Equity investors as the last or residual claimants on the company's cash flow bear the greatest risk. Therefore, equity investors must expect a higher return to bear more risk. Financial risk is the first kind of risk and comes from the degree of debt financing. Our methodology for estimating the COC, which uses the After-Tax Weighted Average Cost of Capital (ATWACC), is explained below. The purpose of the ATWACC is to address differences in financial risk among the sample companies. According to the Capital Asset Pricing Model, some of an asset's risk can be diversified away by including it in a portfolio.[15] Only non-diversifiable risk (also known as systematic, market, or business risk) affects the cost of capital according to financial theory. One reason that decoupling may not affect the cost of capital is that decoupling may primarily affect diversifiable risk.

Third, decoupling is never instituted in a vacuum, but rather is typically a reaction to economic and regulatory



pressures, such as those discussed above. For the cost of equity capital to fall, investors must perceive that decoupling lowers systematic risk to a greater degree than other changes increase systematic risk. As long as volumetric rates recover significant base revenues, the regulated utility will have a throughput incentive which is in direct conflict with the regulatory policy goals with respect to energy efficiency programs, distributed generation, and the long-run desire to see growth in electric consumption decrease. Moreover, technological change and the policy discussions about the ''utility of the future'' increase the possibilities for other parties to take business away from the regulated companies. Thus, declining sales are related to a variety of factors that increase the systematic risk of regulated companies. It is certainly possible that decoupling simply offsets some of the increased risk from the other factors rather than actually leading to a net decrease in risk. We conclude that an empirical test of the effect of decoupling on the cost of capital is necessary to determine if adoption of decoupling by electric and gas utilities has actually reduced their cost of capital.

IV. An Empirical test of Decoupling's Impact on the Cost of Capital

At a high level, the test we employ is to compare the cost of capital of as large a sample of electric utilities as possible over a period of time in which the sample companies' decoupling status changed. In an attempt to isolate the effect of decoupling, we identified and controlled for other factors that are expected to influence capital markets.

The period from 2005 to 2014 is a good study period since the true-up decoupling and FVR decoupling proliferated extensively. Figure 5 shows the growing total of decoupled subsidiaries in our sample over the study period. The rarity of decoupling prior to 2007 is by

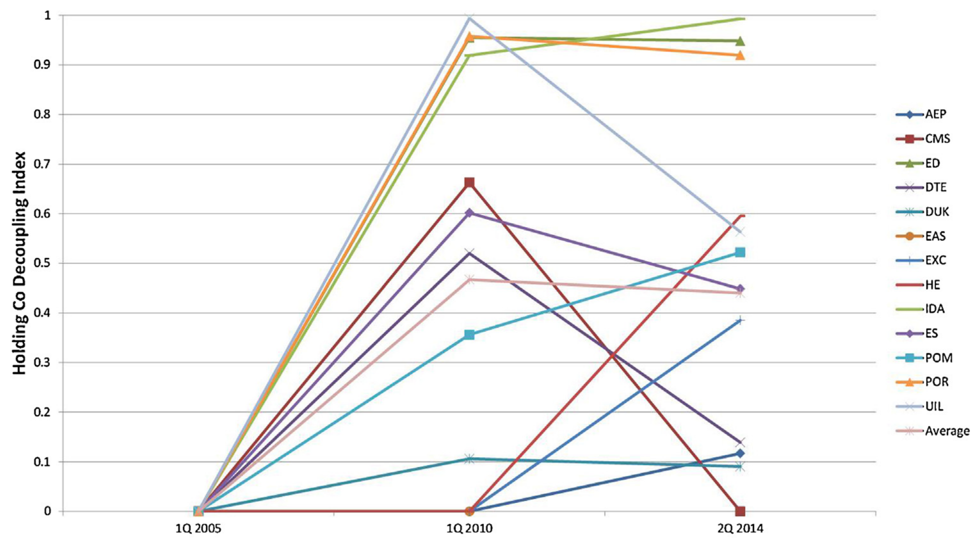


Figure 6: Changing Levels of Decoupling Index of Electric Holding Companies

design; we choose companies that instituted decoupling stating in 2007. There is rapid growth in decoupling from 2007 to 2011 and then a slowdown from 2012 onwards. These three periods provide a good set of data for an examination of the impacts of decoupling on COC since, by including data when companies both are subject to and are not subject to decoupling policies, our analysis can adjust for company-specific differences in the COC.

In carrying out the study, we face the fact that electric holding companies, not their regulated subsidiaries, have stock that is traded on exchanges and so has a market price that is observable. Extensive financial data is available on all major holding companies.[16] This is used to estimate the cost of equity, the cost of debt, and thus weighted average cost of capital of the holding companies. In contrast, state regulated subsidiaries, not their holding companies, operate under state regulatory agencies that set their ratemaking policies and can approve, change, and reverse revenue decoupling policies, and such data is not available at the subsidiary level.

We create a measure of the degree of decoupling in a holding company that can be directly compared to its COC in each quarter. We then assign an Indicator Variable (1 or 0) to each subsidiary of the holding company (HC) based on whether or not it is under a decoupling policy in the quarter, and then we compute a Decoupling Index as the weighted average of decoupled subsidiaries using total asset values[17] of subsidiaries as weights.

$$\text{HC Decoupling Index } (c, t) = \frac{\text{Sum over all decoupled Subs of Total Assets } (s, t)}{\text{Total Assets of the HC } (c, t)}$$

where c = holding company; s = subsidiary of HC; t = quarterly observation.

Figure 6 shows that the decoupling index on average grows then levels off, There are individual holding companies for which the Decoupling Index declines during the analysis period. For example, Until (UIL) has one large subsidiary that is decoupled in the middle of the period but acquisitions lead to a growth in Unitil's total assets that reduces the decoupling index.

The econometric model we use is a linear regression[18] that examines the impact of the Decoupling Index on holding company COC adjusting for variations in cost of capital over time and across holding companies. We estimate the

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Statistics	14 Electric Holding Cos. 1Q 2005 to 2Q 2014
Coefficient of Decoupling Index (Basis Points)	-26
Coefficient of Decoupling Index Vbl (Number)	-0.0026
One tailed P-value test (significant if < .05)	0.173
Two tailed P-value test (significant if < .05)	0.346
Observations	361
R-Squared	0.78

Figure 7: Statistical Results of the Test

model using ordinary least squares (OLS) with clustered standard errors. In statistical terms, the hypothesis we are testing is that decoupling reduces the cost of capital, and the corresponding Null Hypothesis is that there is no reduction in the cost of capital from decoupling.

Figure 7 summarizes the results of our statistical analysis. The regression finds a negative coefficient of the Decoupling Index (i.e. a decrease in COC associated with decoupling) but the result is too small to be statistically significant. The result we observe could very well be entirely due to sampling noise with the true coefficient being zero (or even positive). In other words, we developed an extensive data set of decoupled companies in the electric industry, tested and found no statistically significant effect of decoupling on the cost of capital.

V. The Negative Test Result and the Value of Decoupling

During the period studied, we know utilities have frequently come forward and applied for decoupling. If decoupling does not reduce their cost of capital by increasing their likelihood of revenue recovery, why are regulated companies seeking decoupling? Is there value in decoupling beyond this COC-lowering goal? Our answer is a strong ''Yes, decoupling has value.'' A negative test result for decoupling's impact on cost of capital does not imply that decoupling has no value.

As originally intended with its adoption in California, decoupling removes the throughput disincentive for utilities to pursue energy efficiency programs. As energy efficiency programs have expanded since 2007, that incentive alignment benefit has been important. In the period after the Great Recession of 2008, decoupling also assists utilities with falling sales to maintain financial stability.

Decoupling was not implemented to reduce short-term revenue volatility, but it was implemented to address possible revenue deficiencies. In the example of Washington State cited above, the Commission clearly wanted to find a way to end the need for serial rate cases, which in turn was to solve the revenue deficiency issue. Puget Sound Energy accepted a series of conditions in return for implementing decoupling including increases in the energy efficiency savings goal, so the adoption of decoupling provided benefits to all parties in the case.

Decoupling is generally proposed in an environment of other factors such an increase in demand-side management programs, a slowdown or decline in sales growth, and increased use of distributed generation. A sensible interpretation is that the capital markets during the study period saw a variety of sources of increased risk in the regulated electricity business coincident with any potential decrease in risk due to decoupling.

Finally, our analysis only addresses the specific issue of whether adoption of decoupling is associated with a statistically significant reduction in the estimated cost of capital. However, there are a wide variety of alternative ratemaking mechanisms already in place that affect the companies in our sample. Many of these policies actually have larger effects on revenue volatility than decoupling, but regulators do not generally try to estimate the effect of these policies on the cost of capital on an individual basis. We believe that it is sensible

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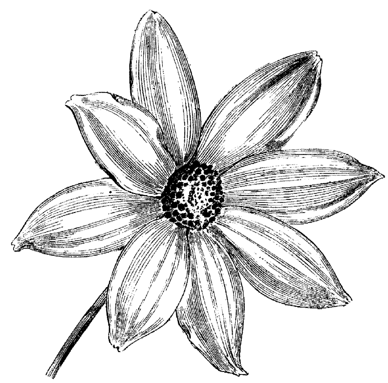
to estimate the cost of capital for the utility as a whole. Estimating the cost of capital for a utility as a whole is already a relatively imprecise exercise. Attempting to do so for individual regulatory policies is not likely to be a productive. The impact of decoupling should be included as part of the cost of capital determination process, not appended after the fact.

VI. Conclusion

We recognize that decoupling is designed to assist electric utilities to collect more base revenues when unit sales are declining, and in doing so may reduce the volatility of revenues, which can reduce some risk to a company. However, based on the data from the 2005 to 2014 period, the statistical evidence does not support the hypothesis of that the adoption of decoupling results in a statistically significant reduction in the cost of capital. This is consistent with the view that decoupling is instituted as a policy response to support other important regulatory goals that may on a net basis increase the overall revenue risk to utilities or that decoupling primarily reduces revenue volatility stemming from diversifiable risk.

Effective energy efficiency programs, customer distributed generation, changing tastes of consumers, and the requirement to integrate renewable energy sources that can raise prices generally all have the tendency to result in decreasing sales growth or an absolute reduction in sales. In conjunction with volumetric rates, declining sales may not allow for full recovery of the utility's fixed costs. This increasing risk can be either



systematic (part of the cost of capital) or diversifiable (not part of the cost of capital) in financial terms, but it is probably some combination of both. Decoupling may reduce the random weather or incorrectly forecast business cycle fluctuations in the short term, but its real purpose is to address the secular downward trend in sales that accompanies the move to greater energy efficiency. The adoption of decoupling then neutralizes the risk and is an important factor in maintaining the utility's financial strength and removing the throughput incentive. This in turn is important as electric utilities seek to move ahead with incorporating advanced technology in the two-way grid and acting as change agents in society's move to meet climate change goals.

Based on the past 10 years of study period in the electric industry, we found no statistical significant empirical evidence that decoupling reduces the cost of capital. For regulated utilities providing the capital-intensive Smart Grid as part of the ''Utility of the Future'' policies, decoupling is likely to be both effective and necessary. The contention that decoupling reduces the cost of capital may be hindering progress in developing the policy.■

Endnotes:

1. Base revenues are the subset of all revenues of a regulated electric utility that cover the fixed costs that do not vary with utility output. These fixed costs include the recovery ''of and on'' capital investments, O&M, A&G, and income taxes. Decoupled base revenues are those collected in volumetric rates, not in fixed charges. Non-base revenues cover variable costs, such as fuel and purchased power. A drop in these non-base revenues is accompanied by a drop in their costs, frequently one for one, so there is no material impact on net income and the bottom line.

2. KW demand charges are a different ratemaking approach used to collect based, fixed costs. They sometimes come into decoupling when kW are used as the vehicle to return or collect revenues in true-up decoupling for large customers.

3. Demand growth has been declining since 1950, from an average annual electricity sales growth rate

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of 9.86 percent during the 1950s to an average annual growth rate of 0.85 percent in the first decade of the 21st century. See Faruqui, A., Shultz, E., 2012. Demand growth and the new normal. Public Util. Fortn. (December).

4. It is important to recall that the policy of energy efficiency rests on the fundamental assumption that with appropriate investments on the demand side, energy services (space cooling and heating, lighting, etc.) can continue at the same or increased levels while the input of electric energy (kWh) declines. Consumers are not ''sacrificing'' their welfare in this process. Nor is the electric grid becoming less important.

5. There is currently an active discussion on the efficacy of the net energy metering and distributed generation. See, for example, Felder, F., Athawale, R., 2014. The life and death of the utility death spiral. Electr. J. (July), as one example of the public debate on the topic. This article takes no position on net energy metering and the expansion of distributed generation. We focus on the role that decoupling plays in dealing with the issue of lost base revenue.

6. For the history of decoupling in California, see Jurewitz, J.L., 2007, April 16. Decoupling and Energy Efficiency Incentives: The California Experience. EEI 2007 Spring Legal Conference, Charleston, South Carolina.

7. See *Relating To Renewable Standards*, HB 623, 68th Legislature (2015) and *Renewable Energy; Energy Efficiency*, HB1464, 25th Legislature (2009). The Hawaii Clean Energy Initiative has reset the goals to achieve 100% clean energy by 2045. More information available at: http://energy.hawaii.gov/renewable-energy.

8. The RAM allows electric rates to increase between rate cases to support additional capital investment. There is an ongoing reexamination of decoupling in Hawaii, and some changes in the decoupling mechanism have been made. This is part of the larger process to achieve the state's aggressive goals and create a utility of the future. See Hawaiian Public Utilities Commission, Docket No. 2013-0141.

9. Washington Utilities and Transportation Commission, Order 7, in Dockets UE-121697, et al., *For an Order Authorizing PSE to Implement Electric and Natural Gas Decoupling Mechanisms and To Record Accounting Entries Associated With the Mechanisms*, June 25, 2013.

10. Voluntary rates that include kW demand charges for fixed costs and lower volumetric rates are more widespread. There are 19 utilities in 14 states that offer that option to residential customers, but acceptance rates are generally around 10–15 percent.

11. Most true-up decoupling, and LRAM mechanisms separately address base revenue for individual rate or customer classes. A few true-up for customers in aggregate. See Morgan, P., 2012, December. A Decade of Decoupling for US Energy Utilities: Rate Impacts, Designs, and Observations. Graceful Systems.

12. In finance, volatility is the standard measure for the variation of a financial quantity over time, e.g., price of Google stock, or in our case, the amount of base revenues ultimately collected over a year. Measured volatility is derived from time series of past values. The symbol σ is used for volatility, and corresponds to standard deviation in statistics, not the variance, which is the square, σ^2.

13. Note that factors like weather increase the variability of customer bills and decoupling takes away that kind of customer bill volatility. So it is not accurate to say that decoupling only shifts risk from the utility to the customers. True-up decoupling is symmetric and reduces variability for both customers and the utility.

14. Pamela Morgan, Op. Cit., p. 5.

15. The risks that can be diversified are also called unsystematic risk, unique risk, or diversifiable risk. For general reference, see Brealey, Myers, Allen, 2008. Principles of Corporate Finance, ninth ed. McGraw Hill Irwin, or other editions.

16. We use data from SNL, Cap IQ, and Bloomberg.

17. We use Total Assets as our sizing variable for the holding company and its subsidiaries to determine the relative sizes of companies that enter into the Decoupling Index calculation. Total Assets = the final amount of all gross investments, cash and equivalents, receivables, and other assets as they are presented on the balance sheet of a company.Many electric holding companies are not ''pure plays'', which means they do not invest solely in the regulated electric business but have subsidiaries that are in other lines of business. Some electric holding companies in our sample have regulated gas delivery businesses, unregulated energy businesses, and some businesses unrelated to the energy industry. For example, the Hawaiian Electric Companies holding company has about half its total assets in the banking business. This is a fact that enters into the data, but it does not invalidate the model in any way.

18. Econometrics model specification: COC (c, t) = +B1 + [B2 * HC Decoupling Index (c, t)] + [B3 * (Qtr t)] + B4 * (Holding Company Vbl c, t) + Error (c, t).Indexes: c = holding company; t = quarter.

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