Explaining Merger and Acquisition Premiums in the U.S. Electric and Natural Gas Sectors in a Period of Deregulation from 1990-2012

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Abstract:

This study aims to explain the variance in premiums, or the price paid for a target firm's equity above its market value, in mergers and acquisitions with natural gas and electric target firms from 1990-2012, a period characterized by industry deregulation. Using a sample of 130 transactions, we test factors that have been shown to be related to premiums in general merger and acquisition studies as well as theorize and test new explanations for premium sizes. We find that premiums offered in our sample of natural gas and electric merger and acquisition transactions are smaller for stock transactions, are positively related to the ratio of acquirer to target firm size, and are negatively related to the percentage of target firm revenue derived from electric operations.

JEL classification:G34, L94, L95

Keywords: Premium; Natural Gas; Electric; Mergers; Acquisitions; Deregulation

Introduction:

The level of merger and acquisition activity in the U.S. electric and natural gas sectors began to increase dramatically in the early 1990's coinciding with a trend of deregulation across both sectors (Becker 2008). As regulations have changed, new strategies for competing have led firmsto engage in mergers and acquisitions. In this study we examine the determinants of premium size, or the price offered above market value of equity for company ownership, for transactions with electric and natural gas target companies in order to improve our understanding of this market.

Businesses involved in the generation, transmission and distribution of electricity and in the processing, transmission and distribution of natural gas have seen industry dynamics change greatly over the past twenty years due to regulatory changes aimed at lowering electric and natural gas costs for consumers. Before deregulation, the U.S. electricity industry was generally structuredas vertically integrated utilitiesowning generation assets, which produce electricity, transmission assets, which transport electricity over long distances, and distribution assets, which transport electricity over shorter distances to end users. Consumers paid a regulated rate for electricity, which allowed the electric utility to recoup their costs and earn a "fair" return on capital.

The natural gas industry functioned similarly. Although a single firm did not typically own the entire supply chain from the exploration & production assets to the distribution assets, competitive natural gas markets did not exist becauseall markets along the supply chain were rate regulated. Exploration& production companies produced and typically processed natural gas, then sold it to transmission pipelines at regulated rates, which would

transport the gas over long distances and sell it to distribution companies at regulated rates. Finally, the distribution company would deliver the gas to end usersalso at regulated rates ("A Primer", 2002).

Deregulation beginning in the 1980's has had a large impact onboth sectors. The complex process of electric deregulation began in 1978 with the passing of the Public Utilities Regulatory Policies Act (PURPA) that allowed forthe entrance of independent operators of electric generation facilities. Since then, many states have allowed independent generation operators to produce and sell electricity to distribution companies at market prices, while the prices that transmission and distribution operations charge for transportation remain regulated ("A Primer", 2002).

Deregulation of the natural gas sector can also be said to have begun in 1978, with the passage of the Natural Gas Policy Act, but it has progressed much more fluidly and broadly across the nation as compared to electric deregulation. The Natural Gas Policy Act of 1978 deregulated the price at which exploration & production operations could charge for natural gas, and subsequent regulatory changes in the late 80's and early 90's required natural gas pipelines to unbundle their natural gas sales from their transportation services and provide open pipeline access for any seller of natural gas. This allows consumers to buy gas from production or marketing companies at market pricesusing the pipelines solely for transportation, the price of which remains regulated ("A Primer", 2002).

The development of deregulated markets in the electric and natural gas sectorshas caused companies to reevaluate their competitive positions, and as a result, we have seen a wave of mergers and acquisitions involving companies that hold electric generation,

transmission, and distribution assets and natural gas processing, transmission and distribution assets. In the electric and natural gas transmission and distribution businesses alone, mergers and acquisitions played a large role in reducing the number of publicly traded firms in the business from 166 in 1990 to only 99 by 2004 (Becher, Mulherin, and Walking, 2008). One reason that has been cited by several executives for engaging in mergers and acquisitions is the importance of achieving economies of scale in deregulated markets, which was not as important for firms previously only engaged in regulated markets(Becker-Blease, Goldberg, Kaen, 2008).

A key characteristic of these mergers and acquisitions, as in transactions for corporate control in other industries, is that a premium over the market value of the target firm's equity is paid by the acquiring firm. In our sample of 130 transactions, the average premium is 33% of the target firm's market value with a standard deviation of 20.5%.We examine these transactions with the focus of finding explanations for why acquiring firms have paid various sized premiums.

Premiums are found in merger and acquisition transactions because acquirers are willing to pay higher prices than market prices for majority equity ownership, and they must offer to do so because current shareholders are choosing not to sell at the market price. Slusky and Caves (1991) derives the following theoretical equation for a transaction's premium:

Equation 1:

*PREMIUM= (BRES[Xi]/MV)*B(Zi)*

BRES is the reservation price of the successful acquirer, or the maximum that the successful acquirer would be willing to pay in order to gain control of the target firm, net of the buyer's transactions costs. *BRES* is a function of *Xi's*, which are factors that predict increases in cash flow that will occur as a result of combining the two firms orchanging company management and any factors that may affect the acquirer's willingness to pay for these increases in cash flow. *B(Zi)* is a bargaining function that determines where the price will end up between the company's market value and the *BRES*. Zi'sare determinants of the bargaining function such as the presence of rival bidders (Slusky and Caves, 1991). *B(Zi)*is between 0 and 1, to ensure thatbargaining considerations do not make the acquirer pay more than he is willing to pay, *BRES.BRES[Xi]*B(Zi)* equals the transaction value for the equity, and *MV* is the market value of equity.

Our study examines various factors that may influence premiums offeredin transactions for electric generation, transmission, and distribution and natural gas processing, transmission, and distribution companiesincluding factors that may affect the acquirer's reservation price, *Xi*'s, and factors that may affect the bargaining function, *Zi*'s, in order to gain a better understanding of the determinants of premiums during deregulation. Factors are included that have been found to affect premiums in other industries, but not specifically in the electric and natural gas sectors, andothers, whichto our knowledge have not been empirically tested before in studies on premiums, several of which are specific to the electric and natural gas sectors.

We find that stock transactions occur at lower premiums as compared to cash transactions and theratio of the acquirer firm size to the target firm size, measured in sales,is positively related to premium. Also, when examining sector specific factors, we find that the

percentage of target firm revenue derived from electric operations is negatively related to premium.

Literature Review:

Several studies havebeen published which seek to explain determinants of the size of premiums paid in M&A transactions. These studies use samples of transactions that span various industries or focus on a particular industry, and they test independent variables that may be related to premium through the reservation price of the acquirer or the bargaining function for the transaction.

Factors Affecting the Acquirer's Reservation Price

Madura, Ngo, and Viale (2012) studied determinants of premiums focusing on both industry and macroeconomic factors and found that premiums were higher in transactions that occurred in high growth markets likely due to the increased revenue synergy opportunities available inthis environment.

Palia (1993) analyzed mergers and acquisitions in the commercial banking sector and found that the ratio of acquirer to target firm sizeis positively related to premiums as acquirers are more likely to be financially capable of creating positive change at an entity that is smaller in size and would therefore have a higher reservation price relative to the target firm's market value.

Factors Affecting the Bargaining Function

Raad (2012) found that firms with higher leverage levels (debt/capital) command larger premiums, supporting Stultz's (1988) theory that managers of target firms resisting an

acquisition may issue debt to buy back stock in order to gain increased influence over a smaller shareholder base, which is likely to require a higher premium to sell as theychose not to sell their stock to management in the buyback.

Kaufman (1988) found that larger premiums are paid in hostile acquisitions when the acquirer's management makes an offerwithout the target firmmanagement's consent. In these situations, the acquirer is making an offer to shareholders who at the same time may be being urged by their management to not accept.

Slusky and Caves (1991) found that the presence of rival bidders is positively related to premium as it gives the target firm an improved the bargaining position, and Madura, Ngo, Viale (2012) found that higher premiums are paid in industries that are more consolidated suggesting that acquirers will pay more when there is a lower supply of target firms.

Payment Method

Different payment methods have also been shown to affect premiums, suggesting that not all forms of payment are valued equally by the target firm. Huang and Walking (1987) found that transactions with stock used as the payment method are negatively associated with premiums, as opposed to cash transactions. They analyzed the returns on target firms' stock following acquisition announcements and found that target firms that receive stock offers return 12% less than those that receive cash offers as a result of higher premiums demanded by target shareholders in cash transactions. They conclude that this is due totransaction taxes that can be deferred for target shareholders in stock transactions but not in cash transactions.

Electric and Natural Gas M&A Premiums

We are given indirect insight into determinants of premiums in the electric sector froma study by Becker-Blease, Goldberg and Kaen (2008)focusing on whether M&A in the electric sector was value creating for target shareholders. They analyzed various factors that affect stock returns of electric target companies from transaction announcement date until withdrawal or completion date and find lower returns for companies with higher levels of debt/capital. This result may be due to lower premiumsoffered forelectric firms in financial distress, which would be in contrast to Raad's (2012) finding that higher leverage is related to larger premiums in the overall M&A market.

Our study takes into account the independent variables described in this literature review, (not including the variables that require comparing various industries) including payment method,firm size ratio, leverage level, whether the transaction is hostile, and the number of rival bidders, which all appear to have an influence on premiums through effects on the acquirer's reservation price, the bargaining function, or how the target firm shareholders value the payment.Our study includes additional variables, which have not yet been tested, and which we believe may influence premiums in electric and natural gas transactions. These variables are either specific to the electric or natural gas sectors or are general and could be tested on a set of transactions that span other industries.

Untested Explanatory Variables:

General Variables (Not specific to natural gas or electric sectors)

Private Equity Buyer

A dummy variable for whether the acquirer is a private equity firm is tested because we believe that private equity acquirers will likely not be able to generate as much synergies as a strategic acquirer which would be combining two operations that may overlap or may be complementary. Therefore, private equity firms should have lower reservation prices than strategic acquirers and offer lower premiums.

Choice of Stock or Cash

Although past studies have showed how all cash, all stock, or a combination of cash and stock payments have affected premiums, we include a category for whether the acquiring company offered the target company a choice of stock or cash as opposed to offering a predetermined mix of cash and stock, all cash, or all stock. We expect premiums to be smallest for offers that provide the target shareholders with a choice of what type of payment to receive, cash or stock, because an option should only make target shareholders value the payment equal to or greater than an agreed upon cash or stock payment.

Electric and Natural Gas Specific Variables:

Percentage of Target Revenue Regulated

As deregulation has progressed, many firms in the electric and natural gas sectors no longer have all of their revenue derived from markets with regulated prices. The split in the target's revenues between revenue from rate regulated operations and non-rate regulated operations may be important in determining premium because savings that are achieved through reducing costs at regulated operations are passed through to consumers,as prices are lowered when costs are reduced,whereas savings achieved through reducing costs of non-rate regulated operations are maintained as profits. This means that an acquirer can likely expect

larger increases in cash flows from a combination with a target that has more of its revenue coming from non-rate regulated operations as compared to regulated operations, which would mean that acquirers should have lower reservation prices and offer lower premiums for target firms with higher portions of their revenue coming from rate regulated operations.

Gas and Electric Revenue Components

Two explanatory variables, one for the percentage of target revenue comprised of electric revenues (from power generation, transmission, distribution, sales) and one for percentage of target revenue comprised of natural gas revenues (exploration and production, gathering, processing, transmission, distribution, marketing) are tested in order to assess whether premiums are affected by the percentage of the target's revenue being derived from electric or natural gas operations as opposed to the other types of operations that many of these firms own including petroleum businesses and land and sea transportation businesses. Premiums may be higher or lower in transactions with higher proportions of target firm revenue coming from electric operations and gas operations depending on whetherregulatory changes are causingincreased merger and acquisition activity primarily through an increase in demand or in supplyfor electric and natural gas assets. It is clear that transactions have risen since deregulation began (Becker-Blease, Goldberg, Kaen, 2008), but if deregulation has led to more transactions because of an improved industry outlook and an increase in eager acquirers than we would expect premiums to be higher for firms with more natural gas or electric revenue. The positive effect on premium would be through higher reservation prices for acquirers and improved bargaining positions for the target companies.On the other hand, if deregulation has led to more transactions by causing a negative outlook for the sectors and creating anxious sellers, then we would expect premiums to be lower for target

firms with more natural gas or electric revenue because of lower reservation prices and better bargaining positions for acquirers.

Diversifying into Gas and Diversifying into Electric

A dummy variable will be tested for whether an acquiring company has less than 50% of revenues coming from electric operations, while the target has greater than 50% of revenue coming from electric, and an analogous variable will be used for gas. We expect that higher premiums will be paid by firms that are diversifying because diversifying may be value enhancing for electric and natural gas firms that are now exposed to competitive markets and have a high interest in reducing their business risk. If diversifying is being used to reduce risk, then we would expect acquirers who are diversifying to have higher reservation prices and offer higher premiums due to the additional benefit accruing to them as a result of a diversifying transaction.

Data:

Merger and acquisition transactions, including withdrawn agreements, from January 1990-October 2012 in the natural gas and electric sectors which had a publicly traded U.S. based target company were pulled from the Thomson Reuters SDC Database. Only public companies are used becauseavailable stock price data are necessary to compute premiums.Offersfor target companieswith less than 50% of their operating revenues coming from electric power generation, transmission, or distribution or from natural gas processing, transmission and distribution were eliminated from the sample as they are not representative of the target companies our study is intended to examine. This left 130 transactions to be studied.

The SDC database provided the date of the transaction, the premium offered, the number of bidders, whether the bid was hostile, whether the acquirer was a private equity firm, the form of payment used, the debt to capital ratio of the target and the acquirer to target sales ratio for the last twelve months prior to the transaction announcement. Data on whether the transaction was withdrawn was also collected from the SDC database to ensure that premiums offered are not dependent on whether the transaction was completed.

The premium offered was based on the market value of the target company's equity four weeks prior to the announcement date in order to avoid picking up price movements that might occur as a result of information leaks prior to the announcement. This is common practice in the merger and acquisition academic literature (Slusky and Caves, 1991). The premium is calculated as *(Transaction Value for Equity/Market Value of Equity-1).*

Data on the percentages of revenues that came from gas and electric operations for the target and acquirer companies in the year before the transaction were retrieved from 10-K filings through the EDGAR database. The percentage of the target firm's revenue that was rate regulated in the year before the transaction was also collected from these 10-K's.

This data allowed us to construct 14 independent variables: "Bidders" is the number of firms, including the acquirer, which offered bids for the target firm. "Hostile" is a dummy variable that equals 1 if the offer was made without target management consent. "PrivEquity" is a dummy variable that equals 1 if the acquirer is a private equity firm. "Withdrawn" is a dummy variable that equals 1 if the transaction was not completed. "Stock" is a dummy variable that equals 1 if the acquirer offered an all stock payment. "Choice" is a dummy variable that equals 1 if the acquirer offered target shareholders a choice of receiving cash or

stock. "Mixed" is a dummy variable that equals 1 if the acquirer offered target shareholders a payment with part stock and part cash. "Leverage" is the debt/capital ratio of the target firm in the last reporting period before the transaction announcement. "SalesRatio" is the ratio of acquirer sales to target sales for the twelve months leading up to the transaction announcement. "RegRev" is the percentage of the target's revenue which is derived from rate regulated operations in the year prior to the transaction. "GasRev" and "ElecRev" are the percentages of the target's revenue which are derived from gas operations and electric operations, respectively, in the year before the transaction was announced. "DivGas" and "DivElec" are dummy variables which equal 1 if the firms are diversifying into the gas or electric businesses, respectively.

As a result of a number of 10-K's not explicitly breaking down revenue as we required for our variable construction and the SDC database not containing acquirer to target sales ratios and target debt levels for every transaction, there are transactions for which we have missing data. Because our totalsample of 130 transactions is inherently small for a study on mergers and acquisitions due to our concentration on electric and natural gas businesses, we organize our sample of transactions into hierarchicalsubsamples, where if Subsample A>Subsample B, then all transactions in Subsample B are contained in Subsample A. We use subsamples in order to be able to test the explanatory variables for which we do not have data for all 130 transactions. Figure 1 shows the sample statistics for the full sample of 130 transactions and for Subsamples 2-4 as well as the expected effects of the explanatory variables on Premium.

We expect the smaller subsamples to be representative of the full set of transactions because there is little change in sample statistics across the subsamples. The only notable

difference is that Subsample 1 is the only subsample which includes transactions with private equity acquirers because the inclusion of the SalesRatio variable in the other models necessitates that the acquirer in the transaction have sales, which private equity firms do not. This results in higher percentages of stock transactions in Subsamples 2-4 because private equity firms primarily use cash to pay for acquisitions. Still, there is no reason to expect that the relationship between premium and the otherexplanatory variables should be affected by the lack of private equity firms in Subsamples 2-4.

Figure 1: Sample Statistics

		Subsample 1 (Total Sample)		**Subsample 2**		**Subsample 3**		**Subsample 4**	
	Number of Transactions	130		95		81		70	
	Expected Effect on Premium	**Mean**	Std Dev	**Mean**	Std Dev	**Mean**	Std Dev	**Mean**	Std Dev
Premium		**32.70**	(20.50)	**31.22**	(18.98)	**30.55**	(17.53)	**31.04**	(18.28)
Bidders	+	**1.10**	(.30)	**1.08**	(.28)	**1.10**	(.30)	**1.09**	(.28)
Hostile (D)	+	**0.07**	(.26)	**0.08**	(.28)	**0.09**	(.28)	**0.09**	(.28)
PrivEquity (D)	-	**0.11**	(.31)	**0.00**	(.0)	**0.00**	(.0)	**0.00**	(.0)
Withdrawn (D)	None	**0.24**	(.43)	**0.22**	(.42)	**0.20**	(.40)	**0.21**	(.41)
Stock (D)	-	**0.38**	(.49)	**0.48**	(.50)	**0.43**	(.50)	**0.47**	(.51)
Choice (D)	-	**0.15**	(.35)	**0.19**	(.39)	**0.19**	(.39)	**0.20**	(.40)
Mixed (D)	-	**0.07**	(.25)	**0.08**	(.28)	**0.10**	(.30)	**0.09**	(.28)
Leverage	+ or -			**0.44**	(.11)	**0.44**	(.11)	**0.43**	(.11)
SalesRatio	+			**6.66**	(15.09)	**6.38**	(14.14)	**6.94**	(15.05)
RegRev	-					**0.77**	(.29)	**0.80**	(.26)
GasRev	+ or -					**0.44**	(.42)	**0.44**	(.43)
ElecRev	+ or -					**0.51**	(.43)	**0.52**	(.44)
DivGas (D)	+							**0.16**	(.37)
DivElec (D)	+							**0.06**	(.23)
(D) Denotes a Dummy Variable									

Methods and Results:

In order to test the potential determinants of premium size, multiple linear regression models are used with the dependent variable, premium size,being regressed first on the set of general factors, which are not unique to electric and natural gas firms, and then on a combination of the general factors and the natural gas and electric specific factors. In total there are four models, two with only general factors and two with both general factors and natural gas and electric specific factors.In terms of independent variables, Model 1 is the smallest an Model 4 is the largest, and each model is run on the subsample with the maximum number of transactions that contain the required data for that model. Fixed effect time variables are used for years in which more than two transactions occurred are used for all models to control for macroeconomic shocks.

The first model is run on Subsample 1, or the full sample containing all 130 transactions, and includes the general variables: number of bidders (Bidders), a dummy for whether or not the deal was hostile (Hostile), a dummy for whether the acquirer was a private equity firm (PrivEquity), a dummy for whether the transaction was withdrawn (Withdrawn), and dummy variables for whether the payment method was stock (Stock), mixed cash and stock (Mixed), the target shareholders' option to receive cash or stock (Choice), or all cash.

Model 1:

$$Premium = C + B0 * Bidders + D1 * Hostile + D2 * PrivEquity + D3 * Withdrawn + D4 * Stock + D5 * Mixed + D6 * Choice + Fixed\ Effect\ Time\ Dummies$$

The second model also contains all variables in model one and two additional general variables, the debtto capital level of the target company(Leverage) and the acquirer to target sales ratio (SalesRatio). This model is run on Subsample 2 containing 95 observations.

Model 2:

$$Premium = C + B0 * Bidders + D1 * Hostile + D2 * PrivEquity + D3 * Withdrawn + D4 * Stock + D5 * Mixed + D6 * Choice + D7 * Leverage + D8 * SalesRatio + Fixed\ Effect\ Time\ Dummies$$

The third model is run onSubsample 3 of 81 observations, and includes all the general variables used in Model 2 in addition to threeelectric and natural gas specific variables: the percentage of the firm's revenue that is derived from regulated rate sales(RegRev), the percentage of revenue derived from natural gas operations(GasRev) and the percentage of revenue derived from electric operations (ElecRev).

Model 3:

$$Premium = C + B0 * Bidders + D1 * Hostile + D2 * PrivEquity + D3 * Withdrawn + D4 * Stock + D5 * Mixed + D6 * Choice + D7 * Leverage + D8 * SalesRatio + B9 * RegRev + B10 * GasRev + B11 * ElecRev + Fixed\ Effect\ Time\ Dummies$$

The fourth model is run on Subsample 4 which contains 70 observations and includes additional dummy variables for whether the acquiring firm diversified into the natural gas sector (DivGas) and for whether the acquiring firm diversified into the electric sector (DivElec).

Model 4:

$$Premium = C + B0 * Bidders + D1 * Hostile + D2 * PrivEquity + D3 * Withdrawn + D4 * Stock + D5 * Mixed + D6 * Choice + D7 * Leverage + D8 * SalesRatio + B9 * RegRev + B10 * GasRev + B11 * ElecRev + D12 * DivGas + D13 * DivElec + Fixed\ Effect\ Time\ Dummies$$

Figure 2: Regression Results

	Model 1	Model 2	Model 3	Model 4
Observations	*130*	*95*	*81*	*70*
Bidders	5.42	12.57	11.00	11.25
	(7.59)	(8.33)	(8.48)	(10.07)
Hostile (D)	2.01	7.83	7.90	7.33
	(8.33)	(9.11)	(9.48)	(10.77)
PrivEquity (D)	-4.86			
	(6.42)			
Withdrawn (D)	-3.88	-7.53	-5.83	-5.38
	(4.87)	(5.6)	(6.24)	(6.92)
Stock (D)	-15.32 ***	-11.48 **	-6.23	-8.84
	(4.83)	(5.47)	(5.62)	(6.88)
Choice (D)	3.85	8.01	5.59	1.26
	(5.67)	(5.64)	(5.68)	(6.78)
Mixed (D)	-6.57	-2.86	-5.77	-8.48
	(7.38)	(7.79)	(7.81)	(9.27)
Leverage		0.73	11.93	12.39
		(17.94)	(19.29)	(22.25)
SalesRatio		0.25 *	0.22	0.23
		(.14)	(.14)	(.16)
RegRev			-0.0617	-0.0651
			(.08)	(.09)
GasRev			-0.3173	-0.155
			(.26)	(.31)
ElecRev			-0.446 *	-0.293
			(.26)	(.31)
DivGas (D)				-0.69
				(7.27)
DivElec (D)				-5.47
				(10.12)
Adjusted R^2	0.19	0.24	0.19	0.13

In parenthesis are the standard errors.

*, **, *** Designate statistically significant at .1, .05, .01 confidence levels, respectively

(D) Denotes dummy variable

General Variables - Previously Tested in Other Studies

Sales Ratio

The sales ratio coefficient is significant with a magnitude of .25 in Model 2. This sign is as expected due to the enhance abilitythat an acquiring firm has in instituting value enhancing changes at a relatively smaller target firm. The coefficient is nearlystatistically significant from zero in Models 3 and Model 4.

Consideration Dummy Variables (Stock and Mixed)

The dummy variable for whether the acquirer paid in stock (Stock)is significant and negative (Models 1 and 2) as expected due to target company shareholders being able todefer taxes if they receive stock as payment. The magnitude of the coefficients, -15.3 and -11.48, in Models 1 and 2, respectively,are not statistically different than the 12% lower return that Huang and Walking (1987)found for target companiesfollowing announcements of stock transactions as compared to cash transactions, which they attribute to lower premiums demanded due to taxes being deferred following stock transactions.As seen in Figure 3, the Stock variable loses significance in Model 3 due to the smaller sample size.

The dummy variable for Mixed (cash and stock payment) was,as expected, negative with a magnitude between the coefficient for stock and 0; however, it was not statistically significant from zero.

Bidders

The Bidders coefficient had a positive sign as expected, but was not significant in any model. In all models, the coefficient is significantly different than the magnitude of the

coefficient of 25 that Slusky and Caves (1991) found for this variable. This may be explained by the higher presence of regulation in the natural gas and electric sectors which may lead to more cooperation and less competitiveness in the bidding process.

Hostile Dummy Variable (Hostile)

The Hostile coefficient was positive as we had expected but was not statistically significant from zero. This result may be explained by the low number of hostile transactions in our sample, 9,which is likely due to the high levels of regulation and oversight in these sectors dissuading business tactics that are perceived as aggressive.

Leverage Level (Leverage)

The Leverage coefficient was positive but not statistically significant from zero.

General Variables - Previously Untested

Private Equity Dummy Variable (PrivEquity)

In Model 1, the PrivEquity coefficient was negative as we expected it would be due to the lower synergy that a private equity buyer can achieve in an acquisition compared to a strategic buyer, but the coefficient was not statistically significant from zero.

Choice of Payment Method (Choice)

The dummy variable for Choice was unexpectedly positive, but was notstatisticallysignificant from zero.

Electric and Natural Gas Specific Variables - Previously Untested

Percentage of Target Revenue Regulated (RegRev)

The RegRev coefficientis negative in models 3 and 4, as expected, butit is not statistically significant from zero. Thus we cannot conclude that lower premiums are offered to firms withhigher percentages of regulated revenue due to the requirement that savings be passed through to consumers in rate regulated operations.

Electric and Gas Revenue Components (ElecRev and GasRev)

The GasRev coefficient was not statistically significant from zero whereas the ElecRev coefficient was statistically significant from zero and negative in Model 3 (itwas not statistically significant in Model 4 due to the smaller sample as evident in Figure 3 by the loss of significance when Model 3 is run on Subsample 4). The significant negative coefficient suggests that premiums are negatively impacted by the proportion of target firm revenue coming from electric operations. The magnitude of the coefficient suggests that for a 1% increase in the target firm's percentage of electric revenue, the premium offered declines by 0.45%. This relationship may be caused by a high supply of electric assets available for sale during deregulation as a result of a negative industry outlook or new regulations requiring asset sales by electric utilities. This would lower the reservationprices of acquirers and improve their bargaining position resulting in reduced premiums paid to the target companies highly concentrated in electric businesses.

Diversifying into Gas or ElectricDummy Variables (DivGas and DivElec)

The coefficients on both dummy variables, DivGas and DivElec, are negative in Model 4 and are notstatistically significant from zero. Therefore we cannot conclude that

higher premiums are paid for diversification into the natural gas or electric businesses in order to reduce risk for electric and natural gas firms that face competitive market exposure.

Interpretation of Adjusted R^2

As we can see in Figure 3, from comparing the adjusted R^2'sfrom models 2-4 with those of the next simplest model on the same subsample, the additional independent variables included in Models 2 and 3 improve explanatory power, whereas the additional independent variables in Model 4 do not improve explanatory power. The adjusted $R^2$for Model 2 on Subsample 2 is 0.24, an improvement from the adjusted $R^2$for Model 1 on Subsample 2 of 0.22. The adjusted $R^2$for Model 3 on Subsample 3 is 0.19,an improvement from the adjusted $R^2$for Model 2 on Subsample 3 of 0.11. However, Model 3 has a higher adjusted R^2on Subsample 4, of 0.16, than Model 4 does, of 0.13, meaning that the additional variables in model 4 do not increase the explanatory power of the regression.

Overall, the adjusted R^2levels are low meaning that only a small portion of the variance in premium is explained by the models.

Discussion and Conclusion:

During thelast twenty years of deregulation in the electric and natural gas sectors premiums appear to be affected by some of the samefactors which have been shown to affect premiums in previous wide scale studies across industries. Our results show that for mergers and acquisitions with natural gas and electric target companies, stock transactions occur at lower premiums as suggested by Huang and Walking (1987) because of the absence of the taxes associated with selling one's shares for cash consideration. Our results also show that

the ratio of acquirer to target firm size, as measured in sales, is positively related to premium, as expected, due to larger differences in firm sizes resulting in the acquirerhaving more resources to institutepositive changesat the target firm. This raises the reservation price of the acquirer, leading to higher premiums, which is in agreement with the findings of Palia (1993) in his study of commercial banks.

Only one natural gas or electric specific factor tested was shown to be significantly related to premium, which was the percentage of revenue of the target firm coming from electric operations. The negative coefficient in model 3 supports our theory that a high supply of electric assets for sale during the deregulatoryperiod due to a general pessimistic sector outlook and/or required asset sales by electric utilities may have improved the bargaining position of acquirers and decreased their reservation prices leading to lower premiums for firms highly concentrated in the electric sector.

Although we are now able to better understand the variance in premium sizein transactions with natural gas and electric target firms during deregulation, the low explanatory power of our models warrants further research into additional determinants of premium size in these transactions.

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Appendix:

Figure 3: Regression Results for Model Comparisons

	Model 1		Model 2		Model 3		Model 4
Observations	*130*	*95*	*95*	*81*	*81*	*70*	*70*
Bidders	5.42	12.85	12.57	14.28 *	11	11.46	11.25
	(7.59)	(8.4)	(8.33)	(8.54)	(8.48)	(9.88)	(10.07)
Hostile (D)	2.01	5.43	7.83	7	7.9	7.6	7.33
	(8.33)	(9.14)	(9.11)	(9.78)	(9.48)	(10.56)	(10.77)
PrivEquity (D)	-4.86						
	(6.42)						
Withdrawn (D)	-3.88	-7.88	-7.53	-9.98	-5.83	-5.36	-5.38
	(4.87)	(5.61)	(5.6)	(6.36)	(6.24)	(6.72)	(6.92)
Stock (D)	-15.32 ***	-12.3 **	-11.48 **	-9.15	-6.23	-9.56	-8.84
	(4.83)	(5.48)	(5.47)	(5.67)	(5.62)	(6.6)	(6.88)
Choice (D)	3.85	7.19	8.01	4.55	5.59	0.82	1.26
	(5.67)	(5.69)	(5.64)	(5.93)	(5.68)	(6.38)	(6.78)
Mixed (D)	-6.57	-4.12	-2.86	-1.46	-5.77	-8.88	-8.48
	(7.38)	(7.77)	(7.79)	(8.02)	(7.81)	(9.07)	(9.27)
Leverage			0.73	10.72	11.93	12.5	12.39
			(17.94)	(19.61)	(19.29)	(21.85)	(22.25)
SalesRatio			0.25 *	0.25 *	0.22	0.22	0.23
			(.14)	(.15)	(.14)	(.15)	(.16)
RegRev					-0.062	-0.07	-0.0651
					(.08)	(.09)	(.09)
GasRev					-0.317	-0.186	-0.155
					(.26)	(.29)	(.31)
ElecRev					-0.446 *	-0.329	-0.293
					(.26)	(.29)	(.31)
DivGas (D)							-0.69
							(7.27)
DivElec (D)							-5.47
							(10.12)
Adjusted R^2	0.19	0.22	0.24	0.11	0.19	0.16	0.13

In parenthesis are the standard errors.

*, **, *** Designate statistically significant at .1, .05, .01 confidence levels, respectively

(D) Denotes dummy variable