

# **Regulatory Risk, Market Risk and Capital Structure: Evidence from U.S. Electric Utilities**

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## Abstract

This paper investigates the impact of regulatory and market risk on capital structure decisions of rate-regulated electric utilities in the US before and after restructuring. We find that the heightened uncertainty created by the deregulation process and the associated increase in both regulatory and market risks have resulted in firms reducing their leverage ratios. Specifically, we find that the important factors that impact capital structure are: 1) the passage of the restructuring legislation itself, 2) the potential loss of market share due competition and divestiture and 3) future earnings stability. Firm size, profitability, tangible assets, growth opportunities, holding company structure and customer and generation characteristics matter as well. Last, the effect of some firm characteristics is different in the pre and post-restructuring period. Identifying the importance of these variables for a firm's financing decisions not only furthers our understanding of capital structure choice but also sheds light on the financial effects of restructuring, which have not been previously documented.

Key Words: Capital Structure, Restructuring, Electric Utility  
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*“Our goals are to control costs while maintaining superior customer service, extract maximum value from our existing wholesale and utility assets, implement a long-term plan for generating capacity and fuel stability, lead Louisiana in service reliability and protect our investment-grade credit rating by reducing debt”.*

Quote from Cleco Corp (Louisiana)

*“In a nutshell, the government that had created this regulated industry was saying, “We don’t want to regulate you anymore. Here’s your business. Good luck.” However, the restructuring process initially generated more questions than answers, as the various players in the market tried to understand how the configuration of this industry might need to change.”* C. John Wilder (CEO, TXU)<sup>1</sup>

## **Introduction**

Restructuring the U.S. electric utility industry has dramatically changed the business environment electric utilities operate in. It has generated uncertainty in the market about the direction of future regulatory policies and about emerging competitive forces. Cash constrained utilities need to make important capital budgeting decisions in the midst on this changing environment. They have a choice of using either equity or debt financing when they borrow from the market. Each choice has associated costs and benefits and these choices have important consequences for all major facets of firm behavior. It influences the risk-taking and investment behavior<sup>2</sup> of firms (Childs et al., 2005; Hirth and Uhrig-Homburg ,2007(a, b); Mauer and Sarkar, 2005; Norton,1985), affects agency issues (Baumol,1965; Jensen and Meckling, 1976; Myers and

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<sup>1</sup> “Leading change: An interview with TXU's CEO” by Warren L. Strickland. The McKinsey Quarterly, 29<sup>th</sup> March 2007.

<sup>2</sup> The earliest work on this topic holds that investment should be independent of a firm’s financial structure (Modigliani and Miller (1958) and Miller and Modigliani (1961)). However, the vast amount of research that followed has shown that although this works in theory, in practice this may not be the case. See Myers (2001) for a good survey.

Maljuf, 1984; Shleifer and Vishny, 1989), and even impacts R&D and innovation decisions (Hall et al., 1990; Himmelberg and Peterson, 1984). Hence understanding a firm's capital structure choice is a crucial first step to understanding how a firm evolves and survives in a given environment. The restructuring experiment provides a rare opportunity to study firms as they transition from a regulated to a competitive environment and document changes in the financing behavior.

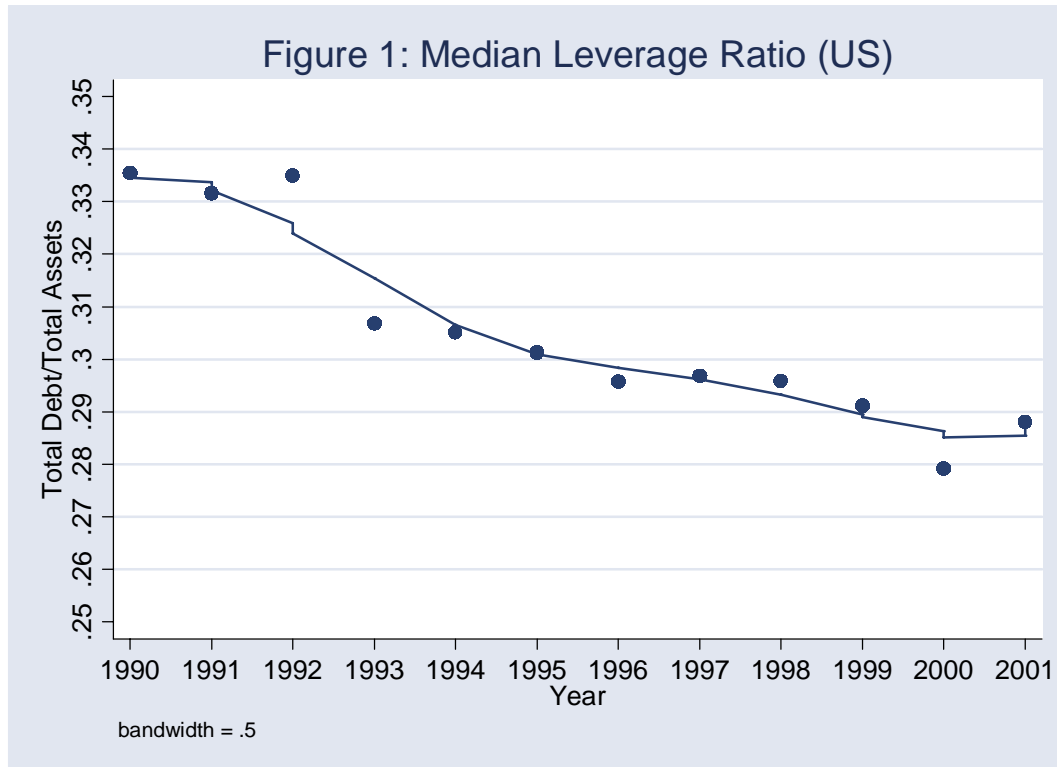
Capital budgeting decisions are at the core of determining the financial structure of a firm and have important long-term implications for the firm. There are multiple competing theories about the optimality of such decisions and the determinants of debt versus equity financing and the factors explaining such decisions (Catania, 1983; Kim, 1978; Fama and French, 2002; Frank and Goyal, 2003; Harris and Raviv, 1991; Kraus and Litzenberger, 1973; La Porta et al., 1997; MacKay and Phillips, 2005; Modigliani and Miller, 1958; Myers, 1977, 1984, 2001; Myers and Maljuf, 1984; Rajan and Zingales, 1995; Robichek et al., 1966). With the exception of a few authors (Bradley, Jarrell and Kim, 1984; Dasgupta and Nanda, 1993; Klein et al., 2000; Rao and Moyer, 1994; Spiegel and Spulber, 1997; Taggart, 1985), these studies have focused on unregulated manufacturing firms who attempt to optimize their capital structures within the constraints imposed by the market.

Furthermore, to the best of our knowledge, there are no papers that analyze how such decisions change once such industries are restructured and erstwhile regulated firms have to operate in a competitive landscape. We believe that this paper makes two important contributions to the literature. First, it adds an important missing piece about the financing decisions of regulated firms. This, we believe, provides a better understanding of the determinants and the observed differences in capital structures across various types of firms. Second, studying firms that are transitioning from a regulated to a competitive environment provides a good opportunity to investigate how changing incentive structures influence financial choices of firms and hence may help explain future investment and risk-taking behavior.

The restructuring of the electric utility industry in the United States gives us the perfect opportunity to investigate the above questions. More than twelve years have passed since deregulation was initiated with the enactment of the Energy Policy Act (EPAct) in 1992 and this gives us a long enough horizon to analyze such financing decisions. Starting with the restructuring process, utilities have had to contend with statewide regulatory and legislative changes when making their financial decisions. Such changes have altered the incentive structure of firms and hence their financial decision parameters. Restructuring has engendered two main types of risk in this industry: regulatory risk and market risk. Regulatory risk refers to uncertainties about the emerging institutional structure and policy environment. Market risk, on the other hand, arises in any unregulated market where firms must contend with demand fluctuations and threats to market share. Most firms have to contend with the latter only. Utilities are in a unique situation where they have to respond to both kinds of risks simultaneously when making capital budgeting decisions. Hence this industry provides a unique opportunity to analyze financing decisions in light of such risks.

Leverage (total debt/total assets) is perhaps, the most common variable used to characterize a firm's capital structure choice (Bradley, Jarrell and Kim, 1984; Fama and French, 2002; Rajan and Zingales, 1995; Titman and Wessels, 1988). In the U.S., leverage ratios for rate-regulated electric utilities have been steadily declining (Figure 1) since the 1992 Energy Policy Act began the restructuring of the power sector. Regulated firms traditionally display a high leverage ratio (Spiegel and Spulber, 1997) compared to competitive firms, and one would expect a decline with the transition to a competitive environment. We want to analyze the drivers behind this decline: what is it about a competitive environment that makes a firm choose different capital structure decisions when compared to its regulated phase. Does the decline signal that utilities have become more wary

about their future?<sup>3</sup> In this paper we discuss how the transition from a regulated regime to a competitive one creates regulatory and market risks and how these in turn, influence financing decisions.



Under perfect capital markets, Modigliani and Miller’s (1958) theory of optimal capital structure states that firms weigh the benefits of debt tax shields (lower cost of capital) against the costs of financial distress (bankruptcy) when determining leverage (Kim, 1978; Kraus and Litzenberger, 1973; Robichek et al., 1966). The optimal debt level is chosen to maximize firm value. For regulated utilities however, where prices are set by the regulator, the incentives for holding debt may be quite different. According to Klein et. al. (2000), both theory and empirical research suggests that “the existence of price regulation in the output market provides the regulated

<sup>3</sup> Debt is as a well-defined, legal contract between borrower (the firm) and lender, where the borrower is expected to meet its contractual obligations (debt payments) or face legal action. Hence, changes in leverage serve as one indicator of a firm’s expectations about its earnings capacity and ability to pay back its debt.

entity with incentives to utilize additional levels of debt to finance the operations of the firm”.

Bradley, Jarell and Kim (1984) document that regulated industries have the highest debt-to-value ratios with electric and gas utilities second only to airlines. Several studies have shown that regulated utilities choose high debt levels to induce rate (price) increases. This is because regulators set rates at a level that accounts for the firm’s costs which includes the cost of debt, thereby insuring the firm against possible financial distress.<sup>4</sup> Taggart (1995), on the other hand, attributes such high debt levels due to the “safer business environment” created by regulation.

The deregulation of the electric utilities industry presents a unique opportunity for studying the determinants of a firm’s capital structure. We expect that the change from a regulated, and hence “safer,” environment to a competitive and uncertain one will result in more conservative financial choices for the firm. The onset of deregulation altered the nature of financial distress costs for the electric utility and increased uncertainty about future earnings. A utility’s expectations of future earnings were likely to be lower than their pre-deregulation levels and the precision of their expectations were likely lower as well. This would increase the probability that debt payments may not be met and thus decrease a firm’s incentives to undertake debt (Bradley, Jarrell and Kim, 1984; Titman and Wessels, 1988). Similarly, the financial market was also uncertain about how the industry was going to change and hence, may have undervalued these firms. Undervalued assets that serve as collateral for borrowings would reduce a firm’s capacity to hold debt.

To date, most empirical work in this area has looked at how firm financing is affected by different institutions across countries.<sup>5</sup> In this paper we take a different approach. We focus on a

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<sup>4</sup> See for example Chen and Fanara (1992), Dasgupta and Nanda (1993), Spiegel and Spulber (1994, 1997) and Rao and Moyer (1994). An opposite view is that holding high levels of debt actually lowers the firm’s over-all cost of capital, leading to the threat of lower rates set by the regulators (De Fraja & Stone, 2003).

<sup>5</sup>Rajan and Zingales (1995) have shown that certain fundamental institutional differences between the G-7 countries cannot adequately explain the observed differences in capital structure across these countries. Other papers that study the influence of institutions on firm financing are La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998),

single industry during a time when the institutional environment changed. In doing so, we can isolate the effect of specific regulatory and market risks on firm leverage. This is not possible with a cross-country comparison. Moreover, we can explicitly identify firm and industry characteristics that directly affect the choice of debt that most prior work has only been able to control for by using industry and firm fixed effects. In fact, MacKay and Phillips (2005) find that most of the variation in firm financial structure is due to intra-industry variation. It is this type of variability that we attempt to explain in this paper. We exploit the considerable variation in inter-state deregulation speed and modality to get a more powerful test of the determinants of a firm's capital structure.

To the best of our knowledge, this study is the first to document the impact of deregulation and restructuring on a firm's capital structure. We find that the heightened uncertainty created by the deregulation process and the associated increase in both regulatory and market risks have resulted in firms reducing their leverage ratios. We hypothesize that this uncertainty undermines the utility's ability to undertake debt. We find that leverage declines by 20 percent on average when restructuring legislation is passed. Other associated restructuring policies that impact capital structure are the size of the competitive market segment, divestiture policies and policies that impact earnings stability such as default provider policies and those that influence market power. Firm size, profitability, tangible assets, growth opportunities, holding company structure and customer and generation characteristics matter as well. In addition, the effect of some firm characteristics is different in the pre and post-restructuring period. Identifying the relative importance of such factors for a firm's financing decisions not only furthers our understanding of capital structure choice but also sheds light on the financial effects of deregulation and future investment patterns.

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Demirguc-Kunt and Maksimovic (1999), Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001), Beck, Demirguc-Kunt and Maksimovic (2002).

The remainder of the paper is organized as follows. Section 1 provides a background of the U.S. electricity industry, before and after restructuring. Section 2 describes the data and key variable construction. Section 3 contains the empirical methodology, section 4 describes the main results and section 5 concludes.

## **Section 1: Background of the U.S. Electricity Industry**

The electric utility industry in the U.S. has been traditionally organized as a vertically integrated regulated monopoly operating within a specified geographical area.<sup>6</sup> The primary players in the market were the investor owned utilities (IOUs), which accounted for more than three-quarters of the energy generated. These firms were vertically integrated for-profit privately owned entities who had service monopolies in particular geographical regions and were overseen by the Federal Energy Regulatory Commission (FERC) and state regulators. The primary purpose of regulating<sup>7</sup> the IOUs was to set prices and the public utility commission (PUC) in each state was principally responsible for determining the price structure and scrutinizing major investments in generation, transmission and distribution by the utilities. The price setting mechanism was the “cost of service ratemaking”<sup>8</sup> and the rates were fixed and could not be changed without PUC authorization. The regulators determined the “revenue requirement”<sup>9</sup> of utilities based on their operating costs, depreciation, taxes and its “rate-base” (total net investment) and a regulator determined rate of return that was considered a ‘fair’ return on investment. Then, based on the total revenues required by the utility, retail rates were set for different groups of customers. Many have blamed this process for the

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<sup>6</sup> This was predicated on the view that efficient generation, transmission and distribution were a natural monopoly (Scherer, 1980; Khan, 1971).

<sup>7</sup> “Regulation can be viewed as an administered contract between the regulated firm and the ratepayers, with the regulatory agency serving as the arbitrator of this contract” (Pechman, 1993).

<sup>8</sup> This involved five main steps. The first four taken together determined the total revenue that a utility may earn – this was termed the “revenue requirement”. The fifth step was the “rate structure” – that determined how much different customers would be charged such that the “revenue requirement is fulfilled.

<sup>9</sup> Thus the revenue requirement equation was given by: Revenue Requirement = Operating Costs + Depreciation + Taxes + (Rate Base)\*(Regulator Determined Rate of Return)

Averach-Johnson type over-investment in capital by utilities. It has now been recognized that cost-based regulation hindered price decrease and created a monopoly through regulation. In addition, it created disincentives for efficiency or cost cutting.

Major changes were underway in the U.S. electricity industry during the nineties and “cost-based” regulation paradigms gave way to competitive electricity markets (DOE/EIA, 2000; Joskow, 1999, 1997, 1989; Hogan, 1995, 1997, 1998). The federal government, along with FERC had issued orders intended to introduce competition in the electricity market (deregulation). Regulators in many states had taken a pro-active role in promoting competition in the generating sector<sup>10</sup>. In 1992, the passing of the Energy Policy Act gave rise to open-access transmission grids for wholesale transactions<sup>11</sup>, but limited FERC’s authority to order retail wheeling. However it paved the way for the subsequent transition to retail competition, which formally started in 1996 with FERC Orders 888 & 889.<sup>12</sup> These orders, for the first time, gave impetus to retail competition and furthered wholesale competition. These provided an effective groundwork to begin retail wheeling, whereby retail consumers could shop around for the best rates while purchasing power much like the present telecom situation<sup>13</sup>.

The passing of EPAct and the FERC orders led to major changes in the incentive structure of IOUs and altered the organizational structure of the electricity industry (restructuring). Each state followed a different trajectory regarding restructuring the electricity industry. Some like California

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<sup>10</sup> Competition has been focused on the generation sector with distribution and transmission still being viewed as natural monopolies.

<sup>11</sup> On the wholesale side FERC took several steps to ensure increased competition. It required utilities to provide a detailed account of their transmission capacities, it expanded the range of services that the utilities were required to provide to wholesale traders and it made it clear that approval of application for mergers or charging competitive rates by IOUs were subject to their filing open access transmission tariffs with comparable service provisions.

<sup>12</sup> FERC Order 888 – “Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Service by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities” and Order 889 – “Open-Access Same-Time Information System”. For a detailed provision of the orders please refer to DOE/EIA (1997)

<sup>13</sup> After the California fiasco in 2001, some states suspended deregulation activities while others slowed down the pace of restructuring. In the analysis that follows, we exclude such cases by looking at the time period from 1990-2000 only. For details on the California case please see: Borenstein (2002), Borenstein et al (2002) and Cohen et al (2004).

and New York were at the forefront while others such as Alabama have not taken any concrete steps even in 2001. However, even in states which were taking a cautious approach towards restructuring there was expectation that eventually the market would be competitive and firms tried positioning themselves to better take advantage of the emerging market structure. Expectations about restructuring policies and future competition gave rise to waves of asset divestitures, mergers and acquisitions. One major consequence of the restructuring process was the voluntary divestiture of generating capacity by IOUs. States promoted this trend because the simultaneous ownership of generation and transmission capacity may engender market power. Furthermore, in the late 1990s mergers became quite frequent in the industry as companies strove to achieve the “critical mass” that was necessary to survive in a competitive environment. These changes gave rise to uncertainties about the emerging regulatory structure and subjected firms to the volatility of market transactions. This paper analyzes the impact of such policies and emerging market structures on a utility’s capital structure decisions. In particular, it studies how such regulatory and market risks influence a firm’s long-term debt holdings. This is important since capital structure decisions have important implications for future investments and this in turn will determine what the emerging industry structure will look like after restructuring.

## **Section 2: Data and Key Variables**

Our estimation sample is all regulated electric utilities<sup>14</sup> that file FERC Form 1 with the government. In this paper we analyze how the financial decisions of this particular group changed when electricity markets were restructured. There are two primary categories of data that this paper relies on: 1) information on state-level deregulation and restructuring policies and 2) firm level data

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<sup>14</sup> It would have been interesting to compare privately owned utilities not subject to regulation and see whether post-restructuring these IOUs behave the same manner as the existing unregulated firms. However, the lack of data prevents us from undertaking this exercise.

on financial and other firm characteristics. Restructuring did not happen in a monolithic fashion. Rather each state followed a different path and had different timetables for policy implementations. Therefore we need to construct variables that would capture the diverse characteristics of the restructuring process. Hence, it is not sufficient to look at the legislative changes alone. We use several measures to capture the complex interactions between broad legislative changes and various implementation measures. These, fall into two main categories: those that capture regulatory risk and those that encompass market risks. Variables measuring *regulatory risk* include the formal rules and bylaws as laid out in the various state restructuring bills. In particular this category captures the actual passing of restructuring legislation, formal stranded cost recovery procedures and a divestiture policy variable. The *market risk* measures comprise variables that describe ‘on-the-ground’ competition conditions once full deregulation goes into effect. This includes the size and nature of the competitive threat and variables that capture the stability of earnings after restructuring and opportunities for exercising potential market power. These data are from EIA’s “Status of State Electric Industry Restructuring Activity as of February 2004”<sup>15</sup>. Table 1(a) and (b) provides the summary statistics and the dates for the restructuring and stranded cost recovery policies.

Firm level data for the paper is primarily from FERC Form 1 that regulated utilities have to file with FERC. Form 1 includes the firm’s balance sheet, income statement and statement of cash flows. It also contains exhaustive data on all operational aspects of the utility such as electricity generation, the fuel mix of the electricity generated, data on the share of sales of residential, commercial and industrial customers, and sales for resale. A secondary source of firm-level data are various Energy Information Administration (EIA) publications from 1990-2003. We have 183 firms in our data set for the period 1990-2001. The unbalanced nature of the panel arises partly because of

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<sup>15</sup> This publication outlines the regulatory orders, legislations and the investigative studies that have been undertaken by each state till present.

mergers, but mainly due to random missing observations. From the financial statements, we construct the following variables: firm size, asset growth, return on assets, tangible assets and book leverage ratio (total debt / total assets where total debt equals long-term debt plus short-term debt or notes payable). Table 3b provides the summary statistics for the main financial variables used in the regression analysis. The following sections discuss the different variables used to build the empirical specification.

## Section 2.1: Leverage

We use book leverage (total debt / total assets where total debt equals long-term debt plus short-term debt or notes payable) as our key dependent variable.<sup>16</sup> Many companies in our sample are wholly-owned by a holding company and hence, we do not observe their stock price and cannot construct a market leverage ratio as other studies do.<sup>17</sup> To illuminate the differences between these regulated utilities and other firms, we first present two benchmark comparisons (Table 2a). First, we compare publicly traded non-regulated US manufacturing firms<sup>18</sup> with the US electric utilities, for the period 1990-2001. We confirm earlier findings in the literature that leverage ratios are significantly higher for the regulated firms (Bradley, Jarrell and Kim, 1984). In addition when we compare US utilities to UK unregulated generating firms, we find that overall US utilities have a higher leverage than their UK counterparts. If we compare firms in restructured states (Table 2b, column 2) with the unregulated UK utilities, even then the US leverage ratios are almost double that of the UK. However, this comparison may be slightly misleading since the US sample has both distribution and generation companies and the UK sample has unregulated generation companies

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<sup>16</sup> We believe that this is the relevant leverage measure for our analysis since the variation in non-debt liabilities is minimized in this measure due to our single industry focus. For a more detailed discussion on this issue and on alternative leverage measures, see Rajan and Zingales (1995).

<sup>17</sup> See for example, Bradley, Jarrell and Kim (1984), Titman and Wessels (1988), Fama and French (2002).

<sup>18</sup> We use COMPUSTAT data for SIC codes 300-396. We exclude outliers.

only. The leverage of UK distribution companies is between 60 – 80 percent. If those are taken into account then the difference between the US and UK sample may not be significant.

Next focusing on the US, we investigate whether leverage was indeed affected by the restructuring process. We divide the sample of firms into two cohorts - labeled as pre and post restructuring<sup>19</sup> (Table 2b): one group consists of observations located in states that have not passed a final restructuring legislation and the second group comprises utilities located in states have passed such legislation.<sup>20</sup> An observation is defined as a firm-year. Several immediate differences between the two cohorts of firms emerge from this table.

We find that leverage is lower (both mean and median) and standard deviation higher for restructured firms when compared to those in states that have not passed a formal legislation. As argued earlier, restructuring may have brought about greater volatility in earnings and greater uncertainty about future income potential. This may make firms unwilling to hold more debt, since the financial safety net of regulation is no longer present. All else constant, the probability of default increases under these scenarios. In addition, this finding is consistent with Dewenter and Malatesta's (2001) result that state-owned enterprises are usually more leveraged than privately held ones and leverage decreases with privatization. Although IOUs were not state-owned as such, the reasons for which state-owned firms hold more debt apply to them, such as a very low or non-existent probability of default and borrowing at a favorable interest rate. Such systematic differences hint at underlying changes in capital structure decisions of regulated and deregulated firms and form the basis of our inquiry into factors that can explain these differences. The summary statistics for all

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<sup>19</sup> This is only one way to slice the data – we could have compared the pre and post 1996 leverage ratios of all firms to see if the FERC orders had any impact irrespective of what the states did. Or we could have separated the sample by the date when a state begins a deregulation investigation. However, for the purpose of this paper, we believe that this current scheme is appropriate.

<sup>20</sup> Firms enter the post-restructuring cohort only when their specific state passes a restructuring legislation. Some firms are only in the pre-restructuring group if they are located in a state that never passes such legislation, while other firms may switch groups when the legislation is passed by their home state.

our dependent and explanatory variables are provided in Table 3b. The next sub-section discusses these variables in greater detail.

## Section 2.2 Regulatory Risks

Restructuring is not embodied in any single law change. It is a multi-faceted phenomena and each state displays different paths. Some states can exhibit “No Activity” regarding deregulation, while some may have “Investigations Ongoing or Orders and Legislation Pending”. Others may be further ahead in the process and may have “Order Issued for Retail Competition” or have “Legislation Enacted to Implement Retail Access”.<sup>21</sup> To capture these different stages we use three of dummy variables. The *deregulation investigation dummy* takes the value 1 if the state has at least opened an official investigation about deregulation. The *restructuring dummy* takes the value 1 if an order has been issued about retail competition. In addition, we use a *legislation enactment dummy* to isolate the effect of actually passing legislation that imposes retail access. This dummy takes the value 1 when a state passes such legislation. The reason for including the three alternative dummies is to investigate which stage of restructuring most affects a firm’s capital budgeting decisions.

We expect a negative relationship between these dummies and leverage since movement towards competitive markets increases uncertainty about the nature of the emerging regulatory and market environment. As mentioned earlier in the paper, greater regulatory and/or market risk increases the probability that a firm will be in financial distress for at least two reasons: First, firms’ expectations of future earnings may be lower than their pre-deregulation levels and the precision of their expectations may be lower as well. Second, the financial market may also be uncertain about how the industry is going to change and hence, may undervalue these firms. These factors decrease a firm’s incentives to undertake debt.

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<sup>21</sup> These classifications are taken from: EIA’s “Status of State Electric Industry Restructuring Activity”, May, 2000.

Next we look at other associated restructuring policies that may affect a firm's capital structure decision in the new regime. The first of these is a state's policy on stranded cost recovery. These are crucially important for long-term financial decisions and form an integral part of the regulatory risk that a firm faces. Stranded costs are potential losses stemming from huge capital expenditures in generation assets that were often incurred at the behest of regulators. Examples of such are investments in nuclear power plants and alternative power generating plants. Under regulation, firms were guaranteed to recoup their investment over a certain period of time. However, restructuring may leave such assets 'stranded', i.e. firms may not be able to recoup their investments when the market opens, since in the restructured environment market forces determine the price of generating assets. Lower market prices and low demand for alternative sources of energy will result in 1) huge losses for the utility that decreases the over-all value of the firm, and 2) lower values for these stranded generation assets. With the rapid transformation of the industry, if utilities cannot be guaranteed to recoup these past costs, the collateral value of their assets will be lower, severely constraining their ability to incur more debt.

To capture this, we use a *stranded cost recovery dummy*. This dummy is based on the type of stranded cost recovery that a state allows. There are three distinctions that can be made: Some states such as Massachusetts, New Jersey and Ohio have a 'fixed' recovery mechanism implying that utilities in those states can recover all their stranded costs by levying a 'fixed' competitive transition charge (CTC) on customers, leading to very low regulatory risk. Other states such as California, New York and Texas allow for the recovery of 'reasonable' stranded costs only, while some states like Minnesota and Washington have not specified the type of recovery, leading to greater regulatory risk. The *stranded cost recovery dummy* takes the value 0 if the recovery type has not been specified or there is no policy in place and 1 if either a 'reasonable' or full recovery is allowed. This dummy turns on when the stranded cost policies are passed (Table 1(b)). The dummy measures whether

having some sort of recovery mechanism in place affects leverage. The existence of a recovery policy should have a positive impact on leverage as firms are assured of recouping some cost.

The last regulatory risk variable we use is a *divestiture dummy*. To spur market competition after EPart, regulators promoted the divestiture of generation assets by utilities that wanted to remain in the regulated transmission and distribution segments of the business.<sup>22</sup> This dummy equals 1 if a state encourages or mandates divestiture of generation assets and 0 otherwise. This dummy turns on when legislation, that spells out the divestiture policies in a state, is passed. From a utility's standpoint, it is better if there are no divestiture requirements since the utility is unsure about how the market is going to value its generation assets. Utilities have traditionally operated in all three segments of the business and prior to deregulation purely generation companies were rare. During this period of uncertainty, it is quite likely that generation assets will be undervalued by the market. Thus, for the same reason discussed above, we expect this divestiture dummy to have a negative impact on leverage ratios.

### Section 2.3: Market Risks

All the variables discussed in the previous section capture varying aspects of the regulatory environment. However, in addition to these we would like to investigate how utilities behave under the threat of future competition, i.e. when they are exposed to varying degrees of market risk. It is conceivable that two utilities with exactly the same regulatory risk may organize their capital structures differently if they face different levels of market risk.<sup>23</sup> The first variable we use to capture this is the *percentage of customers eligible to switch providers* once retail access is

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<sup>22</sup> It was felt that the simultaneous ownership of generation and transmission capacity by the same company could lead them to discriminate against third parties who wanted to use their transmission networks.

<sup>23</sup> All competition variables have values equal to zero before the announcement of a start date for retail access, i.e. the date when residential customers are free to choose their electricity providers. For states which have not announced retail access dates, the values are zero.

implemented. This variable captures the potential market share loss due to competition. For example, if only 10 percent of the customers can freely choose power providers then the competitive threat to the incumbent utility is not that large. In the worst case, all of the eligible customers switch to a competitor and the incumbent loses 10 percent of its market. However, if say, all customers are free to choose then potentially the incumbent could lose its entire market. All else equal, a utility which may potentially lose 100 percent of its market, as opposed to only 10 percent, will face higher market risks and greater pressures to decrease prices. This would adversely affect its earnings and consequently its ability to undertake debt.

The *default provider policy dummy* is used to characterize the existence of effective competition in the market once retail access is granted and serves as a proxy for future earning stability. Being under a regulated monopoly for decades, with all charges consolidated under a single bill, switching to a new provider may prove difficult for customers (especially residential) due to inertia. Hence even with all the competitive apparatus in place, there may be no real competition in the market. Foreseeing such an outcome, many states have adopted policies about which generating companies can be the default provider, i.e. if the customer does not actively choose an electricity provider, which company gets to supply power to this customer. If there is no policy or if the utility is the mandated default provider, then there may be little competition even after consumers have an option to switch and virtually no market risk. The dummy takes the value 1 in this case.<sup>24</sup> If states have decreed that any company, including non-utilities can be default providers, then there will be more competition even when customers do not actively switch, since the incumbent utility will not automatically be the default. The dummy equals 0 in this case. We expect this variable to have a

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<sup>24</sup> We do not know the exact dates that these default provider policies were passed. So they are turned on when a state enacts restructuring legislation.

positive impact on leverage since if a utility is the mandated default provider, it is more certain about retaining its market share and hence expecting a stable future earnings.

Last, we use a *potential market power dummy* to gauge whether the utility may have the opportunity to exercise market power after restructuring, since this too may assure a stable earnings flow. This measure is based on how states view the separation of powers between different segments on a utility that operate in both the competitive generation and regulated transmission market. Two important features differentiate network infrastructures such as transmission lines in the electric utility industry. First, like all networks they suffer from congestion, and second, they are owned by private utilities that provide transmission and distribution service to competing generators. Now if the utility owns both the monopoly network service and is also a player in the competitive generating market, there may be a tendency to favor its own competitive affiliates during congestion. This may prevent other competitors from entering the market. To avoid such a scenario, some states have mandated that there must be either ‘corporate’ or ‘functional’ separation (Malloy & Amer, 2000) between the monopoly and competitive segments of a company. This variable is 1 if there is no policy, 0 if the state mandates either a functional or a corporate separation. If there is no separation, then there is a potential for exercising market power and reducing market risk. A utility can protect its market share by pricing out other generators from the transmission lines. In such a scenario, a firm can be reasonably certain about its earnings and hence would be more willing to take on debt. Thus we expect a positive coefficient since the dummy is one with the existence of market power.

## Section 2.4: Firm and State Characteristics

### Section 2.4.1: Financial Characteristics

From the financial statements, we construct the following control variables: *firm size* (total assets); *asset growth* (annual growth in total assets); *return on assets*, ROA (earnings before interest,

taxes, depreciation and amortization / total assets) and *tangible assets* (net plant and nuclear fuel / total assets). All dollar variables are in 2000 constant dollars. We expect larger firms and ones with more tangible assets to have higher leverage since their debt capacity is higher. Profitability should have a negative impact on leverage since more profitable firms have a lesser need to undertake debt and can finance their investments from cheaper internal funds. We use asset growth to reflect a firm's growth opportunities<sup>25</sup>. This is considered an important determinant of its capital structure. The common prediction from existing theories (Baker and Wurgler, 2002; Fama and French, 2002; Myers, 1977, 1984; Myers and Majluf, 1984) is that we should observe firms with valuable growth opportunities having lower leverage ratios, either because growing firms mitigate the debt overhang problem by using more equity financing or growing firms may accumulate financial slack today in order to take advantage of future opportunities.

In addition, some utilities belong to holding companies and this should affect how they make capital structure decisions. To capture this we include two variables: a *holding company dummy*<sup>26</sup> that is 1 when a utility joins a holding company, or is acquired by a holding company, or was a part of the holding company before our sample period, and a *holding company size* variable that captures the size of the parent. Holding companies vary greatly in size. Some like the American Electric Power Corporation have twelve utilities under its umbrella while others have just one utility. We hypothesize that both variables should negatively affect leverage. This holding company structure could provide greater access to internal funds, and hence greater debt capacity and allow the firm to better manage regulatory and market risks. In addition, a large holding company, i.e., (more subsidiary utilities) provides much more opportunities to share operating losses at the holding company level. This will dampen the benefits from the debt tax shield, lowering the incentives for

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<sup>25</sup> Growth opportunities are commonly defined as discretionary, future investments.

<sup>26</sup> When we could identify the exact date when the utility joined the holding company, the dummy is 1 from that date. Otherwise, if we know that a certain utility belongs to a holding company, the dummy is 1 through out the sample period.

holding debt. Last, we include a *merger dummy*. As alluded to in the introduction, the post restructuring period was characterized by a merger wave in the electric utility industry. This would drastically alter the size and debt capacity of firms. To control for this we add the merger dummy that equals 1 when a firm is part of a merger in a particular year. We are agnostic about the impact of mergers on leverage. A merger may either increase or decrease leverage depending on the financial structure of the two companies and the nature of the merger.

The above discussion outlines how firm characteristics affect capital budgeting decisions for usual firms – however, the restructuring of the utility industry gives us a unique opportunity to study whether these characteristics are different between regulated and restructuring firms. This, we believe, will yield insights about these two cohorts and their financial decisions. Table 3a provides the mean and medians for these two periods. Similar to the analysis of leverage earlier, we again divide the observations into pre and post-deregulation cohorts and observe whether there are any systematic differences across these two types. We find that firm financial characteristics vary systematically across these two groups for some variables.

First, we note that firm size is not significantly different in the two periods. Second, profitability, as measured by the return on assets (ROA), is lower for restructured firms, although the difference is not significant. There is a substantial theoretical and empirical literature that shows deregulation to be productivity enhancing (Baily et al., 1993; Evans & Kessides, 1993; Bertolotti & Poletti, 1997; Djankov & Hoekman, 2000). In addition, there has been some research showing that efficiency of utilities has increased after the US electricity deregulation (Delmas and Yesim, 2003; Markiewicz et al., 2004). Interestingly, we find that this reported productivity increase does not translate to higher profitability for the period under consideration. One possible explanation could be that in the short-term costs associated with restructuring may put downward pressure on profits.

Third, the ratio of tangible assets to total assets and the growth in total assets are both higher for regulated firms. We follow Fama and French (2002) and Titman and Wessels (1988) and use asset growth as a measure of growth opportunities.<sup>27,28</sup> In this case, we find it surprising that growth opportunities are higher for the cohort of regulated firms since the electric utility industry has historically been a low growth industry. It is quite plausible that because of the heightened uncertainty during the period of deregulation firms were more cautious in their investment decisions (McDonald and Siegel (1986)), as reflected in this slow down of asset growth. Alternatively, asset growth reflects a firm's *net* investments. There is anecdotal evidence that deregulation increased the incidence of both acquisitions and divestitures, where the latter was primarily driven by regulatory policy changes used to spur competition. Hence, asset growth may be a weak proxy for growth opportunities. Last, mean holding company size is greater for restructured firms and this may be due to the increased mergers and acquisitions in the restructured phase.

#### Section 2.4.2: Firm Nature and Type

For the power industry, non-financial firm characteristics also play a crucial role in determining how each utility reacts to the regulatory and competitive forces. Depending on a utility's customer base and generation characteristics, the policy changes implemented by its state may not even affect the firm in any significant way. We specify three firm-specific traits that we believe may directly impact a utility's financial decisions in light of industry restructuring. The first variable is the *share of industrial sales* measured by megawatt hours (MWHs) of electricity sold to this segment as a proportion of the total electricity sold by the firm. In most states that began retail competition, industrial customers were the first segment that could choose a retail provider. If the

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<sup>27</sup> The most common proxy for growth opportunities is the market-to-book ratio (or average  $q$ ). Recall however that we cannot observe stock prices and hence are unable to construct this measure.

<sup>28</sup> Both studies also use the ratio of research and development (R&D) to total assets or sales as a proxy for growth opportunities. Due to missing data for R&D, we lose a lot of observations using this measure. The results with R&D, however, are similar to those reported here.

majority of revenue for a utility comes from this segment, then these firms are going to be the hardest hit when markets are opened up. In addition, industrial customers do not suffer from the same inertia as residential ones and are more likely to switch providers if they can get lower rates from alternative providers. Hence, the higher the share of industrial customers, the greater is the exposure to market risk for a utility. This would translate into higher uncertainty about future earnings and lower debt to asset ratios.

The second characteristic we use is a *distribution company dummy*. Restructuring was primarily aimed at generating companies. Hence companies whose primary business was distribution should be unaffected by the deregulation and should have higher leverage ratios than generation companies. This dummy is 1 if the share of own generation is less than 25 percent of the total electricity sold and zero otherwise.<sup>29</sup> For robustness purposes we vary this definition and construct the dummy so that it takes the value 1 if the generation share is 20, 15 or 10 percent. This makes no substantive change in the results.

The third firm characteristic we use is a proxy for cost stability. Fossil fuel based plants (those that relied primarily on coal and natural gas as their major source of fuel) are often subject to fuel price shocks, unlike hydro-electric and nuclear plants, and thus suffer from greater cost-side uncertainties. In addition, most of these plants fell under the purview of restructuring activities and this should make them more unwilling to undertake debt when compared to the hydro and nuclear utilities. We construct the *share of fossil fuel in generation* as the ratio of fossil fuel generation to total generation of a firm. Our main objective is to analyze whether, after controlling for all firm characteristics, restructuring has an impact on a firm's capital structure decision and if so, what policies influence such decisions and how.

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<sup>29</sup> Distribution dummy=1 if generation in MWH/total sales in MWH < -0.25

### Section 2.4.3: State Characteristic

The regulatory risk variables capture the legislative changes when they occur. However, a firm has to take a long-term view when determining leverage ratios, and reacting to current changes may not be sufficient. They may form expectations regarding the future direction of regulatory changes and the imminence of a competitive threat, and act accordingly. To capture the expectation-driven behavior of firms we would use a *high electricity price state dummy*. This variable is a good proxy for the probability that restructuring will occur in the state. Previous literature (Ando & Palmer, 1998) has found that states with a higher than average electricity price were the first ones to initiate restructuring. This dummy takes the value 1 if the state electricity price is higher than the national average and zero otherwise.

The basic premise is that, given identical current conditions, a utility that expects its state to deregulate and face greater regulatory risk will undertake different financing decisions than those whose states have a very low probability of deregulation. We are agnostic about the sign of this variable. Depending on how firms interpret this variable, this may have a positive or negative impact on leverage. For example, a higher expectation of deregulation may signal future earnings volatility and hence decrease a firm's willingness to take on debt. Alternatively, utilities may view this as the end of a cheap debt period. Traditionally, utilities have been able to borrow at a much more favorable rate from the market than unregulated firms.<sup>30</sup> Those with a higher expectation of restructuring may want to lock in lower interest rates for fear of higher rates once they are deregulated. In addition, in order to survive under competition, utilities needed to establish their presence in more than one state to reach a minimum critical size. Debt levels may have increased to finance mergers and acquisitions to achieve these strategic goals.

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<sup>30</sup> This advantage can be attributed to a stable earnings stream, a negligible bankruptcy probability, and the presence of regulators to serve as safety nets.

### Section 3: Empirical Methodology

#### 3.1: Difference-in-Difference Model

Before attempting to model the full impact of restructuring on leverage, we want to be positive that the restructuring policies were indeed responsible for the decline in leverage ratios and that this was not just a secular downward trend, having little to do with the restructuring policies. Thus, we begin by estimating a simple a simple difference-in-difference model<sup>31</sup> given in (1), to analyze whether the regime change after restructuring had a significant impact on the financial structure of the utilities.

$$L_{ijt} = \alpha + \theta Treat_{jt} + \sum_{p=1}^p \gamma_p F_{ijt} + \sum_{T=1}^{10} \phi_T T + \varphi D_{jt} + \sum_{s=1}^{49} \chi_s S + \varepsilon_{ijt} \quad (1)$$

where:  $i$ =firm,  $j$ =state,  $t$ =year.  $L_{ijt}$  is the leverage ratio for firm  $i$  is state  $s$  in year  $t$ ,  $F_{ijt}$  denotes controls for firm characteristics,  $D_{jt}$  is the dummy for high electricity price state, and  $S$  and  $T$  are state and year dummies respectively. In this model  $Treat_{jt}$  is the dummy that captures those states that show some restructuring activity in the particular year. Hence,  $\theta$  is the difference-in-difference coefficient that captures the effect of the treatment on the treated. If restructuring and its associated uncertainty were responsible for significant changes in the financial structure of firms and the decline in leverage, we expect  $\theta$  to have a negative sign. We estimate the model using generalized least square (GLS) random effects panel data methodology.

We present the results of the above model in Table 4. We follow Rajan and Zingales (1995) and use firm size, profitability, tangible assets and growth opportunities as financial control variables which prior studies have found to have significant impact on firm leverage ratios. In addition, we control for other firm characteristics such as the holding company size, merger, share of industrial

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<sup>31</sup> Refer to Bertrand et. al for a discussion of this specification.

sales, distribution company dummy and the share of fossil fuel in generation for reasons outlined earlier. All firm level control variables are lagged by one year to minimize potential simultaneity problems. To capture the treatment, we use three alternative variables. In column 1 we use a deregulation investigation dummy, in column 2 we use the restructuring dummy and in column 3 we use the legislation enactment dummy. This allows us to investigate which stage of restructuring activity had the greatest impact on firm financial decisions.

We find that the estimate for  $\theta$  is insignificant in the first two columns and is negative and significant (at 10%) in column 3. This indicates that the earlier stages of restructuring have little impact on capital budgeting decisions of firms.<sup>32</sup> Firms react when restructuring legislation is finally enacted. In all specifications, firm size does not impact leverage. The coefficient on profitability (return on assets) is negative and significant. If profitable firms are generating more cash flows that can be used to finance investments internally, then higher profitability will be associated with lower leverage ratios (Myers (1984) and Myers and Majluf (1984)). The coefficient on tangible assets is positive and significant. Tangible assets are used as collateral for borrowings and hence more collateral value translates into higher debt capacities and higher debt levels. Firms with high growth opportunities, as measured by asset growth, are more likely to forego profitable investments if they are highly levered (Myers (1977)). The negative coefficient on asset growth, lends support to this hypothesis.<sup>33</sup> Both the holding company variables are significant and show that firms belonging to large holding companies have less need for debt. The merger dummy indicates that merged firms have slightly higher leverage ratios than other firms and this maybe a function of firms taking on excess debt to finance a merger. In addition, we also find that firms with a larger industrial customer

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<sup>32</sup> In alternative specifications when we have included all three dummies simultaneously, only the legislation enactment dummy has been significant.

<sup>33</sup> All of these results are consistent with previous findings (Rajan and Zingales (1995), Barclay, Smith and Watts (1995), Fama and French (2002)). See Harris and Raviv (1991) for a comprehensive review of this literature and Rajan and Zingales (1995) for a more detailed discussion on the effects of these four variables on leverage.

base have lower debt ratios and being a distribution companies or a fossil-fuel based firm has no impact on leverage. The high price state dummy is not significant implying that in this case implying expectations of restructuring have little impact on financing decisions.

### 3.2: Basic Empirical Model

The simple difference-in-difference model estimated earlier provides some indication that the restructuring process adversely affected leverage ratios. However, just using one dummy variable to characterize the restructuring process is simplistic. It fails to capture the complexity of the restructuring process and omits important policy changes. States have differed not only in their pace of deregulation, but also in terms of laying the groundwork for future competition and in other regulatory provisions. In addition, the summary statistics discussed earlier show that firm characteristics are different for regulated and restructured firms and these characteristics should influence leverage differentially in the pre and post-restructured regimes. Therefore, in the specifications that follow, we estimate a richer model that better captures the different aspects of the restructuring process, the impact of regulatory and market risk on a utility's capital structure and the differential impact of firm characteristics on leverage in the two regimes. We use the panel data model outlined below.

$$\ln L_{ijt} = \alpha + \sum_{K=1}^3 \beta_K R_{jt} + \sum_{P=1}^3 \gamma_P M_{jt} + \sum_{H=1}^h \delta_H F_{ijt} + \lambda D_{jt} + \sum_{H=1}^h \varphi_H Int_{ijt} + \sum_{T=1}^{10} \varphi_T T + \sum_{J=1}^j \theta_J S + \varepsilon_{ijt} \quad (2)$$

where:  $i$  denotes a firm,  $j$  denotes a state and  $t$  stands for year.  $R_{jt}$  and  $M_{jt}$  are vectors of regulatory risk market risk variables respectively, that vary by state.  $F_{ijt}$  denotes firm specific financial, generation and customer characteristics, whose components are discussed in detail in the succeeding

sections.  $D_{jt}$  is the dummy for high electricity price and  $S$  and  $T$  are state and year dummies respectively. The term  $Int_{ijt}$  denotes an interaction term between the legislation enactment dummy the firm attributes. We use this particular dummy since from the difference-in-difference model we know that firm financial decisions are affected only when a legislation is passed. These interaction terms show whether firm characteristics have different impacts on leverage for regulated versus restructured firms.

We estimated the above model using generalized least squares. The errors are corrected for first-order autocorrelation<sup>34</sup> and panel heteroscedasticity. We do not include firm fixed effects since the specification includes state dummies and firm and state dummies are highly collinear, since most states have only one utility. We also use alternative estimation techniques in Table 6 to check the robustness of the results. We use a linear random effects model that has robust standard errors that are clustered at the firm level, a linear fixed effects model (without state dummies)<sup>35</sup> and a Prais-Winston model that includes firm fixed effects. Another important point is that our dependent variable is a share and is thus bound between zero and one. None of the above techniques mentioned above corrects for this truncation. Hence in Table 7, we present results that take this truncation into account. We first use a logit transformation<sup>36</sup> of the dependent variable and estimate the specification using both, a fixed effects and a generalized least squares model. We also estimate a random effects tobit model and a truncated regression model with unconditional firm fixed effects as alternative specifications. The results are presented in the next section.

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<sup>34</sup> Since there is persistence in leverage, we hypothesize that past errors may influence current ones and thus we include the autocorrelation correction.

<sup>35</sup> Since many states have only one utility, both firm and state fixed effects cannot be included simultaneously.

<sup>36</sup> The dependent variable for the logit transformation is  $\log(y/(1-y))$  where  $y$  denotes the leverage ratio.

## **Section 4: Main Results**

### **4.1: Impact of Regulatory and Market Risk**

Table 5 presents the results of the basic model. We find that after restructuring legislation is passed, leverage ratios decline by almost 22 percent and this is by far the largest effect. All other policies associated with restructuring have much smaller effects on leverage. We find that in this particular specification neither the stranded cost recovery policies nor divestiture policies matter. However in most alternative specifications (Table 6 and 7), divestiture policies have a significant negative impact on leverage. Having such a policy in place decreases leverage by 2 percent.

The market risk variables show that a firm with higher market risk holds less debt. The percentage of customers who are eligible to switch providers once retails access is granted captures the potential market share loss and a 1 percent increase leads to a 0.02 percent decrease in leverage. The coefficient on the default provider dummy is positive implying that if the utility is the default provider, they are more certain about retaining their market share and hence more willing to take on debt (2.2 percent higher leverage). The coefficient on the potential market power dummy is positive and significant suggesting that firms which expect to exercise greater market power in the future are more likely to take on higher debt. However, it appears that the restructuring legislation is the single most important factor that firms have taken into account when undertaking financing decisions. All associated policies are of second order importance.

### **4.2: Importance of Firm and State Characteristics**

In our model all firm characteristics are interacted with the legislation enactment dummy to capture the pre and post-restructuring effect that these variables have on leverage. Column 1 has the pre-restructuring effect and column 2 shows if the post-restructuring effect is different from the pre-restructuring one. From column 1 we find that all the results are similar in sign, significance and

magnitude to those of Table 4. However, the pre and post results are significantly different. We find that firm size matters after restructuring and larger firms hold more debt. This could be a result of the fact that before restructuring, utilities were a very safe investment sector and the market was sure of utilities repaying their debts. Size of debt capacity may not have been an important consideration. However, after restructuring the market would be more willing to lend to larger firms since the chances of default may be lower. Pre-restructuring, more profitable firms have lower leverage, while after restructuring profitability has little impact on leverage.<sup>37</sup> Asset growth has a greater impact after restructuring since the growth opportunities are bigger once markets are opened up. Firms may need to borrow more to finance various investments in this growth climate. The effect of tangible assets, holding company characteristics and merger are not significantly different in the two periods.

We also observe that all else equal, a firm with a higher share of industrial customers is likely to have a lower leverage ratio before restructuring and a higher one after. As discussed earlier, this is the footloose segment of the utilities' customer base that is willing to switch providers if rates are favorable. Thus, utilities whose primary constituents are such large customers will be under greater price pressure, which would lower their incentives for holding debt. However, after restructuring such utilities may end up borrowing more to increase their investment activity and stay competitive. The distribution company dummy, the fuel source share and the high electricity price state dummy has no impact on leverage in either regime.

#### 4.3: Robustness Checks – Alternative Specifications and Truncation Corrections

Table 6 presents three alternative specifications. The first column presents a linear random effects model with robust standard errors that are clustered at the firm level and include year and

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<sup>37</sup> This is a puzzling result as the earlier discussion in the paper suggests that the relation ought to be negative – even more so than the regulated era.

state fixed effects. The second column presents a linear fixed effects model (without state dummies) and the third estimates the model using Prais-Winsten methodology, with panel heteroscedasticity corrected AR(1) standard errors and firm fixed effects. We find that most results are robust to the different estimation techniques. The effect of restructuring varies between 15 and 20 percent. In Table 7, we correct for truncation. In the first two columns, the dependent variable is the logit transformation of the leverage ratio and the regressions are estimated by Prais-Winsten and GLS respectively, with the appropriate corrections as mentioned earlier. When we calculate the impact on leverage we find that the coefficient is 0.21 for column 1 and 0.29 for column 2. Columns 3 and 4 are estimated by a random effects tobit model and a truncated regression model with unconditional firm fixed effects. Thus the effect of restructuring on leverage varies between 19 and 28 percent for the alternative models. Most other results are unchanged from those found in the basic model in Table 5 and thus we can say with a fair degree of confidence, that our analysis of the various factors influencing a firm's financial decisions, are robust.

## **Section 5: Conclusion**

There has been substantial research investigating the capital structure decisions of firms and some investigation on the financing decisions of regulated ones. However, to the best of our knowledge, this is the only paper that studies how regulated firms behave when they move from a regulated to a competitive regime and they are under the threat of both regulatory and market risk. We achieve this by investigating how the deregulation and restructuring of the U.S. power industry affected utilities' capital structure decisions. Electric utilities in the U.S. provide a unique setting to study this question, since the pace of deregulation and associated restructuring and competition policies varied greatly by state. All results indicate a decline in leverage as the industry is restructured and competitive pressures mount. Our results also show why firm leverage ratios

declined as the electricity industry transitioned from a regulated to a market environment. In a rate-based regulated regime, earnings were stable and firms were insulated, for the most part, from demand and supply-side shocks. Restructuring forced these firms to assess the risks and uncertainties inherent in their capital structure decisions and optimize accordingly. The uncertainties associated with a market environment and the absence of the safety-net of regulation limited the amount of debt a firm was willing to undertake.

Restructuring policies that increase the stability of future earnings, such as a default provider policy which mandates that the incumbent utility is the default provider, makes a firm more willing to hold debt. Another interesting finding is the negative impact of future competitive threat on a utility's leverage ratio. We may cautiously interpret this as evidence that capital structures were sub-optimal during the regulated regime. However, this issue needs to be studied in greater depth before a definitive conclusion can be reached. In addition, we find that the effect of firm characteristics on leverage is different before and after restructuring for some variables. Size matters only after restructuring. More profitable firms have lower leverage, but this effect is different in the two regimes. Growth opportunities matter more in the post-restructured period and holding company structures matter in both regimes. Last firms with a greater share of industrial customers, i.e. the 'footloose' segment of the customer base, have lower leverage and they hold more debt after restructuring than before. As discussed earlier in the paper, capital structure decisions influence all aspects of firm structure, conduct and performance. The electric utility industry provides a clean natural experiment to observe what factors influence such financing decisions. Identifying the importance of these variables for a firm's financing decisions not only furthers our understanding of capital structure choice but also sheds light on the financial effects of restructuring, which have not been previously documented.

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**APPENDIX TABLES**

**TABLE 1(A): DEREGULATION/RESTRUCTURING ORDERS**

<b>Year</b>	<b>Investigations Ongoing or Order Pending</b>	<b>Order Issued for Retail Access</b>	<b>Legislation Enacted to Implement Retail Access</b>
1994	California		
1995	Connecticut, Louisiana, Vermont, Washington	California	
1996	Alabama, Colorado, Connecticut, Hawaii, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Virginia, Washington	New York, Vermont	California, New Hampshire, Pennsylvania, Rhode Island, Texas
1997	Alabama, Arizona, Arkansas, Colorado, Connecticut, Dc, Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Mexico, North Carolina, North Dakota, Oregon, South Carolina, Tennessee, Virginia, Washington, West Virginia, Wisconsin	Illinois, Maryland, New York, Vermont	California, Maine, Massachusetts, Montana, Nevada, New Hampshire, Oklahoma, Pennsylvania, Rhode Island, Texas
1998	Alabama, Alaska, Arkansas, Colorado, Delaware, Hawaii, Idaho, Indiana, Iowa, Kansas, Louisiana, Minnesota, Missouri, New Mexico, North Carolina, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, West Virginia	Arizona, DC, Georgia, Illinois, Maryland, Michigan, Mississippi, New Jersey, Vermont, Washington	California, Connecticut, Maine, Massachusetts, Montana, Nevada, New Hampshire, New York, Oklahoma, Pennsylvania, Rhode Island, Texas, Virginia, Wisconsin
1999	Alabama, Alaska, Colorado, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Missouri, North Carolina, North Dakota, South Carolina, South Dakota, Tennessee	Arkansas, DC, Georgia, Michigan, Minnesota, Mississippi, Vermont, Washington	Arizona, California, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, West Virginia, Wisconsin

**TABLE 1(A) CONTINUED**

<b>Year</b>	<b>Investigations Ongoing or Order Pending</b>	<b>Order Issued for Retail Access</b>	<b>Legislation Enacted to Implement Retail Access</b>
2000	Alabama, Alaska, Colorado, Florida, Hawaii, Idaho, Indiana, Kansas, Kentucky, Louisiana, Missouri, North Carolina, North Dakota, South Dakota, Tennessee	Arkansas, Georgia, Minnesota, South Carolina, Vermont, Washington	Arizona, California, Connecticut, Delaware, DC, Illinois, Maine, Maryland, Massachusetts, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, West Virginia, Wisconsin
2001	Alabama, Colorado, Florida, Hawaii, Idaho, Indiana, Kansas, Louisiana, North Carolina, North Dakota, South Dakota, Tennessee	Arkansas, Georgia, Missouri, Minnesota, South Carolina, Vermont	Arizona, California, Connecticut, Delaware, DC, Illinois, Maine, Maryland, Massachusetts, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, West Virginia, Wisconsin

**TABLE 1(B): DATES FOR STRANDED COST RECOVERY ACTS**

States with No Date (i.e. No Policy)	Alaska, Colorado, DC, Florida, Hawaii, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Missouri, North Carolina, North Dakota, Oregon, South Dakota, Tennessee, Vermont, Washington, West Virginia, Wisconsin
Year	
1996	Alabama, New Hampshire, New York
1997	Arkansas, California, Idaho, Illinois, Maine, Maryland, Massachusetts, Mississippi, Montana, Nevada, New Jersey, Ohio, Oklahoma, Pennsylvania
1998	Arizona, Connecticut, Delaware, Georgia, Rhode Island, South Carolina, Texas
1999	New Mexico, Virginia
2000	Michigan

**TABLE 2A: LEVERAGE COMPARISON**

<b>Leverage (Total Debt/Total Assets)</b>			
Sample	US IOUs	US Manufacturing	UK Utilities
Obs.	1981	24918	68
Mean	0.338	0.224	0.195
Median	0.329	0.183	0.156
Standard Deviation	0.117	0.212	0.173
Minimum	0.009	0	0
Maximum	0.772	1	0.780

Note: Leverage statistics is based on all available data. US manufacturing firms are obtained from the COMPUSTAT dataset for SIC 300-396 and are corrected for outliers. The UK utilities include the private generating companies only and not the regulated distribution companies whose leverage ranges between 55 and 80 percent. Range: 1990-2001

**TABLE 2B: PRE AND POST RESTRUCTURING LEVERAGE COMPARISON**

<b>Leverage (Total Debt/Total Assets)</b>		
	<b>Pre-Restructuring</b>	<b>Post-Restructuring</b>
Obs.	1277	439
Mean	0.345	0.301
Median	0.330	0.304
Standard Deviation	0.104	0.115
Minimum	0.009	0.009
Maximum	0.772	0.772

Note: Leverage statistics is based on regression sample. The pre-restructuring period covers firms in states (for those years) when the state has not enacted a restructuring legislation, i.e. the legislation enactment dummy=0. The post-restructuring period comprises firm-year observations when the legislation enactment dummy equals 1. Kruskal-Wallis equality-of-populations rank test rejects null hypothesis of equality for the pre and post leverage mean and medians for US IOUs. Range: 1990-2001

**TABLE 3A: PRE AND POST RESTRUCTURING COMPARISON OF MEANS OF FIRM CHARACTERISTICS**

	<b>Pre-Restructuring</b>		<b>Post-Restructuring</b>	
	Mean	Median	Mean	Median
Log (Total Assets): Lag (1 Yr.)	21.081	21.396	20.918	21.482
Return on Assets: Lag (1 Yr.)	0.141	0.145	0.138	0.141
Tangible Assets / Total Assets: Lag (1 Yr.)	0.703	0.737	0.589	0.648
Asset Growth: Lag (1 Yr.)	0.019	0.002	-0.006	-0.019
Holding Company Size	3.057	2.000	3.677	2.000
Share of Industrial sales: Lag (1 Yr.)	0.207	0.205	0.180	0.168
Share of Fossil Fuel in Generation: Lag (1 Yr.)	0.728	0.854	0.674	0.800

Note: The statistics reported are sample means based on the regression sample. The pre-restructuring period covers firms in states (for those years) when the state has not enacted a restructuring legislation, i.e. the legislation enactment dummy=0. The post-restructuring period comprises firm-year observations when the legislation enactment dummy equals 1. There are 1277 observations before restructuring and 439 observations after. Range: 1990-2001

**TABLE 3B: SUMMARY STATISTICS FOR REGRESSIONS**

<b>Dependent Variables:</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Leverage = Total Debt/Total Assets	0.334	0.098	0.009	0.772
Logit Transformation of (Total Debt/Total Assets)*	-0.749	0.630	-4.744	1.217
<b>Regressors</b>				
<b>Restructuring Characteristics (Dummies)</b>				
<b>Percentage of Ones</b>				
Deregulation Investigation Dummy	48.31			
Restructuring Order Dummy	31.53			
Legislation Enactment Dummy	25.58			
Stranded Cost Recovery Dummy	27.10			
Divestiture Policy Dummy	17.66			
Utility Default Provider Dummy	94.00			
Potential Market Power Dummy	25.23			
<b>Restructuring Characteristics (Continuous Variable)</b>				
<b>Mean SD Min Max</b>				
Percentage of Customers Eligible to Switch Providers	13.408	33.387	0	100
<b>Firm &amp; State Characteristics (Dummies)</b>				
<b>Percentage of Ones</b>				
Holding Company Dummy	73.78			
Merger Dummy	3.55			
Distribution Company Dummy: Lag (1 Yr.)	20.10			
Pre-Restructuring High Electricity Price State Dummy	22.24			
<b>Firm Characteristics (Continuous Variables)</b>				
<b>Mean SD Min Max</b>				
Log (Total Assets): Lag (1 Yr.)	21.039	1.729	15.545	24.015
Return on Assets: Lag (1 Yr.)	0.140	0.042	-0.007	0.278
Tangible Assets / Total Assets: Lag (1 Yr.)	0.674	0.177	0.024	0.958
Asset Growth: Lag( 1 Yr.)	0.013	0.139	-0.909	1.848
Holding Company Size	3.216	3.413	0	15
Share of Industrial sales: Lag (1 Yr.)	0.200	0.138	0	0.954
Share of Fossil Fuel in Generation: Lag (1 Yr.)	0.714	0.329	0	1

Note: \*: All summary statistics are based on the estimation sample. Observation=1716, Range: 1990-2001. Leverage (the dependent variable) is a proportion and is bounded between 0 and 1 and using traditional OLS based estimation techniques may not yield the correct solution, since the distributional assumptions for this model are based on an unrestricted normal distribution. An usual solution, is to perform a logit transformation of the dependent variable(y):  $\ln(y / (1 - y))$ . This maps the original variable to the real line. One can now estimate this model using traditional techniques.

**Table 4**  
**Difference in Difference Model**  
Dependent Variable: Total Debt/Total Assets

	(1)	(2)	(3)
<b>Regulatory Variables</b>			
Deregulation Investigation Dummy	0.002 (0.003)		
Restructuring Dummy		-0.002 (0.003)	
Legislation Enactment Dummy			-0.005* (0.003)
<b>Firm Characteristics</b>			
Log (Total Assets): Lag (1 Yr.)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Return on Assets: Lag (1 Yr.)	-0.128*** (0.041)	-0.125*** (0.041)	-0.126*** (0.040)
Tangible Assets / Total Assets: Lag (1 Yr.)	0.119*** (0.014)	0.116*** (0.014)	0.116*** (0.014)
Asset Growth: Lag( 1 Yr.)	-0.057*** (0.007)	-0.057*** (0.007)	-0.057*** (0.007)
Holding Company Dummy	-0.015*** (0.005)	-0.014*** (0.005)	-0.015*** (0.005)
Holding Company Size	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Merger Dummy	0.007** (0.004)	0.007* (0.004)	0.007* (0.004)
Share of Industrial sales: Lag (1 Yr.)	-0.054** (0.024)	-0.054** (0.024)	-0.055** (0.024)
Distribution Company Dummy: Lag (1 Yr.)	-0.009 (0.005)	-0.009 (0.005)	-0.009 (0.005)
Share of Fossil Fuel in Generation: Lag (1 Yr.)	-0.007 (0.007)	-0.007 (0.007)	-0.007 (0.007)
<b>State Characteristics</b>			
Pre-Restructuring High Electricity Price State Dummy	0.006 (0.005)	0.004 (0.005)	0.004 (0.004)
Constant	0.716*** (0.063)	0.753*** (0.064)	0.720*** (0.064)
<b>Relevant Statistics</b>			
Observations	1716	1716	1716
Number of Firms	175	175	175
Rho (AR1)	0.770	0.772	0.773
Log Likelihood	3325.665	3328.581	3331.407`
Wald Stat.: Chi-Square	651.017	642.129	646.017

Note: GLS random effects panel model. Standard Errors are corrected for first-order autocorrelation and panel level heteroscedasticity. All equations contain year and state fixed effects. Range: 1990 – 2001. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Wald statistic (Prob. > chi-square) implies that all variables are jointly significant. ‘Rho(AR1)’ denotes the common autocorrelation coefficient.

**Table 5**  
**Basic Model**

Dependent Variable: Total Debt / Total Assets  
(Standard Errors in Parenthesis)

	(1)		(2)
<b>Regulatory Risk</b>		<b>Market Risk</b>	
Legislation Enactment Dummy	-0.220*** (0.059)	% of Customers Eligible for Retail Competition	-0.0002** (0.0001)
Stranded Cost Recovery Dummy	0.005 (0.004)	Utility Default Provider Dummy	0.022* (0.012)
Divestiture Policy Dummy	0.006 (0.007)	Potential Market Power Dummy	0.011** (0.006)
<b>Firm Characteristics</b>		<b>Interactions</b>	
Log (Total Assets): Lag (1 Yr.)	-0.002 (0.002)	Legis. Enact. Dum. * Log (Total Assets): Lag (1 Yr.)	0.007*** (0.002)
Return on Assets: Lag (1 Yr.)	-0.246*** (0.052)	Legis. Enact. Dum. * ROA: Lag (1 Yr.)	0.242*** (0.069)
Tangible Assets / Total Assets: Lag (1 Yr.)	0.108*** (0.017)	Legis. Enact. Dum. * Tang. Ast / Tot Ast.: Lag (1 Yr.)	0.012 (0.020)
Asset Growth: Lag( 1 Yr.)	-0.024*** (0.009)	Legis. Enact. Dum. * Asset Growth: Lag( 1 Yr.)	-0.058*** (0.013)
Holding Company Dummy	-0.016*** (0.005)	Legis. Enact. Dum. * Holding Company Dummy	-0.004 (0.007)
Holding Company Size	-0.004*** (0.001)	Legis. Enact. Dum. * Holding Company Size	0.000 (0.001)
Merger Dummy	0.007 (0.005)	Legis. Enact. Dum. * Merger Dummy	0.003 (0.007)
Share of Industrial sales: Lag (1 Yr.)	-0.076*** (0.024)	Legis. Enact. Dum. * Sh. of Industrial sales: Lag (1 Yr.)	0.111*** (0.028)
Distribution Company Dummy: Lag (1 Yr.)	-0.002 (0.007)	Legis. Enact. Dum. * Distri. Com. Dum.: Lag (1 Yr.)	-0.012 (0.009)
Share of Fossil Fuel in Generation: Lag (1 Yr.)	-0.004 (0.009)	Legis. Enact. Dum. * Sh. of Foss.Fuel in Gen:Lag(1 Yr.)	-0.002 (0.010)
<b>State Characteristic</b>			
Pre-Restruc. High Elec. Price State Dummy	-0.009 (0.006)	Constant	0.749*** (0.052)
<b>Relevant Statistics</b>			
Observations	1716	Rho (AR1)	0.733
Number of Firms	183	Wald Stat.: Chi-Square	912.808
Log Likelihood	3310.444	Prob > Chi-Square	0.000

Note: GLS random effects panel model. Standard Errors are corrected for first-order autocorrelation and panel level heteroscedasticity. Model also contains a constant (positive and significant) and year and state fixed effects. Interactions with the legislation enactment dummy shows if the effect of firm characteristics on leverage is different pre and post restructuring. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Wald statistic is for the overall joint-significant of the variables included. 'Rho(AR1)' denotes the common autocorrelation coefficient.

**Table 6**  
**Alternative Model Specifications**  
Dependent Variable: Total Debt / Total Assets

	(1)	(2)	(3)
	RE	FE	Prais (FE)
<b>Regulatory Risk</b>			
Legislation Enactment Dummy	-0.200***	-0.179***	-0.153***
Stranded Cost Recovery Dummy	0.002	0.002	0.005
Divestiture Policy Dummy	-0.023***	-0.023***	-0.015**
<b>Market Risk</b>			
% of Customers Eligible for Retail Comp.	-0.0002	-0.0001***	-0.0002***
Utility Default Provider Dummy	0.032***	0.032***	0.014**
Potential Market Power Dummy	0.006	0.007	0.016**
<b>Firm Characteristics</b>			
Log (Total Assets):Lag(1Yr.)	0.005	-0.001	-0.011
Return on Assets:Lag(1 Yr.)	-0.389***	-0.413***	-0.349***
Tang. Asset / Tot. Asset:Lag(1Yr.)	0.216***	0.225***	0.165***
Asset Growth:Lag(1Yr.)	-0.026*	-0.031**	-0.025
Holding Company Dummy	-0.003	-0.003	-0.005
Holding Company Size	-0.004***	-0.004**	-0.004**
Merger Dummy	0.022*	0.022*	0.010
Sh. of Industrial Sales:Lag(1Yr.)	-0.120***	-0.186***	-0.179***
Distrib. Com. Dummy:Lag(1Yr.)	-0.002	-0.006	-0.005
Sh. of Foss. Fuel in Gen:Lag(1Yr.)	-0.013	-0.029**	-0.017
<b>Interaction of Legislation Enactment Dummy and the Following Variables</b>			
Log (Total Assets):Lag(1Yr.)	0.011***	0.010***	0.008***
Return on Assets:Lag(1 Yr.)	0.275***	0.233***	0.218**
Tang. Asset / Tot. Asset:Lag(1Yr.)	-0.066***	-0.066***	-0.050*
Asset Growth:Lag(1Yr.)	-0.032	-0.025	-0.021
Holding Company Dummy	-0.014	-0.014	-0.006
Holding Company Size	-0.000	-0.001	-0.001
Merger Dummy	-0.028*	-0.026*	-0.010
Sh. of Industrial Sales:Lag(1Yr.)	0.118***	0.098***	0.088**
Distrib. Com. Dummy:Lag(1Yr.)	-0.012	-0.014	-0.005
Sh. of Foss. Fuel in Gen:Lag(1Yr.)	-0.014	-0.013	-0.005
<b>Relevant Statistics</b>			
Observations	1710	1710	1710
Number of Firms	183	183	183
R-Square	0.184	0.296	0.785
Fraction of Variance Due to $u_i$	0.707	0.855	

Note: Alternative model specifications. Columns contain coefficients. Standard errors not reported. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All specifications have a constant, high price state dummy and year fixed effects. Col(1) has state fixed effects. Alternative models: (1) Random effects with clustering (at the firm level) and robust standard errors (2) Fixed effects within estimator (3) Panel Prais-Winston with firm fixed effects, panel corrected standard errors and ar(1) (estimated ar1 coefficient: 0.630). For col. 1 R-square is the overall one while for col. 2 and 3 we present the within R-square. 'Fraction of Variance Due to  $u_i$ ' denotes the fraction of the error that can be attributed to the random or fixed error term (Error term is  $u_i + \varepsilon_{ijt}$  for these specifications).

**Table 7**  
**Correcting for Truncation**

	(1)	(2)	(3)	(4)
	Logit: Prais	Logit: GLS	RE Tobit	Trunc. Reg.
<b>Regulatory Risk</b>				
Legislation Enactment Dummy	-1.064***	-0.561**	-0.192***	-0.283***
Stranded Cost Mech. Dummy	0.027	0.007	0.002	0.002
Divestiture Policy Dummy	-0.107**	-0.036	-0.023***	-0.023***
<b>Market Risk</b>				
% Cust. Elig. for Retail Comp.	-0.001***	-0.001***	-0.0001**	-0.0001**
Utility Default Provider Dummy	0.078**	0.109**	0.032***	0.033***
Potential Market Power Dummy	0.080**	0.038*	0.006	0.008
<b>Firm Characteristics</b>				
Log (Total Assets):Lag(1Yr.)	-0.169	-0.059	0.006	0.001
Return on Assets:Lag(1 Yr.)	-1.732***	-1.210***	-0.390***	-0.424***
Tang. Asset / Tot. Asset:Lag(1Yr.)	0.836***	0.755***	0.222***	0.210***
Asset Growth:Lag(1Yr.)	-0.197*	-0.195***	-0.027**	-0.030**
Holding Company Dummy	-0.029	-0.044*	-0.003	-0.004
Holding Company Size	-0.021***	-0.004	-0.004***	-0.004**
Merger Dummy	0.045	0.019	0.022**	0.022**
Sh. of Industrial Sales:Lag(1Yr.)	-0.935***	-0.533***	-0.138***	-0.200***
Distrib. Com. Dummy:Lag(1Yr.)	-0.028	0.015	-0.003	-0.005
Sh. of Foss. Fuel in Gen:Lag(1Yr.)	0.064	0.025	-0.018	-0.030**
<b>Interaction of Legislation Enactment Dummy and the Following Variables</b>				
Log (Total Assets):Lag(1Yr.)	0.053****	0.024**	0.011***	0.013***
Return on Assets:Lag(1 Yr.)	0.911	0.756**	0.266***	0.279***
Tang. Asset / Tot. Asset:Lag(1Yr.)	-0.185	-0.036	-0.068***	-0.037
Asset Growth:Lag(1Yr.)	-0.289*	-0.260***	-0.030	-0.031
Holding Company Dummy	-0.110*	-0.046	-0.014	-0.014
Holding Company Size	-0.001	-0.009**	-0.001	-0.000
Merger Dummy	-0.013	0.011	-0.027*	-0.024*
Sh. of Industrial Sales:Lag(1Yr.)	0.646***	0.552***	0.110***	0.119***
Distrib. Com. Dummy:Lag(1Yr.)	-0.002	-0.095**	-0.013	-0.010
Sh. of Foss. Fuel in Gen:Lag(1Yr.)	-0.064	-0.067*	-0.015	-0.010
<b>Relevant Statistics</b>				
Observations	1710	1716	1710	1710
Number of Firms	183	183	183	183
R-Square/ Log Likelihood	0.786	843.889	2402.632	2865.938

Note: Alternative specifications that correct for truncation. (1), (2) Logit transformation (of the dependent variable) estimated by Prais Winston with panel corrected standard errors and AR(1) (ar1 coeff. 0.397) and GLS with autocorrelated errors (ar1 coeff. 0.394) and panel heteroscedasticity respectively (2) Random effects panel Tobit (3) Truncated regression model with unconditional firm fixed effects. The dependent variable for the logit transformation is  $\log(y/(1-y))$  where  $y$  is the leverage ratio. For the other two specifications the dependent variable is the leverage ratio itself. All specifications contain the high price state dummy, a constant and year and state fixed effects. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.