# The End of the "Modern Corporation": Deregulation and Ownership of Electric Utilities[1]

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**Abstract:** Berle and Means (1932) claimed that "modern" corporations in the United States had diffuse ownership. Their claim characterizes regulated electric utilities until the mid-1990s. But following the 1992 EPACT deregulation, block ownership in utilities increased sharply, relative to a matched sample of non-utilities, which already had large blocks by the 90s. The post-EPACT blocks in utilities were not long-term investments by monitors but short duration speculative investments. With the financial crisis of 2008, large active investors are replaced by asset managers. In sum, dispersed ownership arose through the regulatory protections introduced in the 1930s and disappeared following their repeal.

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# 1. Introduction

Ever since the publication of Berle and Means (1932) classic *The Modern Corporation and Private Property*, ownership dispersion and the separation of ownership and control have been core issues in the theory of the firm, corporate law, corporate finance, and politics. While Berle and Means saw the advent of the modern corporation as a fundamental threat to capitalism, with dispersed ownership undermining the efficient and responsible operation of large corporations, others have argued that on the contrary dispersed ownership is the culmination of capital market efficiency, a desirable and inevitable consequence of portfolio diversification by risk-averse investors. According to this latter analysis, what had prevented the full dispersion of ownership was the lack of legal protection of small shareholders. Concentration of ownership was a necessary but inefficient response by shareholders to protect their investments from expropriation actions by management. Once securities laws protecting small shareholders were in place shareholders could safely diversify their holdings (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998, or in short LLSV, 1998).

It is important to note, however, that Berle and Means' empirical analysis of ownership dispersion predates the passage of federal securities laws in 1933 and 1934, and although their arguments about the dangers of the separation of ownership and control significantly contributed to the future passage of legislation protecting small shareholders in publicly traded companies, diffuse ownership was a reality even before the introduction of these shareholder legal protections. One set of firms that displayed particularly dispersed ownership before 1932 is firms in regulated industries, in particular AT&T.

In this paper we focus on regulated electric utilities, which for a long time have had the reputation of being quintessential "widows and orphans" stocks. As Demsetz and Lehn (1985) have suggested, monitoring by a regulator could be a substitute for monitoring by a large shareholder, in which case one might expect to see more ownership dispersion in regulated companies. Indeed, Holderness, Kroszner, and Sheehan (1999) find such evidence in two cross-sections of US publicly traded firms, 1935 and 1995.

Interestingly, however, it turns out that how the company is regulated matters for ownership dispersion. In a nutshell, we show that regulations that reduce operational risk, such as rate-of-return regulation for electric utilities, do not offer sufficient protection to small shareholders. It is only when regulations also reduce financial risk, in particular risk associated with mergers and acquisitions, that we see substantial ownership dispersion. The critical legislation that severely restricted electric utilities' discretion to engage in financial transaction is the Public Utilities Holding Company Act of 1935 (or PUHCA). There were essentially no mergers during the entire period (1935-1992) in which PUHCA was intact and throughout this period we see remarkably dispersed ownership.

Our empirical analysis begins with the repeal of key sections of PUHCA under the Energy Policy Act of 1992 (or EPACT). Our leading hypothesis is that following the repeal of PUHCA we should observe renewed concentration of ownership in electric utilities and greater block ownership. If small shareholders are exposed to greater financial risk, we should see a gradual erosion of ownership dispersion and more block ownership. We track the evolution of block-ownership of nearly 100 utilities. Of these 65 were included in either the S&P large-cap 500 or mid-cap 400 in 1992. We match these to 65 non-utilities and trace the evolution of block ownership in the utilities relative to that of the matched sample from 1993 to 2012, relying on the beneficial ownership filings of publicly traded companies to the SEC.

Our central finding is that although ownership concentration was much larger in the control group of non-utilities in 1993, by 2012 ownership concentration in utilities had essentially caught up with that of non-utilities. The change is shown in figure 3 which includes all large blocks. Over 60% of utilities had no ownership block greater than 5% in 1993 against only 38% for non-utilities. Moreover, over 30% of non-utilities had total block-holdings exceeding 20%, while the only such large ownership concentration in any utility was the passive block in Duke Power and Light held by the Duke Charitable Trust. By 2012, the transition of utilities' ownership structures towards those seen for non-utilities is essentially complete, and the distributions of ownership for utilities and non-utilities are nearly identical, as can be seen in Figure 3. This catch-up effect of deregulation on ownership concentration in electric utilities is strongly reflected in our highly significant difference-in-difference Tobit regression estimates that reveal a 0.96 percentage point average addition per year in ownership concentration in utilities relative to non-utilities.

We break ownership blocks down into "passive" and "non-passive" block categories, the latter being blocks held directly by individuals or active funds and the former being investments held by passive asset managers such as Vanguard or BlackRock. We ask whether the increase in ownership concentration in electric utilities is primarily a phenomenon explained by the growing ownership share and concentration of passive asset managers. Interestingly, we find that before the financial crisis of 2007-2009 there was a sharp relative increase in non-passive ownership concentration in utilities, but this trend reverses after the financial crisis, and the continued increase in concentration in ownership in utilities is largely explained by the growth of blocks held by passive owners (see figure 4). By 2012, non-passive investors had exited from large block holdings in electric utilities. Average block holdings of non-passive investors in utilities were barely higher in 2012 than in 1993. The "modern corporation" of diffuse ownership by individuals was reborn as one of diffuse ownership through indexed funds, ETFs, and other intermediated small block investments. These findings support the view of Demsetz and Lehn (1985) and Holderness, Kroszner, and Sheehan (1999) that monitoring by regulators is a substitute for block-holder monitoring, and—as we have conjectured—that when the regulatory straightjacket is loosened one should expect monitoring by large block-holders to appear. One important caveat, however, is that part of the greater concentration of ownership in utilities we have seen is simply due to the rise of large passive asset managers, who do not do much monitoring.

In addition, a closer look at the effects of EPACT on ownership concentration reveals that far from drawing in sustained monitoring and active governance of block-owners, deregulation mainly resulted in extremely short duration investments by block-holders that resemble speculative bets more than monitoring stakes. We compare the duration of the longest held non-passive ownership block in utilities and non-utilities and find that holding periods for utilities are significantly shorter than for non-utilities. The fraction of blocks with holding periods no longer than two years is over 40% for utilities, while it is around 20% for non-utilities, and the fraction of blocks held for more than sixteen years is less than 3% for utilities, while it is over 20% for non-utilities. Our disaggregated difference-in-differences regressions reveal that the average maximum holding period of blocks in utilities is 3.7 to 3.8 years shorter than in non-utilities, so that the increase in ownership concentration in utilities does not appear to have induced a similar stable block-owner governance as seen in non-utilities.

Besides comparing changes in ownership concentration in utilities relative to a matched sample of non-utilities, we also compare changes in ownership concentration in utilities operating in states that have deregulated post EPACT to those for utilities that are based in states that did not deregulate their electricity industries. Following the passage of EPACT twenty-two states and the District of Columbia restructured their electricity industry over a five year period that begins in 1996 and ends after the California energy crisis in 2001, which essentially stopped all further state deregulation actions in their tracks. Restructuring mostly involved introducing competition in wholesale electricity markets and separation of utilities into distributing and generating firms.

Exploiting this natural experiment, we are able to compare changes in ownership concentration in utilities before and after deregulation across deregulated and non-deregulated states. Although the differences are less pronounced than for those comparing utilities to a matched sample of non-utilities, we find a significant positive effect on non-passive ownership concentration in utilities in deregulated states.

A basic question with any natural experiment is whether the "treatment" is truly exogenous. Could state deregulatory legislation be in any way the consequence of the build-up of ownership blocks in utilities in deregulated states? To address this concern, we undertake an instrumental variable analysis, using the level of electricity prices in a state, the political affiliation of the governor of the state, and an interaction term to instrument deregulation. In the first stage we perform a discrete time survival analysis using logit and find that states with high electricity prices and Republican governors were significantly more likely to deregulate. In the second stage we do both a two-stage least squares and a two-stage residual inclusion estimation as first proposed by Hausman (1978) and learn that utilities in states that are predicted to remain regulated have lower ownership concentration. That is, when we compare the estimated coefficients for the deregulation explanatory variable for ownership concentration in the difference-in-differences estimation, treating state deregulation as an exogenous event, to the coefficient in the two-stage least squares estimation for the predicted deregulation probability, we find that the former is smaller and statistically insignificant, while the latter is strongly significant.

All in all, we find strong and robust evidence of the protective effects of electric utility regulation for investors, explaining why regulated utilities stand out as quintessential widows and orphan stocks, with the most dispersed ownership-structures of any publicly traded companies. An important novel insight of our analysis is that not all regulations are equal. Nearly all the states that undertook some form of restructuring of their electricity industries continued to impose some form of rate-of-return regulation of electricity prices, thus largely shielding investors from operational risks (an important exception is California). However, restructuring exposed investors to substantial financial risk through mergers and acquisition transactions.

Two notorious cases perfectly illustrate the extent of such risks for investors. One is the fate of Montana Power & Light following deregulation of the Montana electricity industry in 1997. The CEO of Montana Power & Light quickly moved to transform the electric utility into a dot-com company, selling its electricity generation operations and renaming the company Touch America. What ensued is a sharp increase in electricity prices and the collapse of Touch America after the dot-com bubble burst.[2] The other is Portland General Corporation, which was acquired by Enron in 1997 after Oregon moved to deregulate its electricity industry. What followed is again a huge increase in electricity prices, the wipe-out of shareholders after the collapse of Enron in 2002, and the loss of pension savings for

[2] See "How Big Sky Went Dark" by D. McNamer, *New York Times* April 6, 2008

Portland General employees.[3] With Enron in bankruptcy, Portland General was put up for sale. The Oregon Public Utility Commission rejected the sale of Portland General to the only willing acquirer in 2002, the hedge fund Texas Pacific Group. It eventually emerged from the Enron bankruptcy in 2006 as the independent electric utility Portland General Electric Corporation.

It is primarily the emergence of this financial risk for investors that caused the transition from dispersed to concentrated ownership. Indeed, as Anderson (1980) and Joskow (1989) have pointed out, during the 1970s regulated utilities were exposed to substantial operational risk as a result of the oil price shocks and rising concerns over the safety of nuclear power. Yet, ownership dispersion barely changed over this period. One may infer from this experience that monitoring and corporate governance have less to do with controlling operational than financial risk.

*Related literature.* Since the publication of Berle and Means (1932) the ownership structure of public corporations and its determinants have been the subject of continued theoretical interest[4] and of somewhat more episodic empirical scrutiny. The next major empirical investigation of the extent of ownership dispersion of the 200 largest US corporations after Berle and Means is by Larner (1966), who finds that the cross-section of 1963 exhibits substantially more ownership dispersion than the cross-section of 1929, which was the focus of Berle and Means. Demsetz and Lehn (1985) changes the focus of previous empirical research by pointing out that that there is substantial heterogeneity in ownership concentration across firms, and asking what determines why some firms have block-holders and others not. Holderness and Sheehan (1988) focus exclusively on publicly traded firms that have a majority owner (they identify over 650 such firms, representing roughly 5 percent of all listed firms) and find that about half of these owners are individuals and the other half are corporations. One of their novel findings is that controlling owners behave differently depending on whether they are corporations or individuals.

One reason why empirical studies of ownership structures have been so sparse until recently, is that systematic data on ownership of corporations was not easily obtainable. Until the emergence of the SEC's EDGAR system the hand-collection of ownership-block data across many companies could be challenging. With the growing availability of detailed datasets on ownership concentration, a more complex picture has emerged than the sweeping Berle and Means representation of separation of ownership and control for most publicly traded corporations. For instance, a surprising finding of the European Corporate

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[3] See "Enron's Havoc Spills Over to a Utility in Oregon" by D.C. Johnston, *New York Times* February 2, 2002

[4] See Becht, Bolton and Roell (2007) for a survey of the theoretical literature.

Governance Network ( 1997) report, the first systematic exploration of the newly available data on corporate ownership in Europe, was that, with the notable exception of the U.K., ownership of public companies was largely concentrated in European countries (see also Becht and Mayer, 2001). Similarly, Holderness (2009) has shown that block-ownership is widespread in a representative sample of 375 U.S. firms, and that ownership concentration in the U.S. is similar to that found in other countries.

The new evidence of different corporate ownership patterns across countries prompted LLSV (1998) to hypothesize that optimal diversification and ownership dispersion were more likely to be attained if there were strong legal protections of small shareholders in place. Although their study found evidence of a link between ownership dispersion and minority shareholder rights, several studies have subsequently called their main finding into question. In particular, in a much more detailed and comprehensive cross-country study than LLSV (1998), using only firm-level observations, Holderness (2016) has shown that the LLSV index of investor protection and other such measures are statistically insignificant. Moreover, Spamann (2010) has found that the LLSV index of legal protection contains multiple inaccuracies and that "[out] of forty-six countries, thirty-three required correction. The correlation between the corrected and the original [index] is only 0.53." He goes on to show that the positive association between greater legal protection and ownership dispersion does not hold with the corrected index. Franks, Mayer and Rossi (2008) have also shown that the evolution towards ownership dispersion in the U.K. preceded the introduction of greater legal minority owner protections, and was mostly caused by mergers and acquisitions.

The link between regulation and ownership dispersion has first been suggested by Demsetz and Lehn (1985), and Holderness, Kroszner, and Sheehan (1999) have found supporting evidence of this relation. The two most closely related studies to ours are by Kole and Lehn (1999), who study the effects of airline deregulation on ownership concentration, executive compensation and board composition, and Lehn (2002), who looks at the effects of deregulation in the telecommunication industry. While the former study finds a shift towards greater concentration in the airline industry following deregulation, the latter finds no such shift in telecommunication firms.

Section 2 provides an overview of electric utility regulation and deregulation as well as a description of utility ownership structures and governance before the passage of PUHCA in 1935, and following the enactment of PUHCA until its eventual partial repeal by the EPACT of 1992. Section 3 describes the data. Section 4 analyzes the relative changes in ownership concentration in electric utilities and a matched sample of non-utilities from 1993 to 2012.

Section 5 turns to an analysis of the differences in duration of block ownership in respectively utilities and non-utilities. Section 6 analyzes the different evolution in ownership concentration across utilities in respectively states that have restructured their electricity industries and states that have not. Finally, Section 7 offers some concluding comments.

## 2. Governance of Public Electric Utilities: The Archetypal *Berle and Means* Corporations

The most extreme example of a corporation where ownership became separated from control according to Berle and Means (1932) was AT&T, which had 642,180 shareholders in 1931, with the largest shareholder owning no more than 0.70% of stock. They explained that "The date of appearance of [the semi-public corporation and the degree of its dominance have in general varied with two factors, the public character of the activity in question and the amount of fixed capital necessary to carry on the business. It came first in the fields of public utilities, common carriers, banks and insurance companies." [Berle and Means, 1932 p. 17]

Along with AT&T, public electric utilities also became archetypal Berle and Means corporations in the wake of the Public Utility Holding Company Act (PUHCA) of 1935. Indeed, the utilities quickly were seen as the quintessential *widows and orphans* stocks, offering stable dividend income to their shareholders. As with AT&T, they were natural monopolies, with a secure profit guaranteed by rate regulation. Their stable business models, combined with regulatory oversight, gave small shareholders sufficient comfort to be willing to invest in these corporations even though they had effectively no control over management.

Electricity markets experienced a long period of stability until the oil price shock of 1973. However, with rising inflation, continuing volatility in oil markets, and rising costs of nuclear power plants due to mounting safety concerns, the electricity regulatory framework inherited from the Great Depression was under considerable stress in the 1970s and 1980s. In particular, electricity rate increases petitioned by utilities to cover their rising costs of electricity generation were the subject of heated political battles (Joskow, 1989).

As we explain below, while a natural monopoly position and rate regulation could dampen operating risks for investors, this alone did not provide sufficient protections to widows and orphans. It is the combination of low operating risk *and* low financial risk that made electric utilities particularly attractive investments. Operating risk increased substantially with the spike in energy prices in the 1980s. Some utilities responded by suspending or decreasing their dividends (Anderson, 1980, pp. 22-23). But financial risk remained low in this period and that, it turns out, was the determining factor for widows and orphans. The low financial risk was not a given, but the outcome of PUHCA, which was designed to curb the excesses of financial speculation that had occurred in the years leading up to the crash of 1929.

### *2.1 Archetypal Widows and Orphans Stocks post-PUHCA*

At the dawn of the deregulation era, beginning in the late 1970s, the electric power industry was heavily regulated at both the state and federal levels of government. In addition to electricity rate regulation by state commissions, introduced at the turn of the 20th century (Anderson, 1980, pp. 4-16), PUHCA severely restricted electric utilities' freedom to engage in related activities and financial transactions such as mergers, acquisitions, and the creation of wholly owned subsidiaries. Indeed, PUHCA's central provision was the restriction imposed on publicly traded investor-owned electric utilities (IOUs) to only two corporate layers, a top holding company layer and a lower operating company layer. Moreover, electric utility holding companies were banned from owning affiliates that were not geographically contiguous or were non-utility businesses.

The passage of PUHCA essentially froze the electric power industry in place for over half a century. By the end of the 1970s it comprised nearly 100 publicly traded IOUs out of a total of about 280 IOUs. We found 97 electric utilities on the SEC's Edgar system in 1993, which marks the end of the PUHCA era. The typical publicly traded IOU only covered a portion of a single state and was subject to the state's public utility commission rate-of-return regulation. Over this period merger and acquisition activity was virtually non-existent. The private sector represented about 70 percent of the output of the industry. The remainder fell to the federal government's TVA, to hydroelectric production in the west, to some large municipal utilities, including Los Angeles, Sacramento, Austin, and Seattle, and to nearly 3000 much smaller organizations that were either in the public sector or cooperatives (see publicpower.org). Deregulation left the public sector untouched. A notable consequence is that Los Angeles and Sacramento escaped the blackouts that infected most of California in 2000 and 2001.

These tight New Deal regulations, and the exceptionally long period of stable and falling energy prices from the end of World War II to the first oil shock of 1973, go a long way in explaining why electric utilities came to be perceived as particularly attractive stocks for widows and orphans, and why their stock ownership was so widely dispersed. It is remarkable that of the 86 publicly traded electric utilities for which we were able to obtain the beneficial ownership SEC filings for 1978, there was only one instance of an active large block investor. This was Richard Green, the president of Missouri Public Service, who with his "associates" owned 16% of the company. In sum, 85 of 86 electric utilities had completely diffuse ownership in 1978.[5]

The example of *San Diego Gas* & *Electric*, which remarkably included information on the distribution of ownership by gender in its annual reports from 1982 through 1996, also provides a striking illustration of the meaning of *widows and orphan*s stocks for regulated publicly traded utilities. Figure 1 compares the percentage held by men and women (with fiduciary and trustee accounts not included). It can be seen that before the passage of the Energy Policy Act (EPACT) in 1992, which paved the way for deregulation of the power industry, female investors predominate. After 1992 there is a switch to males (the 1992 data are for December 31, after the passage of EPACT), which we attribute to the fact that the passage of EPACT was perceived as an increase in risk for investors, an increase that was less appealing to female than to male investors.

## *2.2* Pre-PUHCA Industry Structure and Governance: The Holding Company Era

The era preceding the passage of PUHCA provides a powerful illustration of the financial risks investors in electric utilities could be vulnerable to. This era begins at the end of the 19th century, with electrification and the expansion of the electric power industry. In the early years of electrification, investor-owned electric utilities were competing with municipal owned operators. The combination of high fixed capital outlays, free entry, and unbridled competition was a source of considerable uncertainty and pricing risk, which a number of constituencies sought to reduce. As Anderson (1980, pp. 4-12) describes, the introduction of regulation through the newly created state electricity and gas utility commissions was the result of an unlikely political alliance between the investors in IOUs on the one hand and a coalition of progressives, organized in the National Civic Federation, on the other. While the latter sought to protect customers against the risk of excessively high electricity rates charged by local monopolies, the former were eager to limit competition from municipal utilities. Both wanted to avoid regulation by urban political machines. Following the early lead of

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5 80 had no large blocks, 4 had blocks over 5% held by trustees of employee savings plans (Edison International, PG&E, Sempra, and TNP Enterprises), and the Duke Charitable trust held 20% of Duke Power. The SEC's Edgar database begins in 1993. Before 1993, we were only able to make a partial collection of data from microfiche and CDs in the Baker Library at the Harvard Business School, and from other sources. Consequently, we have data on fewer utilities in 1978 than in 1993. Although we make no further use of the pre-1993 data in this paper, the data will be included in the data spreadsheet that we will post online.

Wisconsin and New York, who first introduced state commissions to regulate electricity markets, nearly two-thirds of the states passed similar legislation between 1907 and 1911

Although the state commissions dampened competition and protected customers against "unfair" or "unreasonable" electricity rates, they did little to protect investors in electric utilities against the financial risks associated with the subsequent expansion and consolidation of the industry. If there is one name associated with the industry over this period it is that of Samuel Insull, the president of *Commonwealth Edison*, who aggressively pursued a policy of expansion and consolidation of smaller utilities, financing acquisitions with preferred stock and bond issues, and in the process building a highly levered, complex, and opaque pyramid of electric power companies. This expansion came to an abrupt end in 1932 with one of the most spectacular collapses of the Great Depression. In his account of the rise and fall of the "House of Insull", Skeel (2005) makes a fitting analogy with the 2002 corporate scandals of *Enron* and *Tyco*, companies that also built their spectacular growth on a complex and opaque web of subsidiaries and acquisitions. The passage of PUHCA was a direct response to the abuse of corporate pyramid structures by Samuel Insull and the obfuscation of risk they epitomized. Today's direct successor to *Commonwealth Edison* is *Exelon.*

### *2.3 Back to the Future: Deregulation, PURPA 1978, EPACT of 1992.*

The oil price shock of 1973 inevitably led to a reassessment of existing electricity generation systems, and to calls for increased efficiency in electricity production and consumption. Thus, a direct consequence of the quadrupling of oil prices between 1973 and 1974 was the passage of the Public Utility Regulatory Policies Act of 1978 (PURPA), the first step in federal deregulation of the electric power industry since PUHCA. PURPA required electric utilities to purchase electricity from lower cost non-utility electricity producers (so called Qualifying Facilities), and thus opening the way for the creation of a wholesale electricity market.

PURPA's goal of promoting greater efficiency in electricity generation took place in the context of a broader economic debate on the structural inefficiencies caused by existing rate-of-return regulations, which provided little incentive to minimize cost or limit investment in excess generation capacity. This economic debate reinforced the growing political appeals for wider deregulation and for greater reliance on market incentives. The culmination of this wave of political support for deregulation was the passage of the Energy Policy Act of 1992 (EPACT), which sought to deregulate electricity pricing and rely instead on competition in wholesale and retail electricity markets.[6] To help develop these markets EPACT removed regulatory barriers to facilitate entry of independent power generators (so called Exempt Wholesale Generators (EWGs), which were exempt from the restrictions imposed by PUHCA on IOUs). Moreover, to help establish a level-playing field in the emerging electricity markets EPACT allowed registered holding companies to acquire EWGs even if they operated in geographically separate markets, thus further weakening the reach of PUHCA. Problems with nuclear power may also have abetted deregulation. In 1988, Public Service Company of New Hampshire was forced into bankruptcy from costs of the Saybrook nuclear plant. This forced a rare interstate, albeit geographically adjacent, merger as the New Hampshire firm was acquired by Northeast Utilities.

The passage of EPACT in 1992 opened the way for action by state governments, which had ultimate jurisdiction over deregulation of utilities operating in their respective states. In other words, although EPACT exempted wholesale generators from PUHCA and permitted foreign ownership of US utilities or investments abroad by US utilities, it largely retained states' ability to regulate mergers and pricing of distributing utilities and the establishment of wholesale generating plants within a state. In the following years many states initiated and enacted restructuring legislation and by the end of the decade 22 states and the District of Columbia had passed such legislation (see Figure 2).[7] This movement towards electric utility deregulation came to an abrupt halt following California's electricity markets crisis in 2001. Since then some states have reversed their deregulation steps (again see Figure 2) and all other states that had not introduced any restructuring legislation by 2001 left their regulated electricity sectors intact.

The long period during which PUHCA was enforced was a period of exceptional stability for investors, who faced little operating and financial risk. This is why publicly traded IOUs

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6 The political support for all forms of market deregulation in the last quarter of the twentieth century was overwhelming. In particular, the conference reports on EPACT passed with only 8 dissenting votes in the Senate and 60 in the House. Even fewer votes were recorded against passage. Source: thomas.loc.gov.

7 See *Public Utility Holding Company Act of 1935:1935-1992, DOE/EIA- 0563 Distribution Category UC-950* (1993), and REPORT TO CONGRESS ON COMPETITION IN WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY (2005).

came to be seen as the quintessential *widows and orphans* stocks. The longer this stability of the electric power industry was maintained the less the reasons for the enactment of PUHCA were remembered, and the more the regulations limiting the scope of activities of IOUs and their corporate structure came to be seen as unnecessary and cumbersome, so much so that by the 1990s the SEC not only relaxed its enforcement of PUHCA but openly advocated its repeal. However, the partial repeal of PUHCA following the passage of EPACT brought back some of the financial risks and accounting obfuscations that PUHCA sought to eliminate, and enabled energy companies such as *Enron* to take advantage of the laxer regulations. Given the increased financial risks investors in electric utilities faced post EPACT, it is to be expected that *widows and orphans* would migrate out of electric utility stocks. Our gender evidence for San Diego Gas and Electric illustrates out-migration. Restructuring meant a leap into uncertainty and financial risk. Investment in non-utility businesses and interstate mergers further increased risk, even for utilities operating in non-restructured states. Political uncertainty over restructuring policy and approval of mergers was an additional source of risk.

This increase in risk indicates two hypotheses, both of which suggest that the quintessential diffuse, Berle and Means, ownership would be replaced by the presence of large block holdings. One hypothesis is that large blocks would be acquired by more activist shareholders, who would have an incentive to monitor management more closely. These activists would be long-term investors. The other is that the large blocks would be purely speculative. These investors would be short-term, in and out. We next turn to a systematic exploration of these hypotheses.

## 3. Data

To test hypotheses on block holdings in electric utilities, we collected comprehensive annual data from 1993 through 2012 on publicly held IOUs. This data was collected through the SECs Edgar system. A large block was defined as any block of 5% or greater of common stock reported as beneficial ownership. Block-holdings in electric utilities are likely to reflect the impact of factors other than deregulation, most notably the development of large blocks held by major asset managers, such as BlackRock and Vanguard, in the indexed mutual fund and ETF markets. It was imperative, therefore, that we construct a matching sample of non-electric utility firms to benchmark our results for electric utilities. We next describe how we constructed our set of electric utilities and our matched sample of non-utility firms.

3.1 *Sample of Electric Utilities.* We assembled our sample of 97 investor-owned, publicly traded, electric utilities in 1993 from various sources, including the list of companies posted by FERC on its website (http://www.ferc.gov) in 2005 and later years, the list of investor-owned electric companies posted on the Edison Electric Institute's website (http://www.eei.org), and 10-K filings on EDGAR. We then tracked mergers and acquisitions of electric utilities from 1993 onwards from 10-K filings and by consulting the filings of these transactions on the FERC website (http://www.ferc.gov/industries/electric/gen-info/mergers). The M&A listings and histories posted on company web sites allowed us to identify IOUs that existed in 1993 that had ceased to exist by 2005 and were no longer identified in more contemporary online listings.

3.2 *Matching sample of non-utility companies.* In matching, we considered all electric utilities that were listed in either the S&P 500 or in the S&P midcap 400 index in 1992 (before the passage of EPACT) or in the S&P 1500 for 1995.[8] Our final match chose 65 non-utilities to match 65 utilities that were in the S&P in 1992. We used the genetic matching algorithm proposed by Diamond (2013) and identified non-utility companies that best matched our utility companies along the following variables: i) total assets; ii) total debt in current liabilities; iii) total long-term debt; iv) property, plant and equipment; v) earnings before interest and taxes; vi) net income/loss; vii) capital expenditures; and, viii) number of employees. We collected Compustat data from WRDS on these variables for the fiscal years 1991, 1992, 1994, and 1995. A primary criterion for variable inclusion was that there is no missing data for utilities. We chose our final match using 1992 S&P membership because, i) few firms were added using the small cap, ii) 1992 was pre-EPACT, and iii) there was missing data on employees for some firms in 1994 and 1995.

We followed Holderness (2009) and hand-collected the block ownership data directly from firms' SEC filings. We have searched all DEF 14A filings for all the companies in our sample for all the years from 1993 to 2012 during which these companies are listed.[9] We coded investors into groups that could be filtered in terms of large blocks that would not be active monitors of management. Foremost among these were Employee Stock Ownership Plans (ESOPs) or any other block containing the word "employee". Second, large blocks held by charitable trusts or foundations created by firm founders. The only such trust was the Duke Charitable Trust in Duke Power and Light. Third, we created a category for commercial

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[8] The 1995 lists allowed us to add a few utilities that were in the S&P small cap 600; S&P did not have a small cap 600 in 1992.

[9] In the absence of block ownership data in DEF 14As, we further searched 10-Ks.

banks, since these were disabled by law from activism. Fourth, we identified large blocks held by the largest institutional investors as of 2015. These were Vanguard, BlackRock, Barclays (before the acquisition of Barclays Global Investors (BGI) by BlackRock), Fidelity, Capital Research, Goldman Sachs, Prudential, BNY Mellon, J.P. Morgan Chase, Franklin Resources, and Deutsche Bank. We also recoded affiliated entities under a single parent holding company name. For example, "Fidelity" and "FMR" were recoded under a single name as were "Vanguard" and "Vanguard Windsor". In addition, while BNY Mellon and J.P. Morgan Chase have commercial banking operations, we elected to group them with large institutional investors.[10]

Tables 1A and 1B report summary statistics for utilities and non-utilities. The first table (1A) provides the number of utilities and non-utilities in our sample for the years 1993, 2003 and 2012. In 1993, the first year of our sample period, there were 97 utilities and 63 non-utilities.[11] By 2012 the respective numbers of utilities and non-utilities has shrunk to 51 and 25 respectively. The decrease in the number of firms over this period is mostly due to mergers, but some firms also disappear from our sample as a result of delistings following acquisitions by private equity investors (TXU Corporation) or by non-electric utility firms (Enron and Portland) or by foreign electric utility firms (Emera and Bangor Hydroelectric).[12] Table 1A also reports the means and standard deviations of the sum of block-ownership stakes (excluding employee stock ownership plans and ownership stakes held by banks). In 1993 non-utilities had much more concentrated ownership, with a mean total sum of block-ownership stakes of 14.08% against 3.5% for utilities. By 2012 these ownership concentration measures had grown to respectively 20.24% for non-utilities and 19.72% for utilities. Statistical tests show no significant differences between utilities and non-utilities in 2012.

Table 1B provides the summary statistics of the matched utility and non-utility samples for the year 1992 preceding the passage of EPACT. It reports the balance sheet entries we used to do the matching of the 65 largest utilities and 65 non-utilities. For comparison it also

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[10] A complete list of all large block investors in both the utility and non-utility samples is provided in an Excel spreadsheet available at Google docs as https://docs.google.com/spreadsheets/d/16l5FLKr30TuRHmi62DBgIH_BMk0ZNAQhD5Iyy0yUj3c/edit?usp=sharing. The spreadsheet also shows how the names that appeared in SEC filings were recoded and gives the average percentage block size reported for the investor and the largest percentage block ever held by the investor.

[11] Two of the 65 non-utilities from the 1992 match no longer existed in 1993.

[12] The Enron bankruptcy also gave rise to the one "birth" that occurs in our sample. The Portland General Corporation, the utility in Portland, Oregon, was acquired by Enron in 1997. The utility assets are then spun off and removed from bankruptcy in 2006 as the Portland General Electric Corporation.

reports the balance sheet entries for the 762 non-matched, non-utilities.[13] (A few firms disappeared between 1992 and 1993. They are included in Table 1B but not in Table 1A.) The 65 utilities and matched non-utilities are very similar, with mean total assets of respectively 6.5 billion dollars for utilities and 6.3 billion dollars for non-utilities. The two samples are also very similar in terms of their mean liabilities (current and long-term debt) or mean reported earnings before interest. The main difference is in mean PP&E, which is larger for utilities ($5.1 billion) than matched non-utilities ($3.9 billion). The matched non-utilities, however, resemble the utilities far more closely than the non-matched, non-utilities which have a mean PP&E of only $1.6 billion. Two other important differences are CAPX and the number of employees. The mean CAPX of utilities was ($371 million), while for matched non-utilities it was somewhat larger ($563 million). As for the mean number of employees (thousands), it was 8,175 for utilities, and 13,974 for matched non-utilities, and 26,589 for non-matched, non-utilities, again a much larger difference. Overall, the matched non-utilities are similar to utilities in terms of their size, the physical capital-intensive nature of their operations, and their higher than average leverage.

In Table 1C, we report the distribution of SIC codes for our 65 S&P utilities, the 65 non-utilities that were matched to them, and the 762 non-utilities that were in the S&P 900 for 1992 but not matched. The first part of the table looks at the first digit of the SIC code. All our utilities have first-digit 4 as against only 46% of the matches and 7% of the non-matches. None of the matches have codes 0, 3, or 8 (agriculture, mining, business services) but 31% of the non-matches are in these three categories. Only one matched firm is in financial services as against 14.3% of the non-matches.

The second part of the table looks at the second digit within the "4s". All of the utilities are 49. Of the 30 matched firms in the 4s, only 13 are 49. These are predominantly natural gas companies that do not have electric operations, such as Consolidated Natural Gas and Williams. Waste Management is another matched 49. The non-matched firms are more likely to be airlines or in communications. In sum, table 1B indicates that the matched firms are similar to utilities, whereas the non-matched firms are quite different. Table 1C shows that both matched and non-matched firms have SIC codes that are different from utilities. Moreover, the non-matched firms' SIC codes are not similar to the matched non-utilities. Since the SIC code was not used by the matching algorithm, table 1C indicates that the matching algorithm rather sharply distinguished the 65 matched firms from the 762 non-

[13] Because of missing data on some non-utilities in WRDS, our matching algorithm used only 892 of the 900 S&P firms.

matched firms. Lists of the 65 utilities and the 65 matched non-utilities are provided in the Appendix.

## 4. The Return of Block-holding after EPACT 1992

Both historical precedent and economic theory indicate that after the passage of EPACT the ownership structure of publicly traded electric utilities should be expected to undergo a transition away from dispersed ownership towards more concentration and block ownership. Indeed, as Berle and Means (1932) point out, ownership of electric utilities prior to the passage of PUHCA in 1935 was concentrated in the hands of large block-holders. Not only that, but by 1930 nearly all operating companies were controlled by only 19 holding companies, under extremely opaque pyramidal structures, with further concentration of control through interlocking boards of directors (Department of Energy Report DOE/EIA-0563, 1993). So EPACT would be expected to return utilities to the large block holding present before PUHCA. In addition, economic theory suggests that the passage of EPACT would expose shareholders in electric utilities to greater financial risk, greater regulatory risk, greater governance risk, and possibly greater operating risk, inducing small, uninformed, passive investors to seek safer ground, and attracting wealthier, more sophisticated, professional investors, with greater risk appetite, to an asset class that became more dynamic as a result of deregulation.

We find compelling evidence of such a transition. To identify this transition in ownership structure, we compare the evolution of ownership of electric utilities, the size distribution of blocks over 5%, to the evolution of ownership in our matched sample of non-utilities from 1993 to 2012. A first set of observations indicating that such a transition has taken place is given in Figure 3, which presents the distributions of total block ownership for respectively all utilities and non-utilities in our sample for the years 1993, 2003 and 2012. As can be seen in the two panels for 1993, while over 60% of utilities had no ownership block, only 38% of non-utilities reported no ownership stake greater than 5%. In addition, essentially no utility had total block ownership exceeding 20%, whereas over 30% of non-utilities were owned by such concentrated block-holdings. Ten years later the block-ownership distribution for utilities and non-utilities had markedly changed, as the panels for 2003 indicate, reflecting the first effects of deregulation. Thus, the proportion of utilities with no ownership block had dropped below 20%, which is more in line with the proportion of 15% of non-utilities with no ownership block. And, the proportion of utilities with a total block ownership greater than 20% increased to over 20%. Basically, both the distribution for utilities and non-utilities exhibits a first-order stochastic shift to the right, with an apparent more pronounced shift for utilities. In a few non-utilities in 2012, a majority of the shares were held by large blocks; otherwise, the distributions for utilities and non-utilities look very similar by 2012, as the last two panels indicate.[14] Thus, based on this admittedly broad-brush analysis, it appears that by 2012 the transition of utilities' ownership structures towards those seen for non-utilities is nearly complete.

This is confirmed in Figure 4, which plots the mean total block share for utilities and non-utilities. (To facilitate comparison with non-utilities, this figure, and all later results in the paper, uses only utilities that were in the S&P 900 in 1992. The Appendix provides many results for alternative data specifications that show robustness.) The left panel, which includes all ownership blocks, clearly shows the transition from dispersed to concentrated ownership for utilities. Mean block-holdings for non-utilities hovered around 20% from the mid-1990s to 2012, with a dip around the financial crisis. In contrast, mean block-holdings for utilities rose from 5% in the mid-1990s to nearly 20% by 2012. The right panel plots mean total block shares after excluding what we refer to as "passive" blocks, namely ESOPS, blocks held by a bank as custodian, the Duke trust, and blocks held by the largest asset managers (see note 16), who are either implementing passive index or ETF-based investment strategies for their owners, or remain passive in governance. Interestingly, while the mean holdings (excluding these passive blocks) for non-utilities were around 10% over this period, the mean block-holdings for utilities rose sharply until the beginning of the financial crisis of 2007-2008, and thereafter significantly declined. A somewhat smaller decline is also visible for non-utilities. Both declines reflect the fact that asset holdings are increasingly concentrated in the hands of the largest asset managers after the financial crisis. The greater decline for utilities reflects a larger retrenchment by smaller block-holders from the utility sector than the non-utilities.

These aggregate findings for our utility and non-utility subsamples are strongly confirmed in our disaggregated difference-in-difference regression analysis reported in Tables 2 and 3. Table 2 and later results come from an unbalanced panel of firms×years. In Table 2 the dependent variable is the sum of all ownership blocks above 5%. In the first regression, with coefficients reported in column (1) we regress this total block share variable against a dummy variable, Util, taking the value 1 if the firm is an electric utility, an initial time variable, Year (=1 for 1993, =20 for 2012), a time trend variable for utilities only, the

[14] The largest total block size in 2012 was for a non-utility, Overseas Shipping, at 63.9, with the largest investor being the Recanati family at 12.6%. Another family Fribourg, held 6.5%. These families held blocks in Overseas as far back as 1993.

interaction variable Util×Year, and a constant. We observe that utilities start out with a substantially lower ownership concentration than non-utilities. The average total block share for the non-utilities is 17.43% in 1993, 14.18 percentage points greater than the total block share for non-utilities. However, this total block share for utilities rises by 0.573% points each year (statistically significant at the 5% level).

One concern with the OLS regression is that the rising average ownership concentration in utilities after 1993 may be driven by survivorship bias, as the number of utilities in our sample declined from 97 in 1993 to 51 in 2012. To address this concern we run a regression adding firm fixed effects. In this second regression, with coefficients reported in column (2) the explanatory variables are Year and Util×Year. Given that we are adding firm fixed effects we cannot include the dummy variable Util. The coefficient for the interaction term Util×Year is almost unchanged (0.567 instead of 0.573).

Another concern with the OLS regression is that our ownership block observations are censored below the 5% cutoff, the block size above which an SEC filing is required. We therefore also estimate a Tobit model, with and without firm random effects. We set the Tobit threshold at 4.99%, rather than zero, to reflect the 5% cutoff. The coefficients without random effects are reported in column (3) and those for the random effects model are reported in column (4). Again, the coefficient for Util is very significantly negative. Indeed the predicted value for utilities in column (3) in 1993 is -4.28% (=15.59-19.87). This result responds to the fact that two-thirds of the utility observations have no large blocks in 1993 and are censored. However, the total block share for utilities is estimated to rise much faster under the Tobit regressions, with respectively 0.925% and 0.881% points added each year as opposed to 0.573% with OLS. Moreover, the coefficients are statistically significant at the 1% level. Overall our finding that there is a catch-up in ownership concentration in utilities following the passage of EPACT is highly robust to the specification of the estimated model and the trend growth in ownership concentration is highly statistically significant.

As we have highlighted above, over the time-period of our sample a growing fraction of shares is being held by larger and larger asset managers, such as Vanguard or BlackRock. One may therefore wonder to what extent the increased concentration of ownership seen in electric utilities is driven by the increased ownership of shares managed by larger and larger asset managers. A first piece of evidence is provided in the second panel of Figure 4, which plots mean total block shares, excluding the largest asset managers. Although the plot reveals a steeper relative rise in non-passive ownership concentration, this trend appears to be reversed post financial crisis. We explore this finding further in a similar difference-in-difference regression analysis as above, but excluding passive blocks. The findings are reported in Table 3.

Comparing the OLS regression results in Tables 2 and 3, the main changes in the OLS regression are that average total block size obviously declines with the exclusion of passive investors. In the OLS regression, it is 10.58% instead of 17.43% for non-utilities, and 1.83% instead of 3.25% for utilities. More importantly, the interaction variable Util×Year is no longer statistically significant. These findings suggest that the main factor behind the relative rise in ownership concentration in electric utilities was the growing fraction of utility stocks held by indexed funds, or ETFs of large asset managers, mainly BlackRock and Vanguard. However, the Tobit regression results for non-passive ownership concentration are much closer in line with those for total ownership concentration. In particular, the interaction variable Util×Year is statistically significant at the 1% level for both dependent variables.

To provide some intuition on these results, we return to Figure 4. By 2008, average block size had increased in non-utilities as well as utilities, but the increase is particularly sharp for utilities. Then, with the financial crisis, there is a sharp decrease in block holding by active investors in utilities. Figure 4 further shows that our modeling of the catch-up of utilities as a simple time trend fails to capture the consequences of the financial crisis. We consider the financial crisis in greater detail in a later section.

To summarize the more solid results of this section, the general effect of deregulation of electric utilities on utilities' ownership structure has been a trend away from dispersed ownership to concentrated holdings of large blocks.

# 5. In-and-Out Block-holders

The post EPACT increase in ownership concentration in utilities did not result in greater shareholder monitoring by stable block-holders. The new blocks that appeared were more likely to be short-term speculative investments.

This can be seen for example in the evolution of block-ownership of Northeast Utilities, as shown in Figure 5. The figure plots the consecutive holding periods of block-owners in Northeast Utilities over our sample period. As a comparison, we also plot the holding periods of block-holders in a similar sized non-utility (as measured by their market capitalization), Hess Corporation, in Figure 6.

While in Northeast Utilities only one block—Barrow, Hanley, Mewhinney & Strauss—remained for seven years (the longest consecutive holding period), the Hess family held a block in the Hess Corporation for the entire sample period (twenty years). Among the asset managers, the longest consecutive holding periods in Hess are by Dodge & Cox (eight years), T Rowe Price (seven years), and FMR (six years). This is in line with the holding periods of Barrow, Hanley, Mewhinney & Strauss and Lord, Abbett & Co. in Northeast Utilities. This comparison thus suggests a significant difference in share ownership patterns between Hess and Northeast Utilities: while the latter had a controlling block throughout the sample period, the former did not. Most of the other blocks in either firm are held by asset managers for short periods of time (one to three years). The investment funds that hold for longer periods (e.g. Barrow, Hanley, Mewhinney & Strauss and Lord and Dodge & Cox) are value investors. None of these asset managers are likely to engage in corporate governance as active monitors.

Is this difference in block-ownership dynamics mirrored across the entire sample of utilities and non-utilities? We tackle this question by first undertaking a simple comparison of the durations of block-ownership across utilities and non-utilities over our sample period. To obtain as complete a picture of duration patterns as possible, we look at three measures of duration. The most obvious measure is the number of consecutive years a block has been held. This is what we define as "duration". Given that our sample only contains block-ownership data from 1993 to 2012, we do not always observe the initial year when a block has been acquired, nor do we always observe the final year when a block has been unwound. When a block has been acquired before 1993 we take 1993 as the initial year and when a block is still held in 2012 we take 2012 as the final year. This means that we inevitably underestimate duration of block ownership.

Another measurement issue arises as a result of the exit of firms from our sample before 2012, due to acquisition, transition to private equity, or bankruptcy. [15] Obviously, the year when a firm exits is also the final year when a block can be held. The concern with early exit, however, is that measured average duration differences across utilities and non-utilities may be driven by different patterns of exit and not necessarily by differences in block-holding behavior. Accordingly, we also break down our duration measure into both a "duration forward" measure, looking at holding periods from a given year onwards, and a "duration backwards" measure, looking at holding periods back in time from a given year.

[15] In a merger, we keep the acquirer or dominant firm and drop the target. For example, when Unicom and Peco merged to form Exelon, Peco exits the sample. The specification of the sample is documented in the online Appendix.

Table 4 illustrates how the three measures are related by taking the example of Fidelity's ownership block in Hess Corporation. As Figure 6 illustrates, Fidelity was an intermittent block owner of Hess stock over the twenty year period of our sample, first appearing as a block-holder from 1993 to 1999, then again for only one year in 2005, and finally for two years in 2007 and 2008. In the initial year—1993—duration and duration forward are identical, reflecting the fact that our duration measure is initially an entirely forward looking measure. In the final year of the first ownership spell—1999—duration and duration backwards are identical, reflecting the fact that in the final year duration is an entirely backward looking measure. At any time t the three measures are related as follows:

$$\text{duration} = \text{duration forward} + \text{duration backwards} - 1.$$

We are interested in persistent block ownership mainly because continuous ownership, as was the case of the Hess family block in the Hess Corporation, is an indication of active control and monitoring by concentrated owners in the firm. Accordingly, we also separate out all passive blocks (in the form of ESOPs and other "employee" blocks, or blocks held by large asset management firms such as BlackRock or Vanguard) and report separately ownership durations for non-passive blocks.[16,17] Finally, we only report maximum duration of continuous block-ownership in each firm. Active control by concentrated owners may be at work if at least one block-holder is engaged with the firm over the long term, even if other block-holders only appear for brief periods of time. Again, the Hess Corporation is an apt illustration: fourteen other block-holders appear next to the Hess family block over our sample period, albeit for much shorter holding intervals. Based on what is known about their business models, as well as their much shorter holding periods, these other block-holders are unlikely to have exercised any significant form of control. Thus, in the case of Hess, mean duration—the average of all the blocks' consecutive holding periods—would clearly have given a very distorted picture of governance by concentrated owners at Hess; certainly, a less accurate description than maximum duration, which would be twenty years for the Hess family block.

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16 Specifically, we treat as large asset management firms Vanguard, BlackRock, Barclays, Capital Research, Goldman Sachs, Prudential, J. P. Morgan Chase, Franklin Resources, and Deutsche Bank. While this specification could be changed, what matters is treating BlackRock and Vanguard as passive investors. They held blocks in far more firms and years than any other investors.

17 We also look at maximum and mean duration for all blocks and find a similar difference in duration dynamics for utilities and non-utilities as for non-passive blocks.

A first clear difference in duration of (maximum) block-holding periods across utilities and non-utilities is reported in Figures 7 and 8, which plot the duration distribution of holding periods across non-utilities and utilities that have survived until 2012. The advantage of looking at only surviving firms is that we can suppress any differences in duration that are due to differences in M&A activity across utilities and non-utilities. It is immediate to see from Figure 7 that block-holding periods for utilities are indeed significantly shorter than for non-utilities. First, the percent of holding periods that are less than or equal to two years is over 30% for utilities, while it is less than 20% for non-utilities. Second, the percent of holding periods that are longer than sixteen years is less than 3% for utilities, while it is nearly 20% for non-utilities. These differences are even more pronounced when we exclude all passive blocks. As Figure 8 reveals, the percent of non-passive holding periods that are less than or equal to two years is over 50% for utilities, while it is just under 30% for non-utilities, and the percent of non-passive holding periods that are longer than fourteen years is 0% for utilities and nearly 20% for non-utilities.

To explore these differences in holding periods more systematically we turn next to a regression analysis. Specifically, we run disaggregated difference-in-differences regressions with our three measures of maximum duration—duration, duration forward, and duration backwards per firm—as the dependent variables, against the independent variables, Util, Yrsinsample, which gives the number of years a firm survives in our sample, Year, Util×Year, Crisis, a dummy variable taking the value 1 for all the years post 2007, Crisis ×Util an interaction variable of Util and Crisis, and a constant.

Table 5 reports the results for the entire sample. We observe first that all three duration measures are significantly shorter for utilities than non-utilities. This is true when we look at all blocks and when we exclude all passive blocks. All in all, the average maximum duration of blocks in utilities is 3.7 to 3.8 years shorter than in non-utilities. The difference in maximum backward duration, however, is somewhat smaller, with utilities having only a roughly one year shorter maximum backward duration. This reflects the fact that the shorter duration of holding periods of utilities is partly driven by the higher rate of exit of utilities than non-utilities. Second, the high significance of the Yrsinsample variable is due to a purely mechanical positive relation between duration of holding periods and the number of years over which the holding period is measured. The same is true for the Year variable: we should expect a positive trend in mean duration as more years are added. Interestingly, the financial crisis does not appear to have had a significant effect on duration.

Table 6 reports the results for only those firms that survive during the entire sample period. Again, the first striking observation is how much shorter average maximum duration is among surviving utilities compared with non-utilities. Since we only look at surviving firms we exclude the Yrsinsample variable, as this is by definition equal to 20 for all surviving firms in 2012.

In sum, the increase in ownership concentration in utilities post EPACT has not resulted in the emergence of the same stable block-owner governance seen in non-utilities. Rather, utilities stand out for their fly-by-night block-owners, with over 40% of the blocks taking ownership positions for less than two years, and no block-holders staying for the entire twenty year period of our sample.

## 6. The Effects of State Restructuring

Our analysis of the evolution of ownership structures in utilities and non-utilities post EPACT so far does not explicitly take into account the fact that not all states initiated deregulation/restructuring actions. The effects of deregulation on utilities' ownership structure are hence imprecisely captured when we compare all utilities to a sample of matched non-utilities. Accordingly, in this section we restrict our sample to utilities only and contrast the evolution of ownership concentration of utilities in states that have undertaken steps to deregulate, to that of utilities in states that have kept the regulatory framework before EPACT in place.

EPACT exempted wholesale generators from PUHCA. It permitted foreign ownership of US utilities and allowed US utilities to invest abroad, but states retained veto powers over any merger of a utility operating in the state. Although it largely retained states ability to veto activities of utilities and wholesale siting within a state, it led to an environment more favorable to inter-state mergers of electric utilities. Following the passage of EPACT some states chose to "restructure" their electric utility industry. Restructuring generally meant separating investor owned utilities into distributing firms and generating firms, so that previously vertically-integrated utilities were forced to sell off their generating facilities. At the same time, utilities could invest in generating capacity in states outside their service area even though they were required to divest their wholesale operations within their service area.

Some form of (wholesale) price deregulation also took place[18]. There were important differences in legislation across states with regard to regulation of generating firms, price freezes for residential users, and the ability of distributors to contract with wholesalers. Most notably, the California legislation offered opportunities for manipulation of the wholesale market, which was alleged to have produced blackouts in 2000 and 2001 (and which led to the criminal prosecution of some employees of Enron).[19]

We eschew differences in deregulatory legislation and simply use a dummy variable that turns to one in the year a state passes restructuring legislation. Once restructuring legislation was passed it remained to be implemented, which could result in a delay of several years. In September 2010 the United States Energy Information Administration released detailed histories of deregulation legislation and implementation in each state.[20] We used these histories to code deregulation dates. By the end of the decade following the passage of EPACT, 22 states and the District of Columbia had initiated and enacted restructuring legislation (see Figure 2), but after the California energy crisis essentially all further restructuring initiatives were halted, with four states even reversing their earlier restructuring actions. More specifically, while no state had deregulated their electric utility industry before 1996, six states deregulated in 1996 and by 1999, twenty-one states have deregulated. The number of deregulated states peaks at 22 in 2000, does not change in 2001 and then has declined to 15 by 2007.

In undertaking a difference-in-difference analysis across "deregulated" and "non-deregulated" states a first question that immediately arises is how we determine the year in which deregulation is effective? The effects of deregulation on the operation of utilities are only borne once the new legislation has been implemented. However, the effects of deregulation on ownership structure could be seen as soon as deregulation is expected to be enacted. Arguably, large block investments would be triggered by passage rather than implementation. Therefore we use two dates to track the regulation status of a state. The date when deregulation legislation is enacted, and the date when it is implemented. Table 5 below illustrates the coding of our state regulation variables for the state of California.

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[18] To protect consumers from sharp increases in electricity prices following restructuring, retail prices generally remained regulated for several years following deregulation or were not deregulated at all.

[19] See Rebecca Smith and John R. Wilke, "Top Trader for Enron Admits to Fraud in California" *Wall Street Journal,* Oct. 18, 2002.

[20] http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html.

California first passed deregulation legislation in 1996 and reregulated in 2003. Therefore we code California as a deregulated state from 1996 to 2003. Our dummy variable Reg accordingly takes the value 1 for all California-based utilities in years 1993 to 1995 and 2004 to 2012. All other years it takes the value 0. California first implemented its new regulations in 1998 and it suspended the new regulations in 2001 in response to the energy crisis. Since then it has reregulated its electric utilities. Thus, the dummy variable Regimp takes the value 1 first in years 1993 to 1997 and again in years 2001 to 2012. All other years it takes the value 0. Note that Regimp denotes regulation not implemented. After some exploratory analysis in defining deregulation by the implementation year, we decided to focus on the passage year.

In Table 8 we report the results of Tobit regressions for our sample of electric utilities, where the dependent variable is the sum of all ownership blocks greater than 5% and the independent variables are respectively Reg and Regimp along with the other explanatory variables used in the previous specification, when we compared ownership concentration in utilities and a matched sample of non-utilities. In the first two specifications, respectively with and without firm random effects, reported in columns (1) and (2) we regress the total of all blocks against a dummy variable, Reg, Year, a time trend variable for utilities that are in regulated states, Reg×Year (the interaction of Reg and Year), Crisis, Crisisreg, an interaction variable of Reg and Crisis, and a constant. Although the coefficient for Reg has the right sign and indicates that utilities in regulated states have a lower ownership concentration than utilities in deregulated states, it is not significant. The only coefficient that is highly significant is the trend variable—Year—which suggests that ownership concentration for utilities in regulated states is steadily rising over our sample period.

The next two specifications, reported in columns (3) and (4) are identical to those in columns (1) and (2), except that the dependent variable is now the total of all non-passive blocks. This is the more meaningful ownership concentration measure from a corporate governance perspective. Interestingly, the coefficients for Reg are now statistically significant, at respectively the 10% (for the Tobit without random effects) and 1% levels. What is more, non-passive ownership concentration is much lower for utilities in regulated than in deregulated states. Another striking difference is with respect to the effects of the financial crisis on ownership concentration. While the financial crisis has had no significant effect on the concentration of ownership, all blocks included, it has resulted in a substantial across-the-board retrenchment of non-passive block-holders. In other words, following the financial crisis passive ownership concentration increased, but the active owners sought to reduce their exposure to under-diversified, idiosyncratic, risk associated with electric utility block-ownership. They reduced their exposure in utilities in both regulated and deregulated states, as the non-significance of the interaction variable Crisreg reveals.

Columns (5), (6), (7) and (8) report the results for essentially the same Tobit regressions as in the first four columns, the difference being that we treat a state as a deregulated state only after restructuring legislation has been implemented. In other words, we replace the explanatory variable Reg with the dummy variable Regimp. The interaction term between Regimp and Year is Regimp. As a comparison of the coefficients reveals, the broad findings that non-passive ownership concentration in electric utilities increases in deregulated states, and non-passive ownership declines in the years following the financial crisis, are robust to the change in treatment dates of the states from the years when deregulation legislation is passed to the years when deregulation legislation is implemented.

*Instrumental Variables Analysis*. We next turn to an instrumental variables analysis of state deregulation. A state may be more likely to deregulate the more inefficient its electric utility sector is and the more politically disposed towards deregulation the state is. One measure of inefficiency is how high electricity prices are under regulation. If a state has exceptionally high residential, commercial, or industrial, electricity prices this could be a reason for this state to seek to implement efficiency improvements by restructuring its electric utility industry. A state may also be quicker to implement deregulation if there is sufficient political support for restructuring in the state. Although a number of interest groups such as "Americans for Affordable Electricity" (AAE) formed post EPACT to lobby the state PUCs and state legislatures in favor of deregulation they also faced opposition typically from the state electric utility incumbents. Our econometric analysis shows that having a Republican or Independent governor was nearly a necessary condition for the passage of restructuring legislation (see Figure 9). Republican governors, however, were faced with one or more houses of the state legislature controlled by Democrats. Inevitably, restructuring legislation reflected political bargaining.

Accordingly, to develop instruments for whether a state undertakes deregulation, we use the level of electricity prices in the state, and the political affiliation of the governor.

*First stage estimation.* We undertake a two-stage estimation, where we perform a discrete time survival analysis using logit, following Jenkins (1995), in the first-stage. Given that no state deregulates before 1996 and that deregulation comes to an end following the California energy crisis in 2000, we only estimate the logit for the years 1996 to 2000. More specifically, we adopt the position that deregulation represents a "death" and the probability of death before 1996 is zero. States that have not died by 2000, survive, thanks to the California fiasco, forever. Death, however, is irreversible, so a state is dropped from the logit panel once it deregulates. We also drop the state of Alaska since there were no investor-owned utilities to restructure in that state, as all electricity is produced by cooperatives. However, we included the District of Columbia. Although we have potentially 250=50x5 observations in our data, our logits are based on only 199 observations since we drop observations in years after restructuring legislation is passed.

Our logit analysis uses two independent variables and their interaction. One independent variable is Governor Republican (we treat independent governors as Republican; this concerns only four observations, Maine in 1996 and 1997, when restructuring passed, and Minnesota in 1999 and 2000). In the District of Columbia, the Public Utilities Commission is appointed by the mayor, who was a Democrat. We treat the mayor as the governor. We also have data on control of state legislatures. We did not find important systematic effects for legislative control. Undoubtedly our relatively small panel of 50 "states" makes it difficult to find small effects.

The other independent variable is the Industrial Price (in cents per kwh) of electricity, as found on the FERC website. These prices correlate with commercial and residential prices in our cross-section at 0.89 or better in the five years 1996-2000. We chose industrial prices because industrial users appear to have been major proponents of restructuring. There is little year-to-year variation in the cross-sectional correlation of industrial prices. For 1996-2000, the lowest pairwise correlation is greater than 0.97. We did not make inflation adjustments to prices. There is little temporal variation in price during our sample period. The mean price is 4.92 in 1996, drops to 4.72 in 1999, and jumps up to 4.96 in 2000. This means that any time-varying dynamics in our logit model will come mainly from the governor variable. Seven states had a gubernatorial transition in our sample. (Three other states had a transition in 1996-2000, but subsequent to "death" by restructuring.)

Subsequent to the California black outs, seven states went back on restructuring. In some cases, restructuring was never implemented before being "repealed." States that went back on restructuring included California and Nevada in 2001, Montana in 2002, Arkansas and New Mexico in 2003, Arizona in 2004, and Virginia in 2007. These turn-backs over seven years are too sparse for analysis. Moreover, it is unlikely that they were promoted by outside block-holders; rather they would be more likely to be promoted by the management of utilities as in Virginia[21].

To summarize, our logit regression estimates the probability that the status of a state switches from regulated to permanently deregulated in any given year as a function of Industrial Price, the variable that designates average industrial electricity prices charged by utilities in the state, Governor Republican, a dummy variable taking the value 1 if the governor of the state is a Republican or an Independent, an interaction variable, Industrial Price × governor, and year fixed effects Year 1997, Year 1998, Year 1999, Year 2000:

$$\text{Prob}\ (\text{Deregulation}_{i,t} = 1) = L\ (\text{constant} + \beta\times\text{Industrial Price}_{,t} + \gamma\times\text{Governor Republican}_{i,t} + \eta\times\text{Industrial Price} \times \text{governor}_{i,t} + \Sigma\psi_t\times\text{Year}_t),$$

where L(.) denotes the logistic cumulative distribution function.

Table 9 reports the results of this logit regression. The coefficient on the interaction variable Industrial Price × governor is positive and statistically significant, indicating that states with Republican governors and high electricity prices were more likely to deregulate. High electricity prices by themselves, however, do not explain a move towards deregulation, as the coefficient on Industrial Price is statistically insignificant. The coefficient on Republican Governor is negative and statistically significant. The reason why the coefficient is negative is

[21] See http://www.eia.gov/electricity/policies/restructuring/virginia.html.

that when a state has very low electricity prices and a Democratic governor the probability of deregulation is close to zero. This can be seen more clearly in Figure 9, which plots the estimated probability of deregulation under respectively a Republican and Democratic governor as a function of electricity prices. Note also that the coefficient for Year 1999 is positive and statistically significant, indicating that a significantly larger number of states deregulated in 1999. Finally, the constant coefficient is -2.961, indicating that the unconditional probability of deregulation is less than 0.5. These results are robust to estimation dropping the District of Columbia as well as Alaska and to dropping, in addition, all 7 states that abandoned or did not follow through on restructuring (see Appendix).

*Second stage estimation*. In the second stage we perform both a standard two-stage least squares (2SLS) and a two-stage residual inclusion (2SRI) estimation as first proposed by Hausman (1978). The reason why we perform a 2SRI estimation is that our first stage regression is a non-linear model. With a first-stage non-linear model the second stage 2SLS is generally not statistically consistent, while the 2SRI estimator is (see, Terza, Basu and Rathouz, 2008). For the second-stage 2SLS, random effects Tobit, we use the logit predicted probability of restructuring from the first stage, a variable denoted by Twostage, as an instrument, but only for the years 1996-2000, excluding the years following restructuring. For example, in California, the predicted probability would not be included for 1997-2000, as restructuring has already occurred in 1996 (see table 4). As for the 2SRI random effects Tobit, we use the Residual from the logit in the same years. This Residual is the actual deregulation response minus the estimated probability, or in other words one minus the predicted probability for a restructured state and just minus the predicted probability for a non-restructured state. In years before 1996 and after 2000, we use the actual value of the deregulated dummy. For the seven states that went back on restructuring, we investigate the sensitivity of the estimates to switching off the dummy as against keeping it on throughout the block holding sample period that ends in 2012. Finally, we have firm-year observations for block-holdings whereas our observations in the logit are state-year. Therefore, we merge the regulation dummy, the instrument, and the residuals to firms using the primary state of operation of the firm.

To summarize, the second-stage random effects Tobit specifications for respectively 2SLS and 2RI are:

$$\text{Block-holdings}_{i,t} = \text{Constant} + \zeta*\text{Twostage}_{i,t} + \lambda*\text{Year} + \mu*\text{Reg}\times\text{Year}_{i,t} + \theta*\text{Crisis}_{i,t} + \varphi*\text{Crisisreg}_{i,t} + \varepsilon_{i,t},$$

and,

$$\text{Block-holdings}_{i,t} = \text{Constant} + \zeta*\text{Reg}_{i,t} + \nu*\text{Residual}_{i,t} + \lambda*\text{Year} + \mu*\text{Reg}\times\text{Year} + \theta*\text{Crisis} + \varphi*\text{Crisisreg} + \varepsilon_{i,t},$$

where Twostage is the predicted probability for Reg from the first stage estimation and Residual is the residual from the first-stage.

The results of the second stage are reported in Table 10. In the specification reported in the first column we regress the total of all blocks against the predicted probability of not restructuring (Twostage), Year, Reg×Year, Crisis, Crisisreg, and a constant. The coefficient for Twostage is statistically significant and has the right sign. It indicates that utilities in regulated states have a lower ownership concentration than utilities in regulated states. In the second specification reported in the second column we again regress the total of all blocks, but now against Reg, the dummy variable taking the value 1 when a state remains regulated and Residuals, the residuals from the first-stage logit. The other variables are the same as in the first specification. Again, the coefficient for Reg is statistically significant and of the right sign. In fact, the estimated decrease in ownership concentration is nearly the same under both specifications. Comparing the significance and size of the coefficients for Twostage or Reg in Table 10 to the significance and size of the coefficient for Reg in column 2 of Table 8, we observe that the effect of deregulation on ownership concentration using all blocks is not only much lower but is also statistically insignificant when we do not control for the endogeneity of a state's decision to deregulate. The interpretation of the 2SLS or 2SRI results could be either that prospective large block-holders in electric utilities are able to lobby and influence a state's decision to deregulate, or that large investors' expectations on the likelihood of deregulation are affected by the level of electricity prices and the political affiliation of the state governor.

The next two specifications reported in the third and fourth columns are the same as in the first two columns except that the independent variable is the total of all non-passive blocks. Again, the coefficients for respectively Twostage and Reg are statistically significant and of the right sign. The magnitude of the decrease in ownership concentration in states that remain regulated is slightly larger. Interestingly, the 2SLS and 2SRI results are not that different from the results for Reg in column 4 in Table 8. This suggests that non-passive block-holders actions were mostly responses to deregulation and its implementation and were not significantly driven by expectations of deregulation before deregulation was actually introduced.

## 7. Conclusion

We have shown how the deregulation of electricity in the 1990s and the repeal of PUHCA have resulted in a greater concentration of ownership in publicly traded electric utilities. So much so that by 2007 the average fraction of non-passive shares held by block-holders in electric utilities had reached the same level as in a matched sample of non-utilities comprising mostly industrial and energy companies. This is not to say, however, that the greater concentration reflected the substitution of monitoring by block-holders for that of regulators. Rather, the replacement of widows and orphans by block-holders in electric utilities seems to reflect opportunistic investments or speculative motives more than stewardship and monitoring by a committed owner. This is indeed how Enron characterized its acquisition of Portland General: "[We] got involved in Portland General Electric to better understand the utility market, as it appeared there would be opportunities in an environment of deregulation."[22]

An important inference of our analysis is the critical role of PUHCA in protecting investors by severely constraining utilities' discretion to engage in risky financial transactions. This more than the regulatory protections against operational risks seems to have mattered for shareholders. Once EPACT repealed key parts of PUHCA the electricity industry again became a high stakes financial arena as in the days of Samuel Insull and Commonwealth Edison. But after the California energy crisis broke out and the collapse of Enron, political support for further dismantlement of vertically integrated utilities through electricity

[22] A quote from "Enron's Havoc Spills Over to a Utility in Oregon" by D.C. Johnston, *New York Times* February 2, 2002

industry restructuring vanished. On the other hand, opportunities for interstate mergers and acquisitions remained.

Further research is called for into the observed exit of non-passive investors from electric utilities following the financial crisis. One possibility is that the exit was a response to liquidity needs and retrenchment from idiosyncratic risk exposure. Another is that merger and acquisition opportunities were non-existent in the aftermath of the crisis. Additional research might also investigate how block holdings are related to merger and acquisition activity and track the behavior of specific large investors over time and across firms.

The economic case for electricity deregulation was to achieve greater cost efficiency, to introduce incentives for capacity expansion, and—through competition—to bring about lower electricity prices for both consumers and industry (Joskow, 1989). One largely unanticipated effect of deregulation by economists and other commentators, however, was the increase in financial risk investors were exposed to, and thereby the potential increase in the cost of capital for utilities. With a higher cost of capital it is no longer obvious that deregulation will bring about more capacity expansion. Moreover, as the California energy crisis powerfully illustrated, competition in wholesale markets, far from inducing capacity expansion, may actually give rise to the opposite incentives to profit from generation capacity scarcity. A study of the larger US electric power market suggests that deregulation has not led to lower prices (Borenstein and Bushnell, 2015). All in all, the wave of electricity restructuring of the 1990s, while enabling some cost efficiencies, does not seem to have benefited consumers in any significant way.

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## Table 1. Utilities and Matched Non-Utilities: Basic Description
## A. Mean Large Block Holdings in Utilities and Matched Non-Utilities for Selected Years

This table reports the total sum of block-ownership stakes, 1993, 2003 and 2012. The decrease in the number of firms over time is due to either mergers, delistings, or bankruptcies. We computed the total percentage of common stock held in blocks of 5% or greater, as reported in firm reports of "Beneficial Ownership" for each firm-year. The match used S&P 900 large and mid-cap firms. There were 65 utilities in the S&P 900 in 1992. Of the 65 matched non-utilities, two no longer existed in 1993. The number of "all" utilities exceeds 65 because of utilities that were not in the 900. These small utilities were the most likely to no longer exist by 2003. In 1993, means for utilities were below 5% because most utilities had no block-holders.

| | 1993 | | | 2003 | | | 2012 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of Firms | Mean | S.D. | Number of Firms | Mean | S.D. | Number of Firms | Mean | S.D. |
| Utilities, All | 97 | 3.50% | 5..68% | 66 | 10.38% | 9.83% | 51 | 19.72% | 9.10% |
| Utilities in S & P 900 | 64 | 3.80% | 5.93% | 46 | 10.62% | 8.73% | 38 | 18.59% | 8.75% |
| Non-Utilities | 63 | 14.08% | 14.92% | 35 | 21.91% | 15.20% | 25 | 20.24% | 16.26% |
| t-statistic, all | 5.39 (p-value = 0.000) | | | 4.06 (p-value=0.000) | | | 0.15 (p-value = 0.440) | | |
| t-statistic, S & P only | 5.09 (p-value = 0.000) | | | 3.93 (p-value=0.000) | | | 0.47 (p-value = 0.321) | | |
| K-S p-value, all | 0.000 | | | 0.000 | | | 0.239 | | |
| K-S p-value, S&P only | 0.000 | | | 0.000 | | | 0.499 | | |

*Note:* The t-statistic is for two samples with unequal variances. The p-value is one one-tail. The Komolgorov-Smirnov (K-S) test is the standard two-sample test.

## B. Summary Statistics of Matching Variables

This table reports the balance sheet characteristics of the 65 largest utilities, 65 matched non-utilities and 762 non-matched non-utilities for fiscal year 1992. Total Assets, Total debt in current liabilities (current debt), Total long-term debt (LT debt), PP&E, earnings before interest (EBI), Net income/loss, and CAPX are all reported in millions of dollars, while Employees are in thousands.

| Variable | Utility | | | Matched Non-Utility | | | Other Non-Utilities | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | S.D | N | Mean | S.D. | N | Mean | S.D. |
| | 65 | | | 65 | | | 762 | | |
| Total Assets | | 6562 | 5634 | | $6332^{\#}$ | 6329 | | 8701 | 23233 |
| Current debt | | 273 | 295 | | $259^{\#\#\#}$ | 475 | | $1412^{+++}$ | 8120 |
| LT debt | | 2297 | 2039 | | $2018^{\#}$ | 1908 | | $1242^{++}$ | 5097 |
| PP&E | | 5153 | 4636 | | $3888^{\#\#\#\#}$ | 3976 | | $1580^{+++}$ | 4534 |
| EBI | | 793 | 766 | | 783 | 821 | | 640 | 1584 |
| NI/L | | 233 | 252 | | 162 | 246 | | $85^{++}$ | 1037 |
| CAPX | | 371* | 338 | | $563^{\#\#}$ | 589 | | 295 | 840 |
| Employees | | 8.175* | 7.531 | | $13.974^{\#\#\#}$ | 15.244 | | $26.589^{+++}$ | 56.255 |

*, **, ***: Two-tailed t-test utility vs. matched for respectively p-value < 0.05, p-value < 0.01, p-value < 0.001

+,++, +++: Two-tailed t-test utility vs. other for respectively p-value < 0.05, p-value < 0.01, p-value < 0.001

#,##,###: Two-tailed t-test matched vs. other for respectively p-value < 0.05, p-value < 0.01, p-value < 0.001

## C. Distribution of SIC codes for Utilities, Matched Non-Utilities, and other S&P 900 Firms, 1992

This table reports the distribution of matched and non-matched non-utilities across industries based on the first digit of their reported SIC code in 1992. All the 65 utilities are, not surprisingly, classified under SIC codes with first two digits 49. (The number of firms does not total 900 because of missing data for some non-utilities.)

**First digit of SIC code, Percentages**

| SIC | Description | Utility | Matched Non-Utility | Non-Matched Non-Utility |
|---|---|---|---|---|
| 0 | Agriculture | 0.0% | 0.0% | 0.3% |
| 1 | Mining, Construction | 0.0% | 12.3% | 4.5% |
| 2 | Household Products | 0.0% | 33.8% | 23.9% |
| 3 | Manufacturing | 0.0% | 0.0% | 28.9% |
| 4 | Transport, Utilities | 100.0% | 46.2% | 7.3% |
| 5 | Distribution | 0.0% | 1.5% | 10.9% |
| 6 | Financial Services | 0.0% | 1.5% | 14.3% |
| 7 | Services | 0.0% | 3.1% | 7.2% |
| 8 | Business Services | 0.0% | 0.0% | 2.2% |
| 9 | International | 0.0% | 1.5% | 0.5% |
| Total Firms | | 65 | 65 | 762 |

**Second digit of SIC code, Number of Firms with first digit 4**

| SIC | Description | Utility | Matched Non-Utility | Non-Matched Non-Utility |
|---|---|---|---|---|
| 40 | Railroad Transportation | 0 | 5 | 3 |
| 41 | Passenger Transit | 0 | 0 | 1 |
| 42 | Motor Freight | 0 | 0 | 3 |
| 43 | USPS | 0 | 0 | 0 |
| 44 | Water Transportation | 0 | 3 | 1 |
| 45 | Transportation by Air | 0 | 1 | 8 |
| 46 | Pipelines not Gas | 0 | 0 | 0 |
| 47 | Transportation Services | 0 | 1 | 1 |
| 48 | Communications | 0 | 7 | 24 |
| 49 | Electric, Gas & Sanitary | 65 | 13 | 15 |
| Total Firms | | 65 | 30 | 56 |

# Table 2 Effect of EPACT on Ownership Concentration in Electric Utilities:

Dependent Variable: Sum of Blocks ≥ 5%

Sample: All S&P 900 (1992) Firms, Utilities and Matched Non-Utilities

| Independent Variable, | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Util | -14.18*** | | -19.87*** | -19.01*** |
| | (2.441) | | (3.370) | (2.163) |
| Year | 0.113 | 0.141 | 0.202 | 0.215*** |
| | (0.207) | (0.223) | (0.225) | (0.0745) |
| Util×Year | 0.573** | 0.567** | 0.925*** | 0.881*** |
| | (0.221) | (0.236) | (0.262) | (0.0999) |
| Constant | 17.43*** | 9.244*** | 15.59*** | 15.56*** |
| | (2.357) | (0.833) | (2.578) | (1.524) |
| Sigma | | | 14.84*** | |
| | | | (1.167) | |
| sigma_u | | | | 10.88*** |
| | | | | (0.785) |
| sigma_e | | | | 10.27*** |
| | | | | (0.215) |
| Observations | 1,776 | 1,776 | 1,776 | 1,776 |
| R-squared | 0.174 | 0.621 | | |
| Number of Firms | 127 | 127 | 127 | 127 |

Parameter estimates are reported with robust standard errors in parentheses. Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components. The threshold limit for the Tobit was not set at the standard 0 but at 4.99 to reflect the non-reporting of blocks below 5%.

**Table 3: Effect of EPACT on Non-Passive Ownership Concentration in Electric Utilities**

Dependent Variable: Sum of Blocks ≥ 5%

Sample: All S&P 900 (1992) Firms

| Independent: Variable | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Util | -8.755*** | | -20.81*** | -18.82*** |
| | (2.065) | | (4.575) | (2.691) |
| Year | -0.115 | -0.0719 | -0.116 | -0.0880 |
| | (0.145) | (0.120) | (0.248) | (0.0890) |
| Util×Year | 0.234 | 0.191 | 0.630** | 0.512*** |
| | (0.150) | (0.127) | (0.314) | (0.130) |
| Constant | 10.58*** | 5.502*** | 4.834* | 5.730*** |
| | (2.033) | (0.447) | (2.637) | (1.834) |
| Sigma | | | 18.51*** | |
| | | | (2.076) | |
| sigma_u | | | | 13.02*** |
| | | | | (1.016) |
| sigma_e | | | | 11.16*** |
| | | | | (0.335) |
| Observations | 1,776 | 1,776 | 1,776 | 1,776 |
| R-squared | 0.114 | 0.683 | | |
| Number of Firms | 127 | 127 | 127 | 127 |

Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by BARCLAYS, FIDELITY, CAPITAL RESEARCH, GOLDMAN SACHS, PRUDENTIAL, BNYMELLON, J.P. MORGAN CHASE, DEUTSCHE BANK, BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES. Parameter estimates are reported with robust standard errors in parentheses. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components. . Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993;.

## Table 4. Duration Measures for Fidelity in Hess Corp

| Year | Share | Investor | Initial Year | Final Year | Duration | Duration Forward | Duration Backwards |
|---|---|---|---|---|---|---|---|
| 1993 | 0.1093 | FMR Corp | 1993 | 1999 | 7 | 7 | 1 |
| 1994 | 0.1362 | FMR Corp | 1993 | 1999 | 7 | 6 | 2 |
| 1995 | 0.1394 | FMR Corp | 1993 | 1999 | 7 | 5 | 3 |
| 1996 | 0.0787 | FMR Corp | 1993 | 1999 | 7 | 4 | 4 |
| 1997 | 0.063 | FMR Corp | 1993 | 1999 | 7 | 3 | 5 |
| 1998 | 0.1509 | FMR Corp | 1993 | 1999 | 7 | 2 | 6 |
| 1999 | 0.0853 | FMR Corp | 1993 | 1999 | 7 | 1 | 7 |
| 2005 | 0.0968 | FMR Corp | 2005 | 2005 | 1 | 1 | 1 |
| 2007 | 0.1104 | FMR Corp | 2007 | 2008 | 2 | 2 | 1 |
| 2008 | 0.0799 | FMR Corp | 2007 | 2008 | 2 | 1 | 2 |

## Table 5: Maximum Duration of Block Holding Periods – All Firms

| Independent Variables: | All Blocks (1) Total | (2) Forward | (3) Backward | No Passive Blocks (4) Total | (5) Forward | (6) Backward |
|---|---|---|---|---|---|---|
| Util | -3.755*** | -3.299*** | -0.958*** | -3.858*** | -3.319*** | -1.118*** |
| | (0.689) | (0.666) | (0.226) | (0.660) | (0.653) | (0.190) |
| Yrsinsample | 0.221*** | 0.201*** | 0.025 | 0.154** | 0.142*** | 0.015 |
| | (0.047) | (0.036) | (0.017) | (0.046) | (0.036) | (0.015) |
| Year | 0.145* | -0.158** | 0.328*** | 0.103* | -0.132** | 0.260*** |
| | (0.060) | (0.048) | (0.057) | (0.043) | (0.040) | (0.056) |
| Util×Year | 0.096 | 0.216*** | -0.089 | 0.120 | 0.223*** | -0.072 |
| | (0.083) | (0.053) | (0.066) | (0.069) | (0.042) | (0.064) |
| Crisis | -1.107* | -0.643 | -0.593 | -0.201 | 0.027 | -0.285 |
| | (0.555) | (0.461) | (0.500) | (0.476) | (0.339) | (0.444) |
| Crisis ×Util | -0.232 | -0.618 | 0.291 | -0.435 | -0.769 | 0.315 |
| | (0.742) | (0.641) | (0.623) | (0.666) | (0.529) | (0.538) |
| Constant | 1.945*** | 1.822*** | 0.892** | 1.870*** | 1.736*** | 0.814** |
| | (0.540) | (0.383) | (0.288) | (0.503) | (0.361) | (0.283) |
| Log-like | -7256.487 | -6269.332 | -6130.394 | -7051.363 | -6027.448 | -5890.387 |
| N | 2418 | 2418 | 2418 | 2425 | 2425 | 2425 |
| $R^2$ | 0.163 | 0.138 | 0.239 | 0.160 | 0.127 | 0.220 |

Parameter estimates are OLS estimates with robust standard errors in parentheses (clustered at the individual firm level). The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993; Crisis =1 if Calendar Year > 1986. Util×Year and Crisis ×Util are interactions. Yrsinsample = total number of years firm was in the sample (maximum = 20.)

## Table 6: Duration of Block Holding Periods – Surviving SAP Firms

| | All Blocks | | | No Passive Blocks | | |
|---|---|---|---|---|---|---|
| Independent Variables: | (1) Total | (2) Forward | (3) Backward | (4) Total | (5) Forward | (6) Backward |
| Util | -5.156*** | -4.529*** | -1.128** | -5.535*** | -4.770*** | -1.444*** |
| | (1.259) | (1.222) | (0.329) | (1.187) | (1.172) | (0.251) |
| Year | 0.101 | -0.213** | 0.343*** | 0.035 | -0.196** | 0.251*** |
| | (0.071) | (0.072) | (0.069) | (0.046) | (0.063) | (0.066) |
| Util×Year | 0.183 | 0.288** | -0.078 | 0.235*** | 0.318*** | -0.051 |
| | (0.093) | (0.085) | (0.080) | (0.064) | (0.069) | (0.074) |
| Crisis | -1.193 | -0.561 | -0.811 | 0.132 | 0.300 | -0.213 |
| | (0.634) | (0.523) | (0.455) | (0.499) | (0.319) | (0.393) |
| Crisis ×Util | -0.723 | -0.945 | 0.132 | -0.308 | -1.039* | -0.235 |
| | (0.849) | (0.722) | (0.612) | (0.625) | (0.504) | (0.590) |
| Constant | 7.298*** | 6.711*** | 1.450*** | 5.860*** | 5.390*** | 1.246*** |
| | (1.090) | (1.087) | (0.259) | (1.145) | (1.145) | (0.228) |
| Log-like | -5227.028 | -4528.176 | -4436.276 | -4333.478 | -3704.667 | -3649.782 |
| N | 1420 | 1420 | 1420 | 1420 | 1420 | 1420 |
| $R^2$ | 0.115 | 0.129 | 0.205 | 0.135 | 0.132 | 0.195 |

Parameter estimates are OLS estimates with robust standard errors in parentheses (clustered at the individual firm level). The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993; Crisis =1 if Calendar Year > 1986. Util×Year and Crisis ×Util are interactions.

## Table 7. California Deregulation and Reregulation

| Year | Status | Status Law | Status Implementation | Restructuring Activity | Legislation |
|---|---|---|---|---|---|
| 1993 | Regulated | Regulated | Regulated | No | No |
| 1994 | Regulated | Regulated | Regulated | Yes | No |
| 1995 | Regulated | Regulated | Regulated | Yes | No |
| 1996 | Deregulated | Regulated | Regulated | Yes | Yes |
| 1997 | Deregulated | Regulated | Regulated | Yes | Yes |
| 1998 | Deregulated | Deregulated | Deregulated | Yes | No |
| 1999 | Deregulated | Deregulated | Deregulated | Yes | Yes |
| 2000 | Deregulated | Deregulated | Deregulated | Yes | Yes |
| 2001 | Regulated | Reregulated | Regulated | Yes | Yes |
| 2002 | Regulated | Reregulated | Regulated | Yes | Yes |
| 2003 | Regulated | Reregulated | Regulated | No | No |
| 2004 | Regulated | Reregulated | Regulated | Yes | Yes |
| 2005 | Regulated | Reregulated | Regulated | No | No |
| 2006 | Regulated | Reregulated | Regulated | Yes | No |
| 2007 | Regulated | Reregulated | Regulated | No | No |
| 2008 | Regulated | Reregulated | Regulated | Yes | No |
| 2009 | Regulated | Reregulated | Regulated | No | No |
| 2010 | Regulated | Reregulated | Regulated | Yes | No |
| 2011 | Regulated | Reregulated | Regulated | No | No |
| 2012 | Regulated | Reregulated | Regulated | No | No |

Status indicates if a given state has a regulated or deregulated utility system. Status Law indicates if a given state has regulated, deregulated, or reregulated utilities. Status Implementation indicates if a given state has implemented the state restructuring law. Restructuring Activity indicates if a given state has had any restructuring activity (laws, proposals, voting, etc.) in a given year. Legislation indicates if a given state voted any restructuring proposal in a given year. Source: http://www.eia.gov/electricity/policies/restructuring/index.html

## Table 8: Effect of State Deregulation on Ownership Concentration in Electric Utilities, 1996-2012

| | All Blocks | | No Passive Blocks | | All Blocks | | No Passive Blocks | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | | Firm RE | | Firm RE | | Firm RE | | Firm RE |
| Reg | -0.556 | -1.699 | -6.468* | -9.133*** | | | | |
| | (2.121) | (1.370) | (2.563) | (1.582) | | | | |
| Regimp | | | | | -1.699 | -3.211 | -8.040** | -10.965*** |
| | | | | | (2.922) | (1.809) | (3.068) | (2.069) |
| Year | 1.110*** | 1.002*** | 0.522 | 0.222 | 0.903** | 0.725*** | 0.222 | -0.152 |
| | (0.235) | (0.139) | (0.278) | (0.153) | (0.285) | (0.175) | (0.332) | (0.199) |
| Reg×Year | -0.215 | -0.028 | 0.409 | 0.816*** | | | | |
| | (0.284) | (0.159) | (0.331) | (0.182) | | | | |
| Imp×Year | | | | | 0.097 | 0.327 | 0.790* | 1.319*** |
| | | | | | (0.328) | (0.190) | (0.359) | (0.222) |
| Crisis | -1.578 | -1.990 | -6.631** | -6.382*** | -0.210 | 0.222 | -4.863 | -4.083* |
| | (1.907) | (1.384) | (2.536) | (1.605) | (2.007) | (1.553) | (2.926) | (1.841) |
| Crisisreg | 1.261 | 1.002 | -3.118 | -3.739 | -1.079 | -1.865 | -5.738 | -7.259*** |
| | (2.323) | (1.714) | (2.946) | (2.013) | (2.373) | (1.820) | (3.221) | (2.174) |
| Constant | 0.323 | 1.142 | -0.846 | 1.323 | 1.359 | 2.886 | 1.047 | 3.388 |
| | (2.050) | (1.477) | (2.376) | (1.617) | (2.836) | (1.889) | (3.086) | (2.107) |
| Log-like | -3854.854 | -3580.237 | -2186.448 | -1971.279 | -3862.182 | -3580.749 | -2192.918 | -1969.487 |
| N | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 |

The dummy variables Reg and Regimp indicate whether a state is respectively still regulated and whether it still has not implemented any approved deregulations. Parameter estimates are reported with robust standard errors in parentheses (clustered at the individual firm level). Crisisreg is an interaction term, Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components. Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993; Crisis =1 if Calendar Year > 1986. Reg×Year and Imp×Year are interaction terms. Model variance terms not shown.

**Table 9: First Stage Logit regression: The Role of Electricity Prices and State Governor Political Affiliation in inducing State Deregulation, 1996-2000**

| Independent Variable | Coefficient |
|---|---|
| Industrial Price × governor | 1.124*** |
| | (0.301) |
| Industrial Price | -0.140 |
| | (0.176) |
| Governor Republican | -4.360*** |
| | (1.587) |
| Year 1997 | 0.948 |
| | (0.855) |
| Year 1998 | 0.294 |
| | (0.884) |
| Year 1999 | 2.193*** |
| | (0.772) |
| Year 2000 | 0.957 |
| | (0.976) |
| Constant | -2.961*** |
| | (1.073) |
| Observations | 154 |

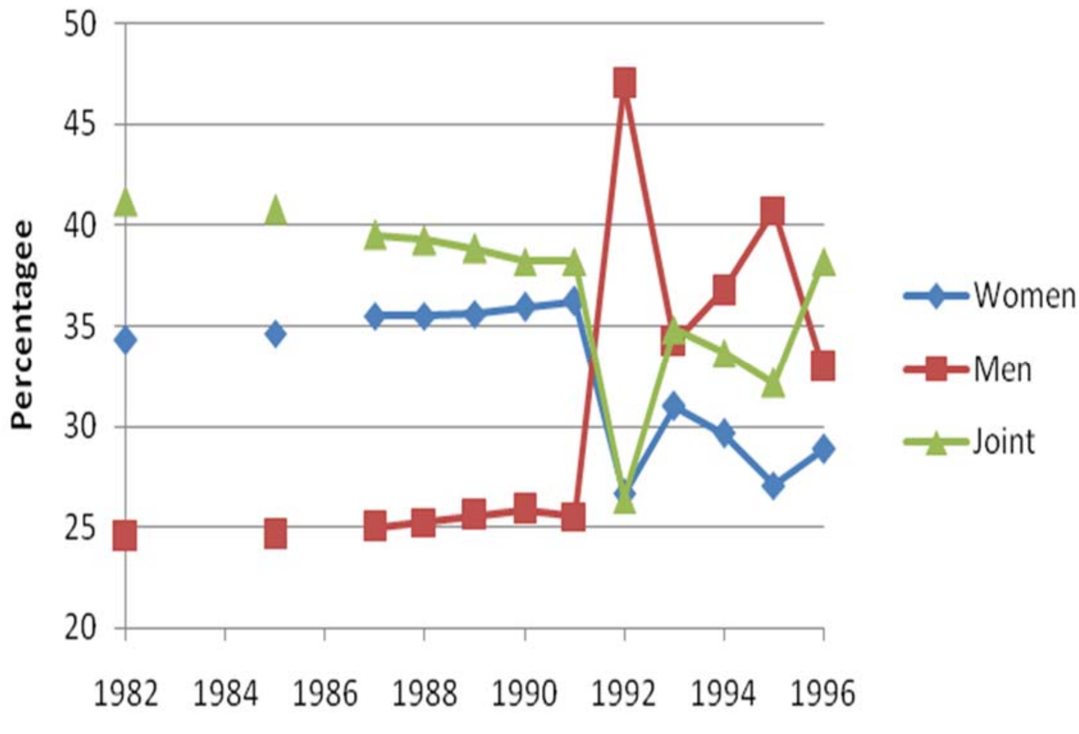
Dependent Variable = 1 in the year state deregulates. State dropped from sample in later years. Industrial price is in cents per kwh. Governor Republican. is 1 if governor is Republican or Independent. The two Independent cases are Maine and Minnesota. The symbol *** represents significance at the 10%, 5%, and 1% level, respectively. Industrial price × governor is an interaction term. The "Year" variables are year dummies. The model assumes that the probability of deregulation is zero in years prior to 1996 and after 2000.

## Table 10: Second Stage of 2SLS and 2SRI: The Effect of State Deregulation on Ownership Concentration in Electric Utilities: Random Effects Tobits, 1996-2012

| | All Blocks | | No Passive Blocks | |
|---|---|---|---|---|
| | 2SLS | 2SRI | 2SLS | 2SRI |
| Twostage | -6.428*** | | -10.378*** | |
| | (1.830) | | (2.127) | |
| Reg | | -6.368*** | | -10.510*** |
| | | (1.846) | | (2.155) |
| Residual | | 3.261 | | 3.644 |
| | | (1.747) | | (1.988) |
| Year | 0.793*** | 0.807*** | 0.059 | 0.075 |
| | (0.146) | (0.147) | (0.167) | (0.167) |
| Reg×Year | 0.436* | 0.412* | 0.858*** | 0.824*** |
| | (0.187) | (0.188) | (0.217) | (0.219) |
| Crisis | -0.298 | -0.419 | -5.333** | -5.474*** |
| | (1.371) | (1.368) | (1.633) | (1.631) |
| Crisisreg | -2.261 | -2.061 | -3.982 | -3.690 |
| | (1.753) | (1.752) | (2.115) | (2.115) |
| Constant | 3.511* | 3.451* | 3.254 | 3.316 |
| | (1.633) | (1.637) | (1.825) | (1.834) |
| sigma_u | 7.986*** | 7.974*** | 8.250*** | 8.237*** |
| | (0.713) | (0.711) | (0.833) | (0.832) |
| sigma_e | 7.037*** | 7.036*** | 7.014*** | 7.002*** |
| | (0.184) | (0.184) | (0.263) | (0.263) |
| Ll | -3076.821 | -3076.877 | -1793.385 | -1792.843 |
| N | 1164 | 1164 | 1164 | 1164 |

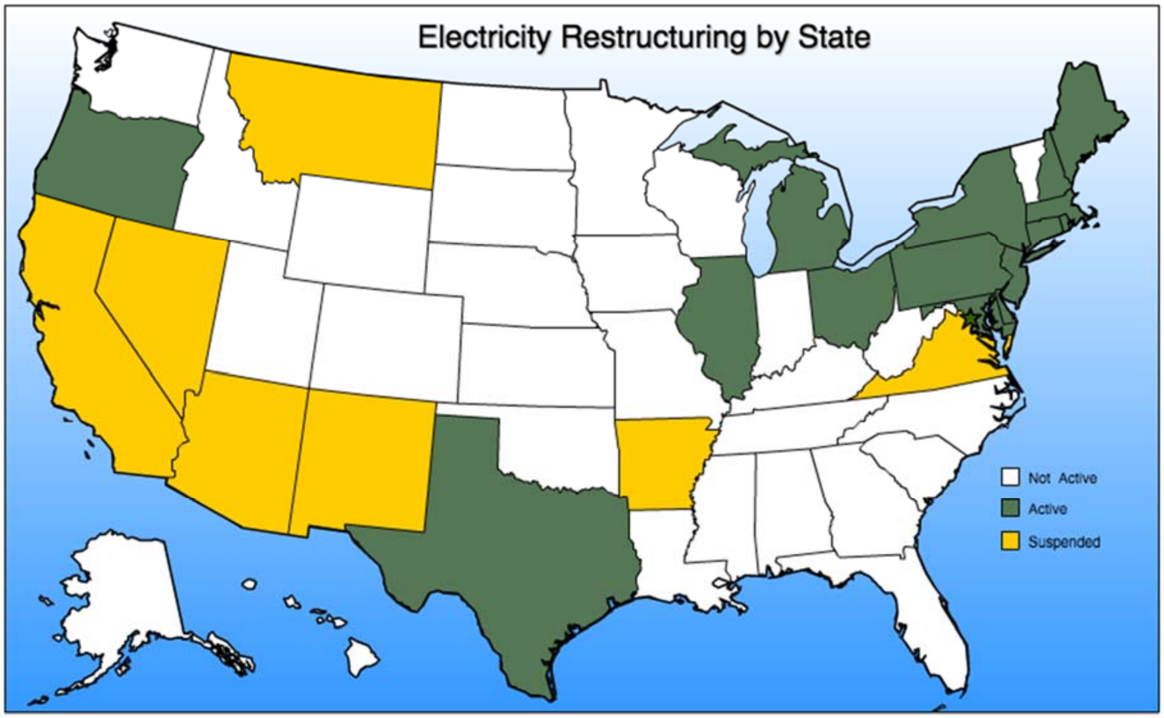
The dummy variable Reg indicates whether a state is still regulated s. Reg×resid is the interaction of Reg and the first stage residual. Twostage is the predicted probability a state stays regulated in the first stage regression (Table 9). Parameter estimates are reported with robust standard errors in parentheses (clustered at the individual firm level). Crisisreg is an interaction term. Util=1 if firm a utility, 0 if non-utility; Year = Calendar year – 1993; Crisis =1 if Calendar Year > 1986.

**Figure 1: Percentage of San Diego Gas and Electric Shareholders by Sex**



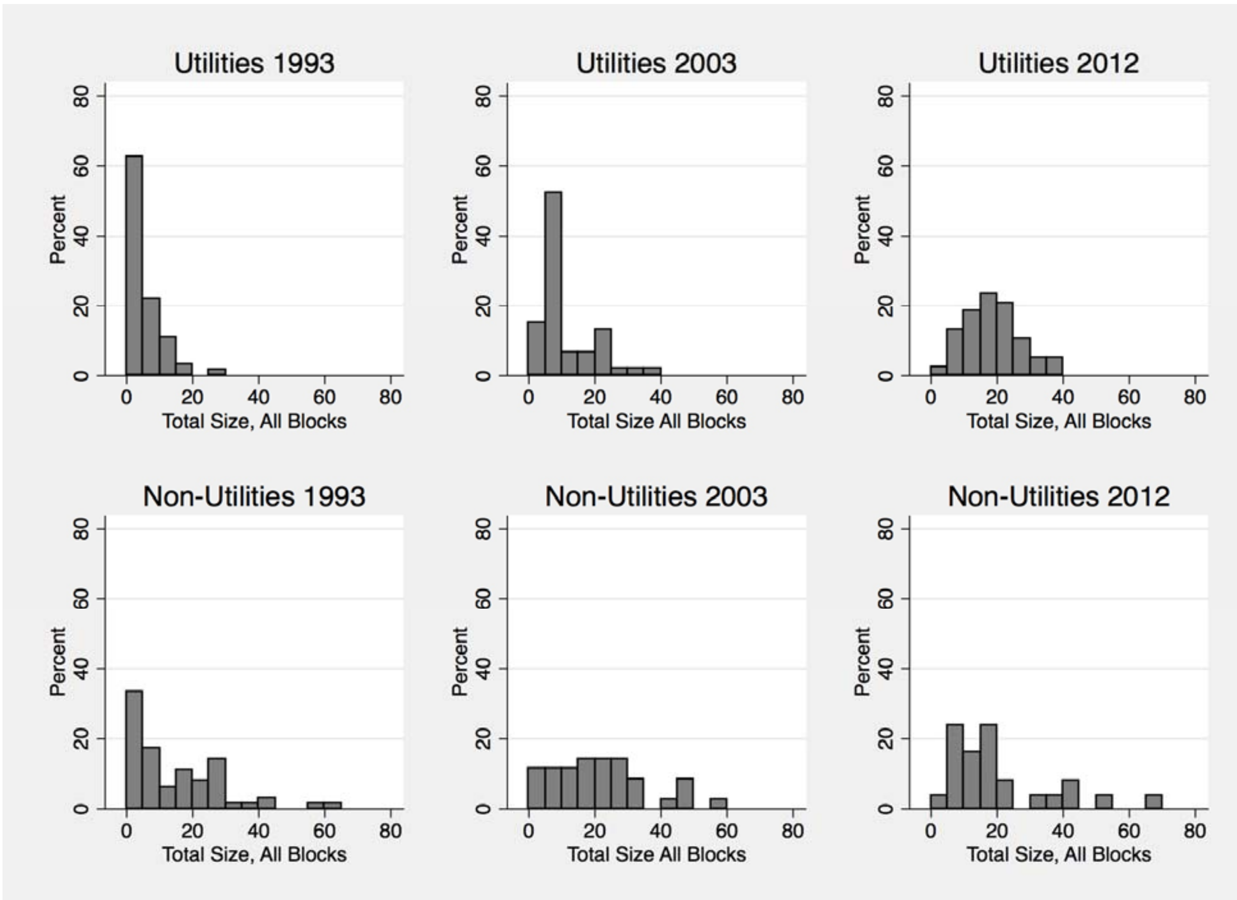

Source: San Diego Gas and Electric annual reports.

**Figure 2. State Restructuring of Electric Utilities.**




Source: Energy Information Administration

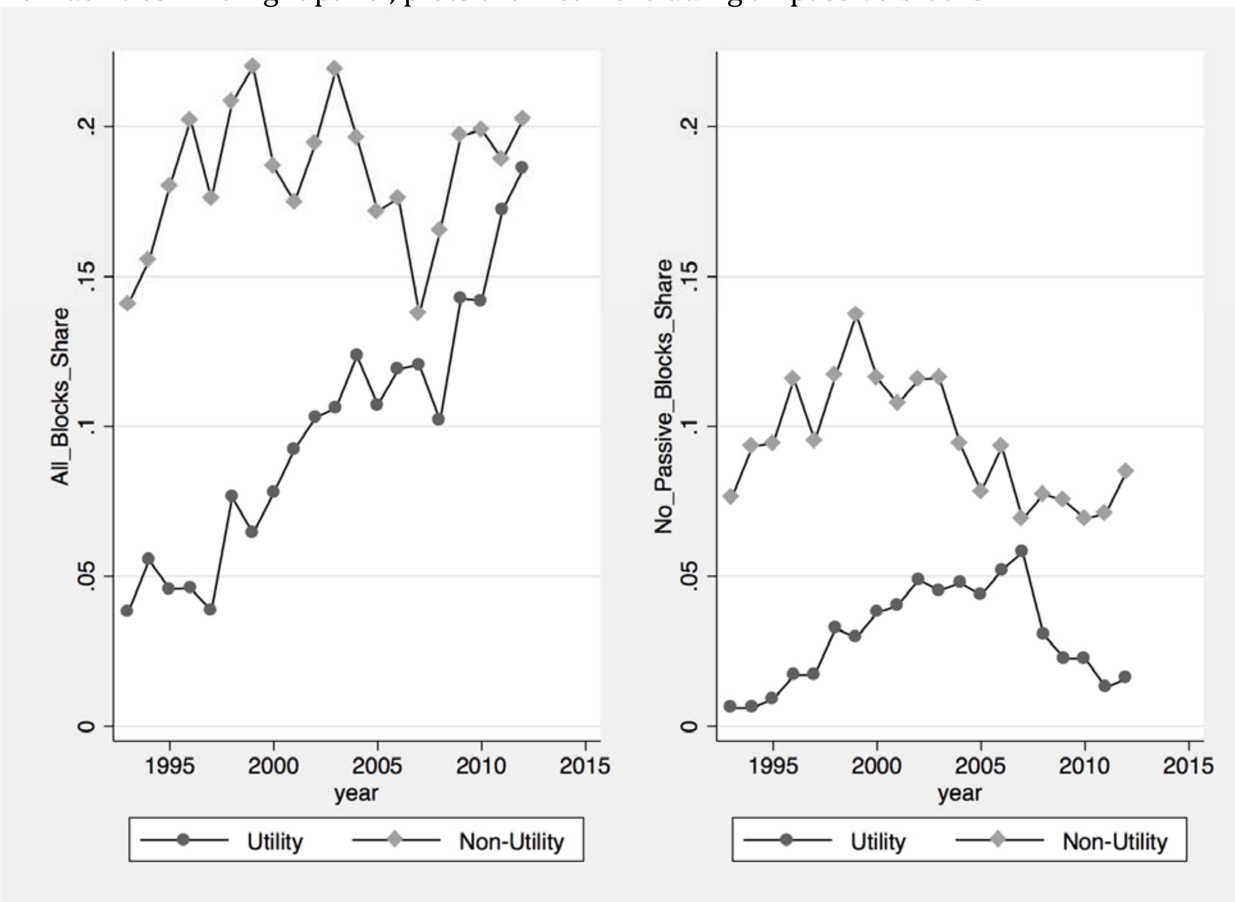
**Figure 3. Distribution of Total Block Ownership for SAP 900 (1992) Utilities and Matched Non-Utilities for the Years 1993, 2003 and 2012**




Note: Each bin represents a 5% width. Because the smallest large block is 5%, the first bin contains the fraction of firms with no large blocks. The one utility with total blocks greater than 20% in 1993 was Duke Power, where there was a single large passive investor, the Duke Charitable Endowment.

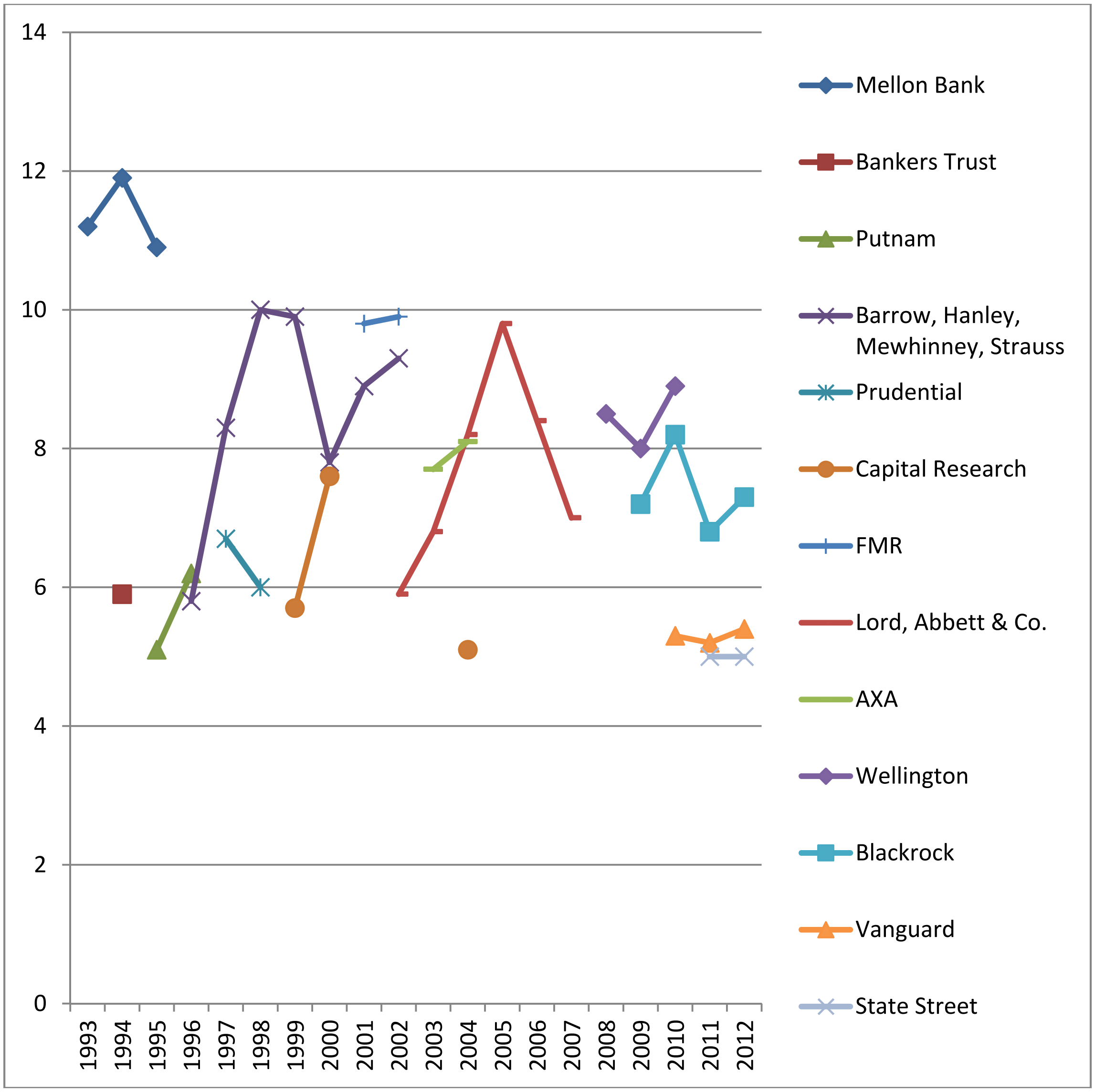
**Figure 4. Mean Total Block share for Utilities and Non-Utilities: 1993—2012.**

The left panel plots the mean of the total of all ownership blocks in S&P utilities and non-utilities. The right panel, plots the mean excluding all passive blocks:



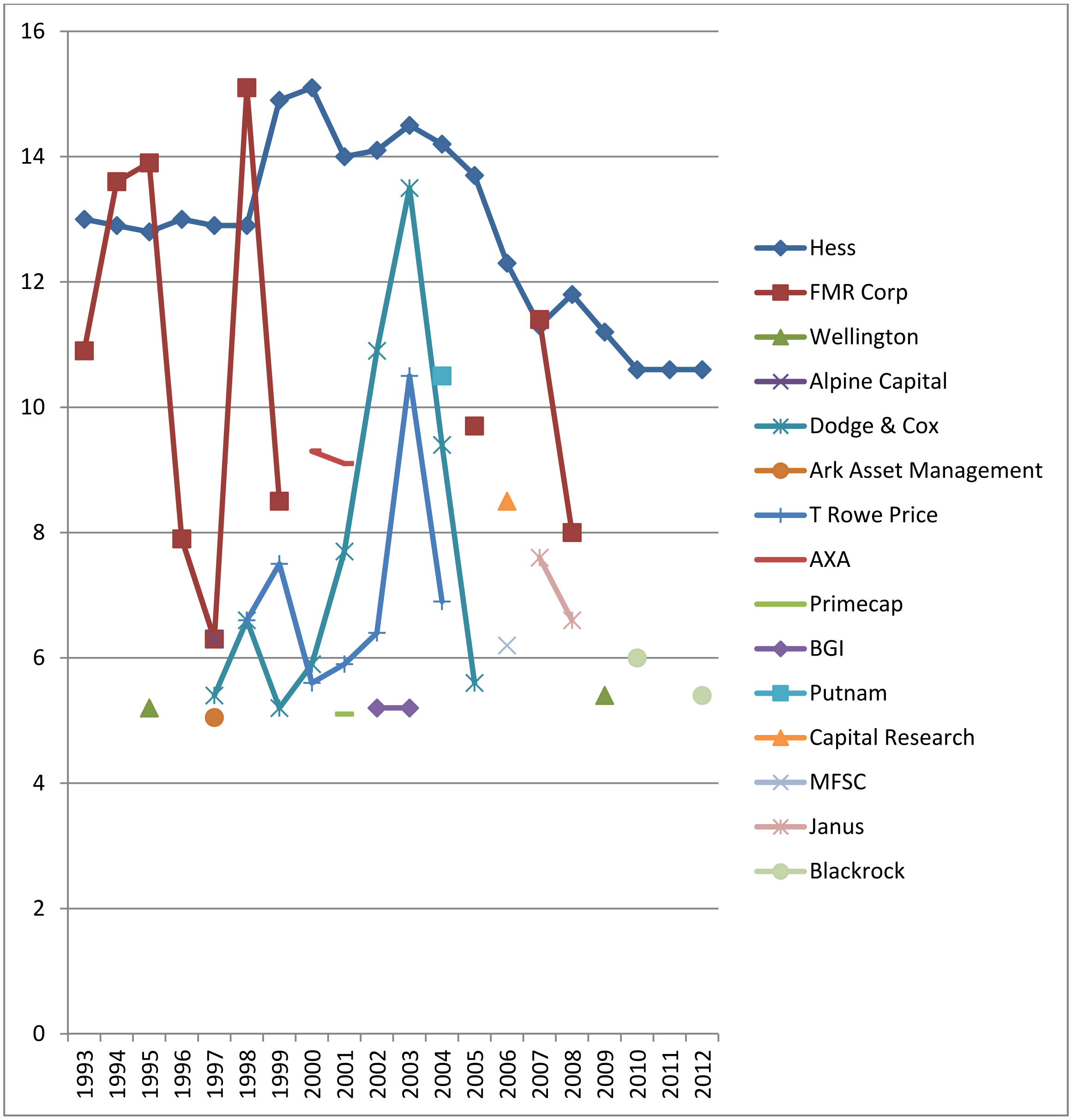

Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by the largest asset managers: CAPITAL RESEARCH , GOLDMAN SACHS , PRUDENTIAL , BNY MELLON , J.P. MORGAN CHASE & CO. , DEUTSCHE BANK , FIDELITY, BARCLAYS , BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES

**Figure 5: In-and-Out Investors in Northeast Utilities**



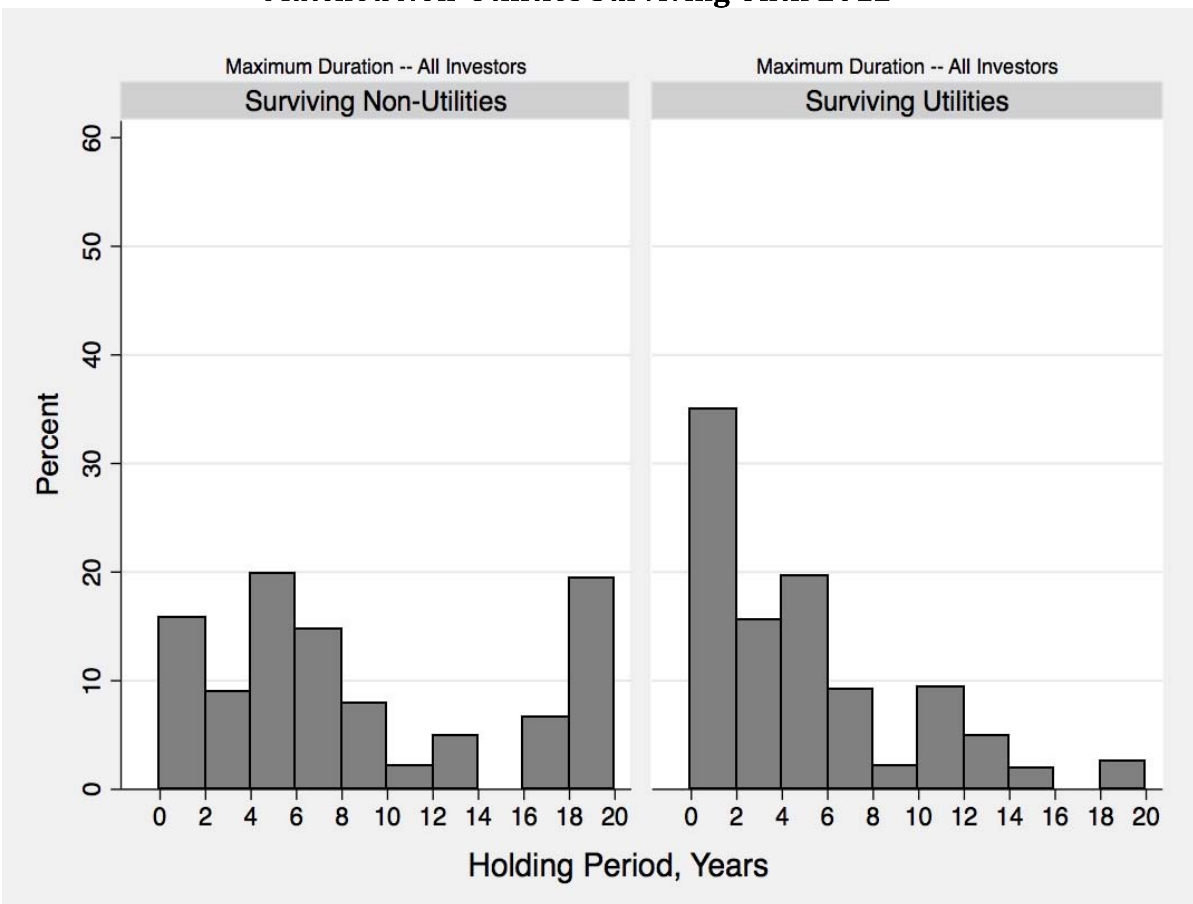

The vertical axis gives the percentage ownership stake of the different block-holders as they are reported in the Def14A filings.

**Figure 6: Investors in Hess Corp**



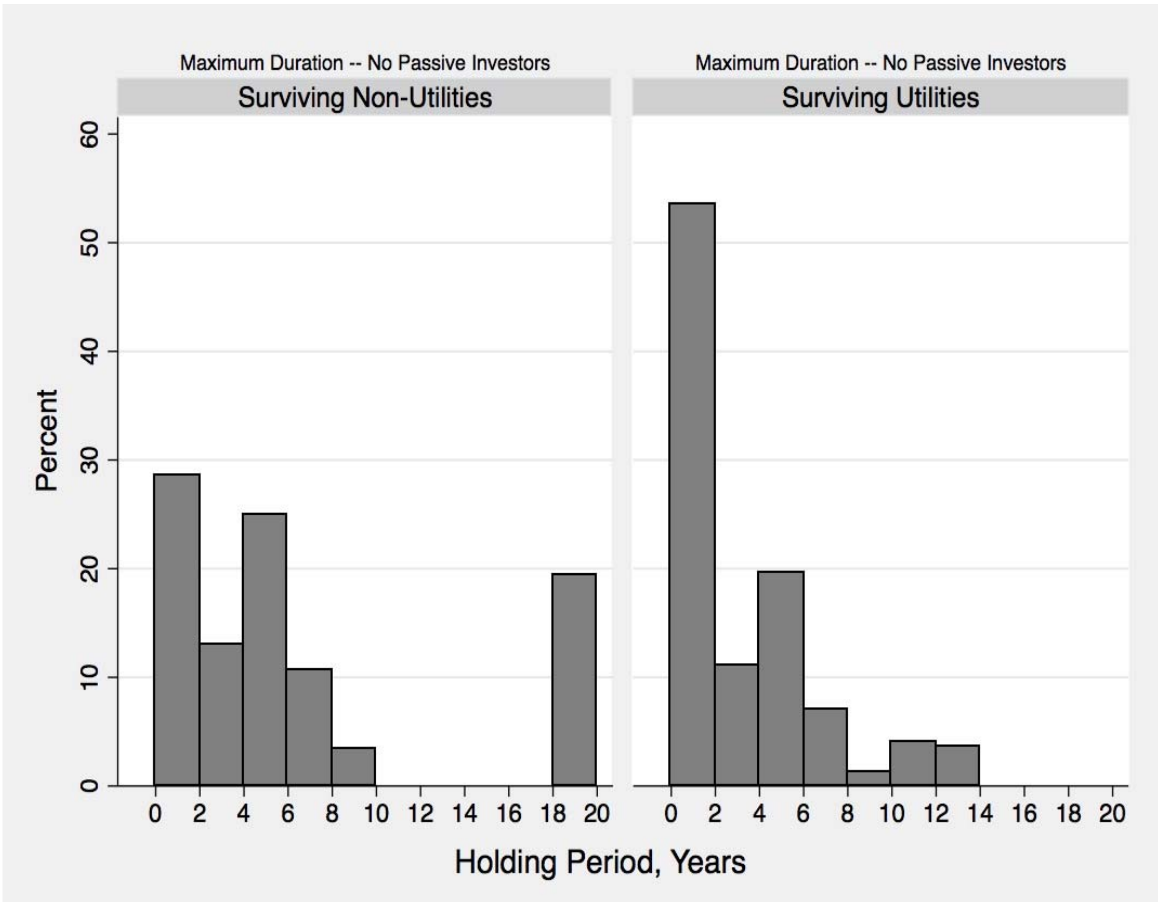

The vertical axis gives the percentage ownership stake of the different block-holders as they are reported in the Def14A filings. Hess stands for Leon Hess from 1993 to 1999. Thereafter it stands for John B. Hess, John Y. Schreyer, Burton T. Lefkowitz, Nicholas F. Brady, and Thomas H. Kean, who are listed as beneficial owners c/o the Amerada Hess Corporation. BGI stands for Barclays Global Investors, MFSC for Massachusetts Financial Services Company and Janus for Janus Capital Management LLC.

**Figure 7. Distribution of Block-Ownership Maximum Duration for Utilities and Matched Non-Utilities Surviving Until 2012**



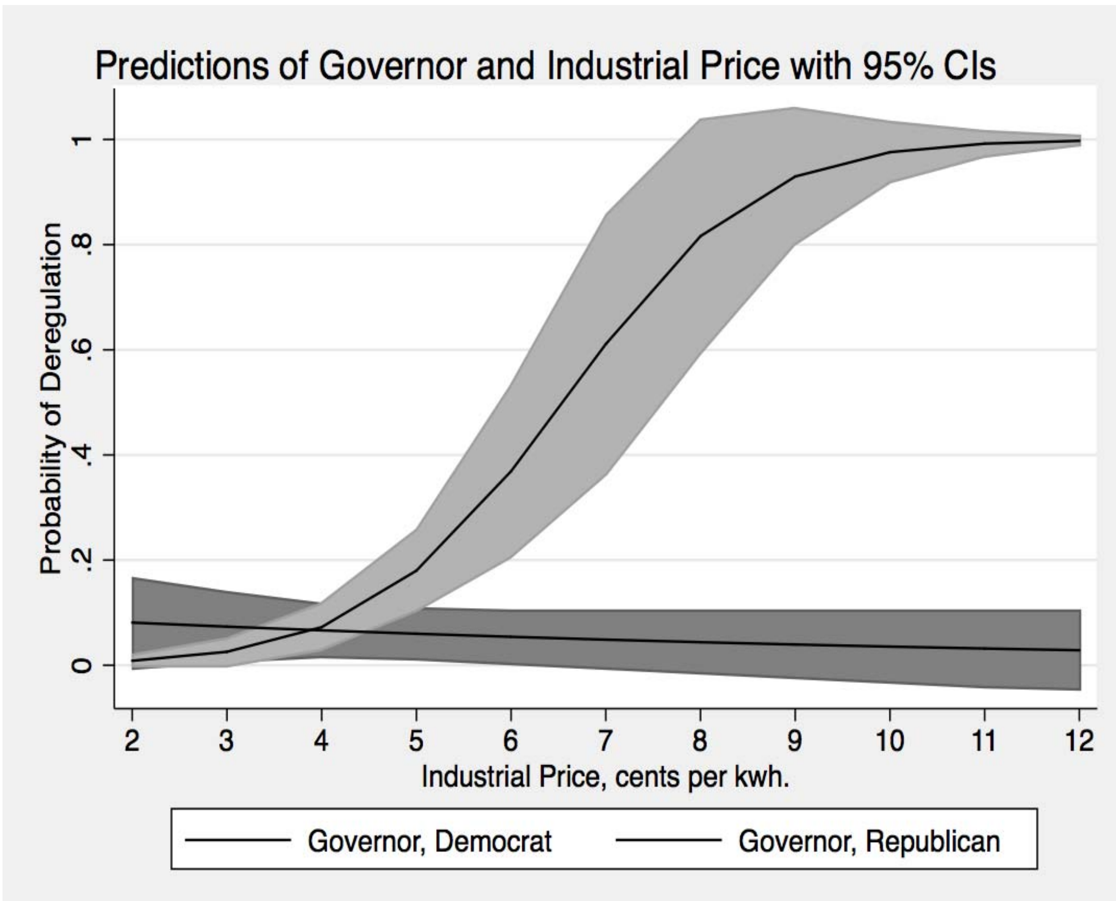

Maximum Duration is the longest consecutive holding period of a block in firm i measured from respectively the year when the block is first reported to the last consecutive year when it is reported in the Def14A filings. The highest possible duration is 20 (and the lowest is 1). The histograms give the distribution of the maximum holding period across respectively non-utilities and utilities.

**Figure 8. Distribution of Non-Passive Block-Ownership Maximum Duration for SAP Utilities and Matched Non-Utilities surviving until 2012**




Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by the largest asset managers: CAPITAL RESEARCH , GOLDMAN SACHS , PRUDENTIAL , BNY MELLON , J.P. MORGAN CHASE & CO. , DEUTSCHE BANK , FIDELITY, BARCLAYS , BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES.

**Figure 9. Deregulation Prediction of State Governor Political Affiliation**




**Note: Governor, Republican denotes Republican or Independent Governor**

## Appendix (For Online Publication Only)

**List of S&P 900 Electric Utilities in 1962 and Matched Non-Utilities**

| Standard Industry Classification | Company Name | Ticker Symbol |
|---|---|---|
| | **Non-Utilities** | |
| 1311 | ANADARKO PETROLEUM CORP | APC |
| 1311 | APACHE CORP | APA |
| 1311 | BURLINGTON RESOURCES INC | BR.2 |
| 1311 | KERR-MCGEE CORP | KMG |
| 1311 | MAXUS ENERGY CORP | MXS |
| 1311 | OCCIDENTAL PETROLEUM CORP | OXY |
| 1311 | ORYX ENERGY CO | ORX |
| 1311 | UNOCAL CORP | UCL |
| 1311 | PET INC | PT.1 |
| 2000 | DREYER'S GRAND ICE CRM HLDGS | DRYR |
| 2024 | ARCHER-DANIELS-MIDLAND CO | ADM |
| 2070 | WEYERHAEUSER CO | WY |
| 2400 | POTLATCH CORP | PCH |
| 2421 | CHAMPION INTERNATIONAL CORP | CHA.3 |
| 2621 | FORT JAMES CORP | FJ |
| 2621 | FEDERAL PAPER BOARD CO | FBO |
| 2631 | MEADWESTVACO CORP | MWV |
| 2631 | TRIBUNE CO | TRB |
| 2711 | AIR PRODUCTS & CHEMICALS INC | APD |
| 2810 | QUANTUM CHEMICAL CORP | CUE.1 |
| 2821 | CHEMFIRST INC | CEM.2 |
| 2860 | LYONDELL CHEMICAL CO | LYO |
| 2860 | FREEPORT MCMORAN INC | FTX |
| 2870 | IMC GLOBAL INC | IGL |
| 2870 | ATLANTIC RICHFIELD CO | ARC.3 |
| 2911 | CONOCOPHILLIPS | COP |
| 2911 | HESS CORP | HES |
| 2911 | MARATHON OIL CORP | MRO |
| 2911 | TEXACO INC | TX.2 |
| 2911 | VALERO ENERGY CORP | VLO |
| 2911 | CONRAIL INC | CRR.3 |
| 4011 | CSX CORP | CSX |
| 4011 | ILLINOIS CENTRAL CORP | IC.1 |
| 4011 | SANTA FE PACIFIC CORP | SFX.2 |
| 4011 | UNION PACIFIC CORP | UNP |
| 4011 | ALEXANDER & BALDWIN INC | ALEX |
| 4400 | APL LTD | APL.4 |
| 4412 | OVERSEAS SHIPHOLDING GROUP | OSG |

| | | |
|---|---|---|
| 4412 | SOUTHWEST AIRLINES | LUV |
| 4512 | GATX CORP | GMT |
| 4700 | SPRINT NEXTEL CORP | S |
| 4812 | AT&T INC | T |
| 4813 | FRONTIER CORP | FRO.1 |
| 4813 | MCI COMMUNICATIONS | MCIC |
| 4813 | SOUTHERN NEW ENG TELECOMM | SNG.1 |
| 4813 | CBS INC | CBS.1 |
| 4833 | COMSAT CORP -SER 1 | CQ.1 |
| 4899 | EL PASO CGP CO | EP2 |
| 4922 | PANENERGY CORP | PEL.1 |
| 4922 | SONAT INC | SNT.1 |
| 4922 | WILLIAMS COS INC | WMB |
| 4922 | CONSOLIDATED NATURAL GAS CO | D2 |
| 4923 | NORAM ENERGY CORP | CNP2 |
| 4923 | ONEOK INC | OKE |
| 4923 | QUESTAR CORP | STR |
| 4923 | AGL RESOURCES INC | GAS |
| 4924 | NATIONAL FUEL GAS CO | NFG |
| 4924 | NICOR INC | GAS.2 |
| 4924 | PEOPLES ENERGY CORP | PGL.1 |
| 4924 | WASTE MANAGEMENT INC-OLD | WMX |
| 4953 | ENRON CORP | ENRNQ |
| 5172 | BENEFICIAL CORP | BNL.1 |
| 6141 | FIRST FINANCIAL MGMT CORP | FFM. |
| 7320 | TIME WARNER INC-OLD | TWX.1 |
| 7812 | COMDISCO HOLDING CO INC | CDCO |
| | **Utilities** | |
| 9995 | ALLEGHENY ENERGY INC | AYE |
| 4911 | AMERICAN ELECTRIC POWER CO | AEP |
| 4911 | ATLANTIC ENERGY INC | ATE.2 |
| 4911 | BLACK HILLS CORP | BKH |
| 4911 | CENTRAL & SOUTH WEST CORP | CSR.1 |
| 4911 | CLECO CORP | CNL |
| 4911 | CMP GROUP INC | CTP.1 |
| 4911 | DOMINION RESOURCES INC | D |
| 4911 | DTE ENERGY CO | DTE |
| 4911 | EDISON INTERNATIONAL | EIX |
| 4911 | ENTERGY CORP | ETR |
| 4911 | EXELON CORP | EXC |
| 4911 | FIRSTENERGY CORP | FE |
| 4911 | FLORIDA PROGRESS CORP | PGN3 |
| 4911 | GPU INC | GPU. |
| 4911 | GREAT PLAINS ENERGY INC | GXP |
| 4911 | HAWAIIAN ELECTRIC INDS | HE |
| 4911 | IDACORP INC | IDA |
| 4911 | IPALCO ENTERPRISES INC | AES4 |

| | | |
|---|---|---|
| 4911 | NEW ENGLAND ELECTRIC SYSTEM | NES.2 |
| 4911 | NEXTERA ENERGY INC | NEE |
| 4911 | NORTHEAST UTILITIES | NU |
| 4911 | NV ENERGY INC | NVE |
| 4911 | PEPCO HOLDINGS INC | POM |
| 4911 | PINNACLE WEST CAPITAL CORP | PNW |
| 4911 | PNM RESOURCES INC | PNM |
| 4911 | PORTLAND GENERAL CORP | PGN.3 |
| 4911 | PPL CORP | PPL |
| 4911 | PROGRESS ENERGY INC | PGN |
| 4911 | PSI RESOURCES INC | CIN2 |
| 4911 | SOUTHERN CO | SO |
| 4911 | SOUTHWESTERN PUBLIC SVC CO | NCE2 |
| 4911 | UIL HOLDINGS CORP | UIL |
| 4911 | UNICOM CORP | UCM.2 |
| 4911 | VECTREN CORP | VVC |
| 4923 | ALLETE INC | ALE |
| 4931 | ALLIANT ENERGY CORP | LNT |
| 4931 | AMEREN CORP | AEE |
| 4931 | AQUILA INC | ILA |
| 4931 | CENTERPOINT ENERGY INC | CNP |
| 4931 | CINCINNATI GAS & ELECTRIC | CIN1 |
| 4931 | CMS ENERGY CORP | CMS |
| 4931 | CONECTIV INC | POM2 |
| 4931 | CONSOLIDATED EDISON INC | ED |
| 4931 | CONSTELLATION ENERGY GRP INC | CEG |
| 4931 | DUKE ENERGY CORP | DUK |
| 4931 | ENERGY EAST CORP | EAS |
| 4931 | ENERGY FUTURE HOLDINGS CORP | 0033A |
| 4931 | ILLINOVA CORP | ILN |
| 4931 | IOWA-ILLINOIS GAS & ELEC | IWG |
| 4931 | LG&E ENERGY CORP | LGE |
| 4931 | MONTANA POWER CO | MTP.1 |
| 4931 | NEW CENTURY ENERGIES INC | NCE.1 |
| 4931 | NIAGARA MOHAWK HOLDINGS INC | NMK |
| 4931 | NISOURCE INC | NI |
| 4931 | OGE ENERGY CORP | OGE |
| 4931 | PG&E CORP | PCG |
| 4931 | PUBLIC SERVICE ENTRP GRP INC | PEG |
| 4931 | PUGET ENERGY INC | 5495B |
| 4931 | SCANA CORP | SCG |
| 4931 | TECO ENERGY INC | TE |
| 4931 | WISCONSIN ENERGY CORP | WEC |
| 4931 | XCEL ENERGY INC | XEL |
| 4931 | KEYSPAN ENERGY CORP | KSE. |
| 4932 | SEMPRA ENERGY | SRE |

## Table 2A-1 Effect of EPACT on Ownership Concentration in Electric Utilities:

This table includes all non-utilities (including those not in the final sample), and all utilities.

Dependent Variable: Sum of Blocks ≥ 5%

| Independent Variable, | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Utility | -15.56*** | | -20.73*** | -18.97*** |
| | (2.192) | | (3.038) | (1.907) |
| Year-1993 | 0.220 | 0.194 | 0.265 | 0.220*** |
| | (0.186) | (0.176) | (0.199) | (0.0596) |
| Utillity*(Year-1993) | 0.546** | 0.582*** | 0.875*** | 0.800*** |
| | (0.200) | (0.189) | (0.215) | (0.0787) |
| Constant | 18.35*** | 9.034*** | 16.27*** | 17.62*** |
| | (2.124) | (0.652) | (2.380) | (1.409) |
| Sigma | | | 15.10*** | |
| | | | (1.567) | |
| sigma_u | | | | 11.40*** |
| | | | | (0.686) |
| sigma_e | | | | 9.201*** |
| | | | | (0.165) |
| Observations | 2,418 | 2,418 | 2,418 | 2,418 |
| R-squared | 0.194 | 0.698 | | |
| Number of Firms | 174 | 174 | 174 | 174 |

Parameter estimates are reported with robust standard errors in parentheses. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components. The threshold limit for the Tobit was not set at the standard 0 but at 4.99 to reflect the non-reporting of blocks below 5%.

## Table 2A-2 Effect of EPACT on Ownership Concentration in Electric Utilities:

This table includes all non-utilities in final match and all utilities.
The Dependent Variable is the Sum of Blocks ≥ 5%

| Independent Variable, | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Utility | -14.64*** | | -21.05*** | -20.05*** |
| | (2.416) | | (3.249) | (1.965) |
| Year-1993 | 0.113 | 0.141 | 0.201 | 0.214*** |
| | (0.206) | (0.223) | (0.225) | (0.0738) |
| Utillity*(Year-1993) | 0.653*** | 0.635*** | 1.058*** | 0.978*** |
| | (0.219) | (0.234) | (0.258) | (0.0926) |
| Constant | 17.43*** | 7.753*** | 15.61*** | 15.58*** |
| | (2.355) | (0.707) | (2.588) | (1.515) |
| Sigma | | | 14.73*** | |
| | | | (1.010) | |
| sigma_u | | | | 10.83*** |
| | | | | (0.707) |
| sigma_e | | | | 10.19*** |
| | | | | (0.195) |
| Observations | 2,227 | 2,227 | 2,227 | 2,227 |
| R-squared | 0.194 | 0.626 | | |
| Number of Firms | 160 | 160 | 160 | 160 |

Parameter estimates are reported with robust standard errors in parentheses. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components. The threshold limit for the Tobit was not set at the standard 0 but at 4.99 to reflect the non-reporting of blocks below 5%.

**Table 3A-1: Effect of EPact on Non-Passive Ownership Concentration in Electric Utilities**

Table includes all non-utilities (including those not in the final sample) and all utilities. Also note non-passive owners defined differently than in main text.

| Dependent variable: sum of non-passive blocks ≥ 5% | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Util | -10.13*** | | -20.34*** | -16.30*** |
| | (1.938) | | (4.275) | (2.108) |
| yearmin1993 | -0.0695 | -0.0851 | -0.0752 | -0.105* |
| | (0.153) | (0.101) | (0.212) | (0.0630) |
| Utilyear | 0.262 | 0.274** | 0.700*** | 0.538*** |
| | (0.160 | (0.111) | (0.245) | (0.0883) |
| Constant | 12.11*** | 6.096*** | 8.914*** | 10.17*** |
| | (1.909) | (0.391) | (2.183) | (1.529) |
| Sigma | | | 17.76*** | |
| | | | (3.051) | |
| sigma_u | | | | 12.38*** |
| | | | | (0.784) |
| sigma_e | | | | 8.823*** |
| | | | | (0.214) |
| Observations | 2,418 | 2,418 | 2,418 | 2,418 |
| R-squared | 0.110 | 0.752 | | |
| Number of Firms | 174 | 174 | 174 | 174 |

Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES. Parameter estimates are reported with robust standard errors in parentheses. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components

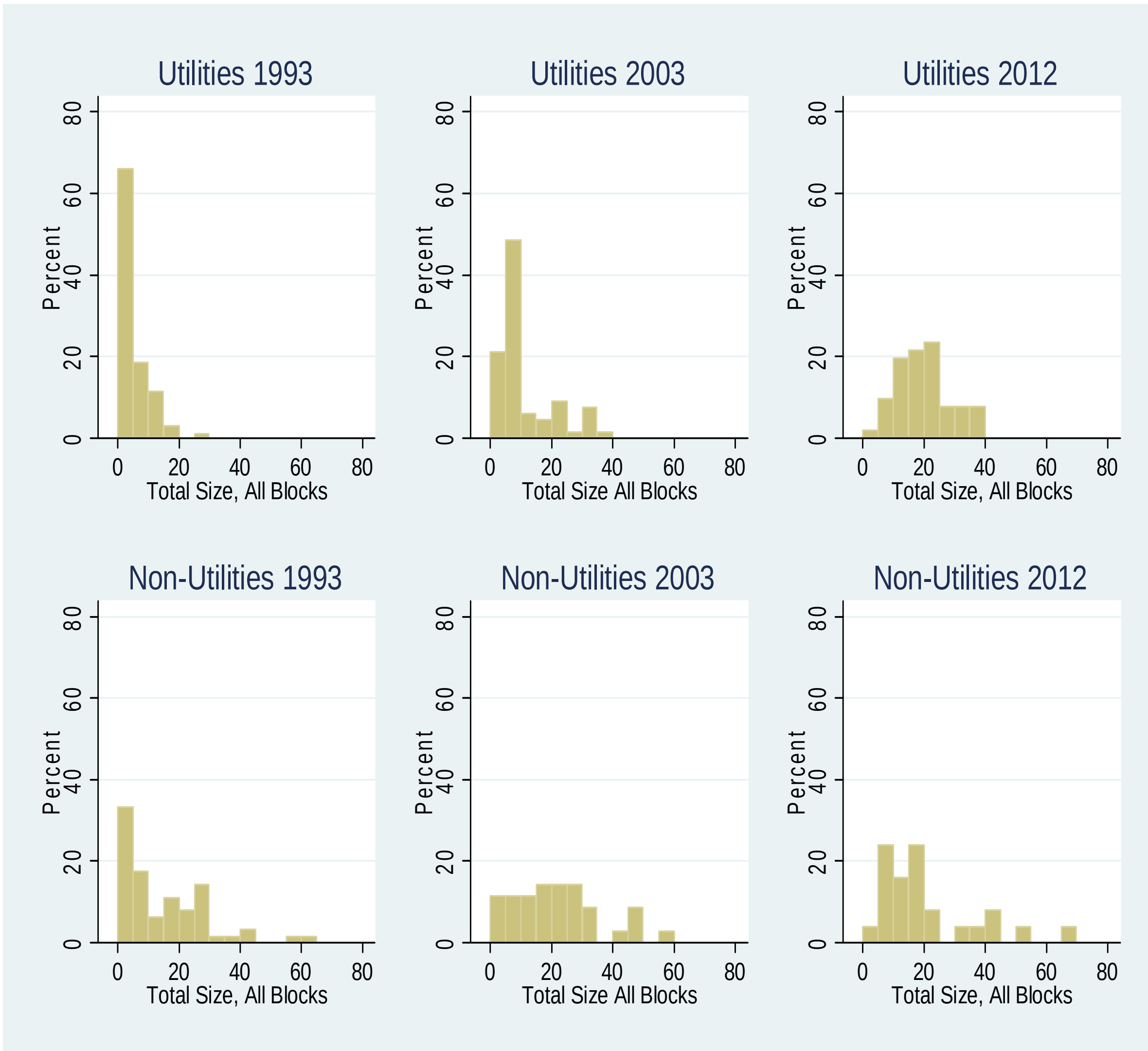
**Table 3A-2: Effect of EPACT on Non-Passive Ownership Concentration in Electric Utilities**

This table includes all non-utilities in the final match and all utilities.

| Dependent variable: sum of non-passive blocks ≥ 5% | (1) OLS | (2) OLS Firm FE | (3) Tobit | (4) Tobit Firm RE |
|---|---|---|---|---|
| Util | -8.600*** | | -19.74*** | -17.85*** |
| | (2.059) | | (4.142) | (2.389) |
| yearmin1993 | -0.115 | -0.0719 | -0.116 | -0.0882 |
| | (0.145) | (0.120) | (0.245) | (0.0905) |
| Utilyear | 0.307** | 0.261** | 0.801*** | 0.660*** |
| | (0.152) | (0.129) | (0.307) | (0.119) |
| Constant | 10.58*** | 4.879*** | 5.007* | 5.663*** |
| | (2.031) | (0.409) | (2.663) | (1.808) |
| | | | 18.08*** | |
| Sigma | | | (1.733) | |
| sigma_u | | | | 12.76*** |
| | | | | (0.900) |
| sigma_e | | | | 11.36*** |
| | | | | (0.303) |
| Observations | 2,227 | 2,227 | 2,227 | 2,227 |
| R-squared | 0.097 | 0.641 | | |
| Number of Firms | 160 | 160 | 160 | 160 |

Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by BARCLAYS, FIDELITY, CAPITAL RESEARCH, GOLDMAN SACHS, PRUDENTIAL, BNYMELLON, J.P. MORGAN CHASE, DEUTSCHE BANK, BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES. Parameter estimates are reported with robust standard errors in parentheses. The symbols *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. Sigma is the estimated standard error of the Tobit regression, and sigma_e and sigma_u are respectively the estimated overall and panel-level variance components

**Figure 3A. Distribution of Total Block Ownership for All (SAP and not SAP) Utilities and Matched Non-Utilities for the Years 1993, 2003 and 2012**




Note: Each bin represents a 5% width. Because the smallest large block is 5%, the first bin contains the fraction of firms with no large blocks. The one utility with total blocks greater than 20% in 1993 was Duke Power, where there was a single large passive investor, the Duke Charitable Endowment.

**Figure 4A. Mean Total Block share for Utilities and Non-Utilities: 1993—2012.** The left panel plots the mean of the total of all ownership blocks in utilities and non-utilities. The right panel, plots the mean excluding the following passive blocks: ESOPS, custodian-bank held blocks, the Duke trust, and all blocks held by Blackrock, Vanguard, AXA, and Franklin Resources. It includes all non-utilities including those not in the final matched sample. It includes PORTLAND GENERAL ELECTRIC.

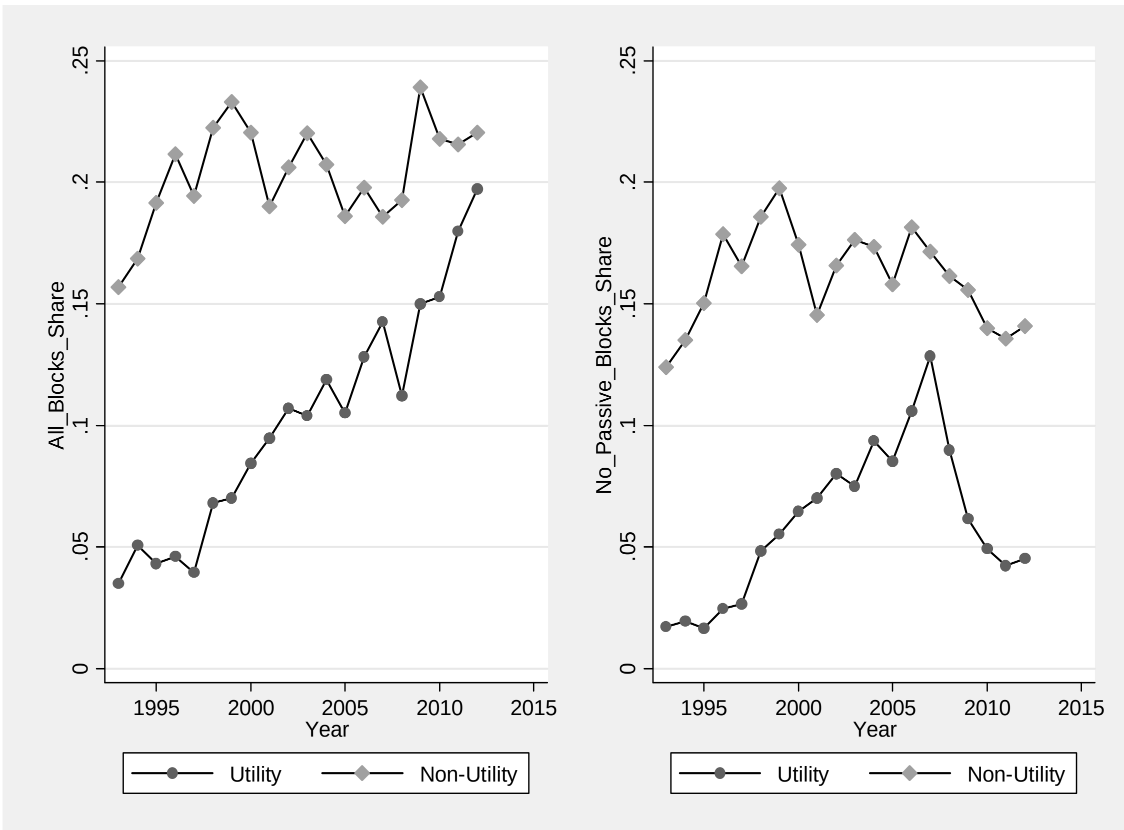
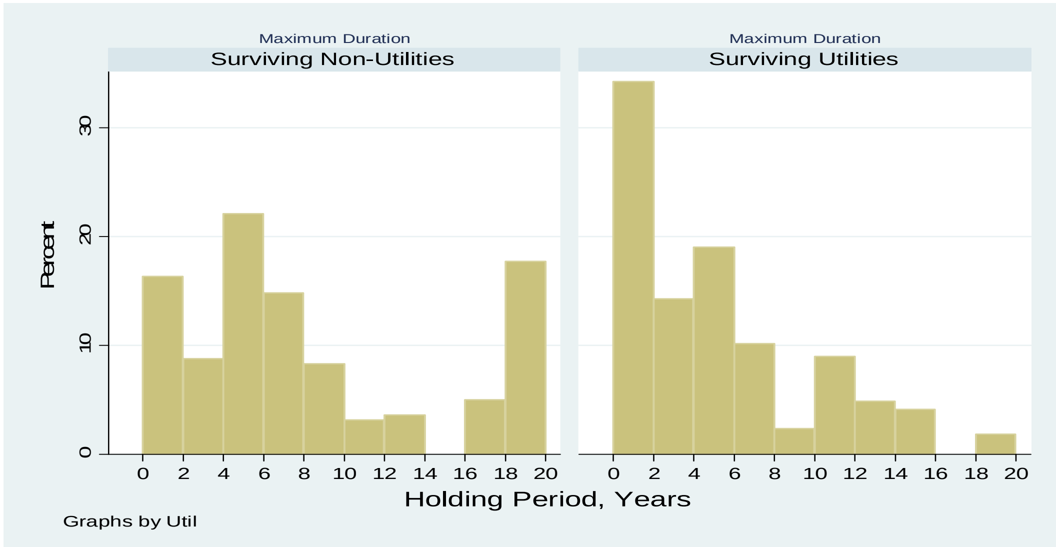
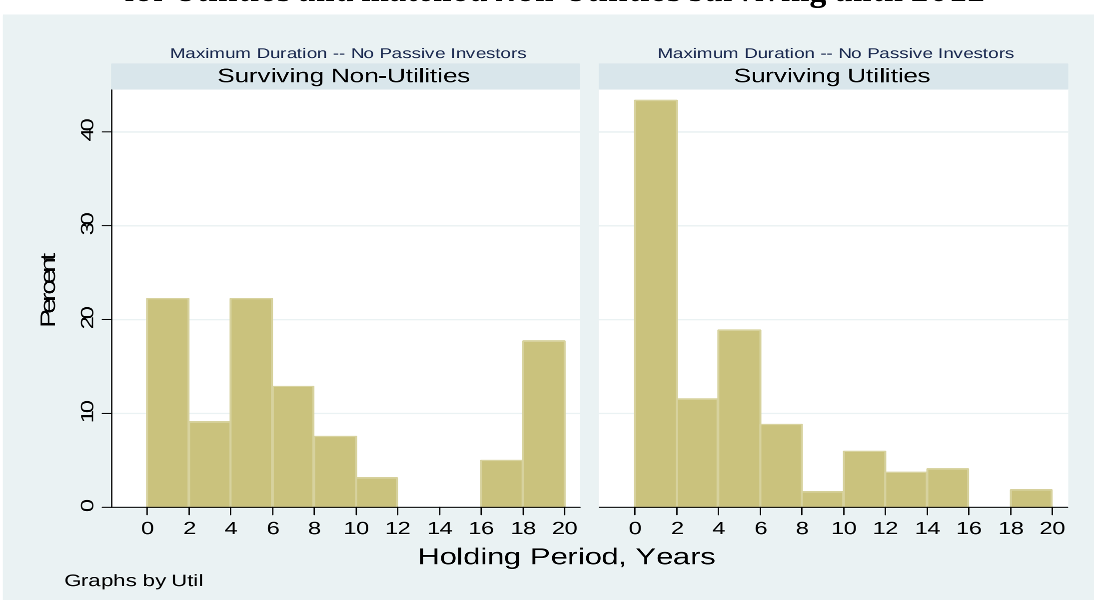


**Figure 7A. Distribution of Block-Ownership Maximum Duration for Utilities and Matched Non-Utilities Surviving Until 2012**




Maximum Duration is the longest consecutive holding period of a block in firm i measured from respectively the year when the block is first reported to the last consecutive year when it is reported in the Def14A filings. The highest possible duration is 20 (and the lowest is 1). The histograms give the distribution of the maximum holding period across respectively non-utilities and utilities.

**Figure 8A. Distribution of Non-Passive Block-Ownership Maximum Duration for Utilities and matched Non-Utilities surviving until 2012**




Non-Passive blocks are all blocks except blocks held by banks as trustees, ESOPs, the Duke trust and blocks held by the largest asset managers: CAPITAL RESEARCH , GOLDMAN SACHS , PRUDENTIAL , BNY MELLON , J.P. MORGAN CHASE & CO. , DEUTSCHE BANK , FIDELITY, BARCLAYS , BLACKROCK, VANGUARD, AXA and FRANKLIN RESOURCES.