Draft: July 8, 2004

Regime Change and Corruption: A History of Public Utility Regulation

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I. Introduction

The history of public utility regulation has an odd circular quality. Consider the rise and fall of state public utility commissions . Between 1907 and 1924, nearly thirty states created state-wide regulatory commissions to govern the behavior of private utility companies. At the time, just about all observers—government officials, consumers, the managers of public utility companies, academic economists and political scientists—viewed the creation of state utility commissions as a positive development that would promote both equity and economic efficiency (Anderson 1914; Farlie 1914; and Gessell 1914). Yet sixty to seventy years later, when these same regulatory commissions were dismantled and public utilities were returned to a regulatory environment akin to that that had preceded state regulatory commissions, this too was heralded as progress, and was welcomed by most all concerned (Winston 1993).

The same circular pattern emerges in the rise and fall of municipal ownership. (In the United States, municipal ownership was the most common way of regulating the behavior of urban water companies for much of the twentieth century.) Around 1900, scores of local governments began acquiring the private water companies in their jurisdictions (Troesken 2003; Troesken and Geddes 2003). As with the rise of state regulatory commissions, the municipalization of public water supplies was heralded by most observers as a positive development (Brown 1905; Carey 1900; Clark 1917; McDonnell 1924; and Rosewater 1903). Yet by the turn of the twenty-first century, the same governments that had municipalized their water systems a century earlier, were now privatizing those systems and returning them to the institutional environment that had governed private water companies for much of nineteenth century. Again this was done to the cheers of

nearly all concerned (Vitale 2001).

It is tempting to attribute the circular history of public utility regulation to ideological mistakes. An economist with right-leaning sympathies could be easily persuaded that Progressive-Era reformers believed too strongly in the efficacy of state regulatory regimes and municipal ownership, and that the deregulation and privatization of public utilities during the 1970s and 80s simply undid the mistakes of the past. Alternatively, a left-leaning historian would have little trouble believing that late-twentieth-century conservatives have too much faith in deregulation and privatization, and somewhere down the road, it will be necessary to undue their mistakes. Whatever variant one prefers, there are two problems with the "mistakes-were-made" argument. First, it presumes a flawed ideological faith, in either statism or markets, led many otherwise intelligent people astray. While ideological mistakes are certainly possible, they probably should be adopted as explanatory factors only after all other reasonable alternatives have been exhausted. Second and more important, evidence presented later in the paper shows that transitions in regulatory and governance regimes—whether from market-orientated to statist, or vice versa—can dramatically improve the operation of public utilities. In other words, the process of change can, by itself, be beneficial to public utility markets, and the direction of the change—whether to something entirely new and untried, or back to a regulatory environment long since abandoned—can be of second-order importance.

Accordingly, this paper argues that the circularity of public utility regulation has not been driven by ideological mistakes, but instead by the desirability and necessity of occasional regime changes in public utility markets. Why are occasional regime changes

desirable for public utility markets? In answering this question, the paper here will build on the following three observations. First, corruption is endemic to public utility industries; corruption exists, in some form, across all regulatory and ownership regimes. Second, regime change in utility industries does not eliminate corruption; it only alters the type of corruption observed. Third, for any type of governance regime (e.g., state regulation or municipal ownership) corruption grows increasingly severe over time, and at some point, becomes politically untenable. When corruption becomes politically untenable, politicians intervene and replace the existing and utterly corrupt governance regime with a new regime. The institutional change breaks the fully-matured and corrupt relationships of the old regime, and replaces them with new corrupt relationships that will also eventually mature and flourish, but this maturation takes much time, and at least initially, the new governance regime is associated with much less corruption than the old regime.

II. Contractual Necessities

Public utilities and local governments confront a difficult contracting problem, and as will be made clear below, this contracting problem lies at the heart of corruption in public utility industries. On the one hand, utility companies have to invest heavily in non-redeployable capital, particularly their distribution systems. For example, in Chicago and New York during the late nineteenth century, local gas companies owned more than 10 percent of all private capital invested in both cities and nearly all of the physical capital held by gas companies was in the form of distribution mains (Troesken 1996, pp. 9-10). If one contemplates the magnitude of industrial investment and activity in both of these cities, 10 percent of all capital is a remarkable statistic. In Chicago, the only industry that was even close to owning as much capital as the gas companies was the city's meatpackers and slaughterhouses. Chicago's infamous stockyards were, by themselves, a reasonably sized town (see, generally, Wade 1987).

Moreover, once gas and other utilities install their distribution systems, they are stuck; gas mains and electric transmission wires cannot be resold for some other purpose, or moved to some other market if local conditions turn against producers (Troesken 1996). Utility companies, in other words, were held hostage by their investments (Goldberg 1976; Williamson 1985). Because producers cannot credibly threaten to exit, these investments leave them vulnerable to the opportunistic acts of consumers and local governments. For example, local politicians might demand large bribes from local utilities in return for fair treatment in terms of regulations and taxes (Troesken 1996, pp. 55-78; and 1997). If local politicians tried to do this to, say, local grocery stores and restaurants, those businesses could simply exit and locate in a more hospitable political environment. As

the discussion below makes clear, local politicians frequently used privately owned companies as a means of extracting rents and garnering constituent support.

On the other hand, local governments usually have to grant utilities exclusive rights to install mains and wires along streets and property. Once granted, these rights cannot be meaningfully revoked and leave cities vulnerable to the opportunistic acts of utility companies (Goldberg 1976; and Jacobson 2000, pp. 114-15; and Troesken 1996, pp. 10-12). Consider, for example, the case of a private water company and some city A. Suppose that the water company enjoys a monopoly over the city's water market so that the city must depend solely on this company for its water. In this context, city A is much like any buyer of a unique and highly specialized product who must rely solely on a single, monopolistic supplier. Just as the customer of the unique product is vulnerable to hold up by the product's manufacturer, city A's reliance on the water company creates incentives for the water company to act opportunistically. By shutting down or curtailing service to the city—which historically could have resulted in disease epidemics or great city-wide fires—the water company might be able to secure tax breaks or other favorable treatment from the city.

The notion that cities could be held hostage by a single utility company is not a theoretical contrivance. Consider the experience of Kansas City, Missouri. In 1893, a dispute arose between Kansas City and the National Waterworks Company, the city's monopoly water provider. Among other things, the water company claimed that the city owed it thousands of dollars in rental payments for the use of its fire hydrants. The city claimed it did not. To get the city to accede to its demands, the water company threatened to shut off the

city's water supply. Not surprisingly, the dispute had to be litigated.[1]

To induce the requisite investments in property rights and non-redeployable capital, cities and public utilities need to devise contractual arrangements that provide credible assurances to both sides that the other party to the contract will not behave opportunistically *ex post*. In particular, city officials need to somehow credibly assure utility companies that they will not enact extortionate regulations or taxes. Without such credible promises, private utility companies will refuse to invest in the necessary capital. For their part, private utility companies need to pre-commit to providing reliable service at a reasonable cost once they have exercised their rights to dig up streets and private property. Without such commitments, local officials will refuse to grant utility companies the rights needed to operate in city boundaries.

There are three possible solutions to the contracting problem facing cities and private utility companies. The first solution is a franchise bidding scheme whereby municipalities auction off the right to operate in their jurisdiction: the company that makes the best offer wins. Franchises are contracts between cities and utility companies that include provisions limiting the ability of city governments to impose onerous rates and taxes—these protect utilities—and provisions setting quality standards and rate ceilings—these protect the cities and their residents. Because franchises embody legally-binding promises about future behavior, they put limits on the ability of both cities and utilities to behave opportunistically *ex post*. Limiting the ability of both sides to behave opportunistically, cities and utility companies become

[1]See the following issues of the *Kansas City Star*: November 24, 1893, p. 1;

sufficiently confident to invest in non-redeployable capital and property rights.[2]

The second solution is a state regulatory commission. Ideally, state regulatory commissions act like impartial arbitrators, mediating disputes between cities and utility companies as they arise. Commissions, in other words, function like an administered contract, the terms of which are set by the legislature that creates the commission. In the presence of objective and impartial commissions, cities and utilities feel confident that *ex post* opportunism will be minimized, and therefore make the necessary investments in property rights and capital (Goldberg 1976; Troesken 1995 and 1996; and Williamsom 1985).

Although it is only recently that economists have come to think of it as such, municipal ownership is yet another way to mitigate the contracting problems that confront public utilities and local governments. One might think of public ownership as a form of vertical integration. To see this consider two recent studies, Levy and Spiller (1995) and Troesken (1997). Comparing the ownership of telephone systems across several countries, Levy and Spiller find that publicly-owned telephone systems are most common in those nations that cannot commit to stable and reasonable regulatory policies. Comparing the ownership of urban gas systems across U.S. cities and towns in 1911, Troesken finds the same pattern; publicly-owned gas companies were most common in those towns that could not commit to stable and reasonable regulatory policies. There is a clear parallel between the city that buys its own gas company because it cannot commit to treating a private gas company fairly and the manufacturer that

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November 25, 1893, p. 1; and December 13, 1893, p. 1.
[2]On the use of municipal franchises, see Jacobson (1989 and 2000); Miller (1993); Priest (1993); Troesken (1996), pp. 3-24; and Wilcox (1910).

acquires a potential supplier because it cannot commit to treating that supplier fairly.

III. Corruption and Contracts in Theory

All of the contractual mechanisms described above—franchise bidding, state regulatory commissions, and municipal ownership—are imperfect devices and each is susceptible to corruption. Understanding the sources and nature of corruption across these different contracting devices is essential if we are to explain the link between corruption and the circular evolution of public utility regulation. Accordingly, this section discusses the problems associated with each contracting device. Although the discussion here is largely theoretical and speculative, it is important because it will lay down a framework for understanding the historical evolution of utility regulation described below.

Before turning to this theoretical discussion, a definition is in order. For the purposes of this paper, corruption refers to the *illicit* sale of political influence. The sale of political influence can take many forms, including the following: patronage arrangements (politicians buy votes by offering plum jobs at above-market wages); political extortion (politicians can extract bribes from private utility companies by threatening to impose confiscatory regulations and taxes); strategic investment decisions (as explained below, private utilities can distort their capital investment decisions to secure more favorable treatment from state regulators); and industry capture (private utilities spend resources to make friends with regulators). Having offered these examples, in the definition of corruption offered above, the word *illicit* is critical. The act of selling political influence is not, in and of itself, corrupt. For example, through franchise bidding schemes, private utility companies

pay for the right to an exclusive and legally protected market. As long as the fees private utilities pay for this right are returned to voters, either directly in the form of reduced taxes or through the provision of public services, this is a completely legitimate sale of political influence. The act only becomes corrupt if politicians pocket for themselves some or all of the proceeds of the sale.

Franchise Bidding

Demsetz (1968) develops the first coherent statement on the use franchise bidding to regulate public utilities. Demsetz argues that by auctioning off the exclusive right to operate in a particular market, local governments could secure the benefits of regulation, with none of the costs. *Ex ante* competition for the franchise, not a costly and corruptible administrative agency, would govern the behavior of the utility. As long as Demsetz's bidding scheme is fair and open, the utility who won the franchise would offer rates and service such that the utility would earn zero economic profits; price would equal average total cost. This solution is, of course, second best. A first-best solution would force the utility to adopt marginal-cost pricing offer the utility a subsidy to compensate for its losses (Telser 1969 and 1971). In an exchange with Telser (1969), Demsetz (1971) argues that concerns about marginal cost pricing are relatively unimportant in the context of public utility markets. History suggests Demsetz is correct on this point; there are much bigger fish to fry, particularly those related to corruption.

Franchise bidding schemes are subject to a myriad corrupt practices. The most obvious potential source of corruption relates to the initial sale of the franchise. It easy to imagine scenarios whereby politicians allow producers to charge rates above average cost, and then split the subsequent excess rents with producers

through outright bribes and political donations. Different forms of corruption can also emerge depending on the length of the utility's. Consider the case of a public utility that is offered a very short franchise, say for five years. Because the utility's assets are much longer lived, when the franchise comes up for renewal there are potential hold up problems. Politicians, for example, could claim that the utility failed in some areas of performance and then deny renewal. Local politicians could then undervalue the exiting firm's capital, and split the rents with the entering firm which acquires the capital at bargain rates.

A solution to the corruption arising from short term franchises is to simply make franchises longer in length, say roughly the time it takes for utility's the capital stock to fully depreciate. The problem here is that the longer the franchise, the less robust are competitive forces and the threat of non-renewal to promote good service. Furthermore, anticipating future changes in technology and the price level is difficult. Consider the case of nineteenth America when the general price level fell steadily and the technology of producing gas and electricity improved rapidly, both of which drove down the profit-maximizing price for gas and electric. At this time, long-term franchises usually set price ceilings in nominal terms and in a few years those ceilings were not binding, even for firms holding monopoly positions (Troesken 1996, pp. 10-17). The point of this example is that unforeseeable changes in economic conditions allowed local utilities to acquire increasing market power and take advantage of consumers. Furthermore as will be made clear in the historical discussion below, during the initial contracting period, there will be very strong incentives for the utility and local politicians to create contracts that virtually guarantee the firm market power, and in turn,

allow for unholy exchanges of cash for favorable franchise terms. Given the complexity of utility franchises, and the genuine difficulties associated with trying to predict the future, it would be difficult for voters to identify franchise provisions that promoted the long-run market power of the utility.

Regulatory Commissions

State regulatory commissions are subject to at least two types of corruption. The first type of corruption stems from the mechanics of rate regulation. State commissions in the United States set utility rates high enough to allow private utilities to earn a reasonable rate of return on their capital investments, typically around 8 percent. Rate of return regulation creates strong incentives for private utilities to exaggerate the size of their capital stock so that they will be able to charge higher rates. Jarrell (1979) presents evidence that, during the mid-twentieth century, privately-owned electric companies that were regulated by state commissions had suspiciously high levels of capital investment. But private utilities need not cook their books to get favorable treatment, simply by investing more in capital investments than would unregulated firms, private utilities are able to secure a more favorable rate base (Averch and Johnson 1962).

The second type of corruption is the longstanding idea that regulatory commissions are subject to industry capture. Crudely put, industry capture occurs when regulators get to close to the industry they regulate and begin promoting the interests of the industry at the expense of broader societal interests. More formally, one might think of industry capture in the context of the well-known work by McCubbins, Noll, and Weingast (1987 and 1989). In this work, administrative agencies (like regulatory commissions) embody a

contract between the legislature that created them, and the interest groups that originally lobbied for them. It is in the interest of the legislature that creates an administrative agency to make it difficult for subsequent legislatures to undo their legislative actions, which represent a contract with the interest groups. It is also in the interest of the creating legislature to design a set of rules so that no matter the political, ideological, or economic background of the administrators, the agency will reflect the needs and wishes of the interest groups with whom the legislature struck its bargain. When subsequent legislatures undo the original contract, it is called coalitional drift. When subsequent administrators undo the original contract, it is called bureaucratic drift (Macey 1992 and Shepsle 1992).

Industry capture is a type of bureaucratic drift. As the word itself connotes, capture upsets the original contract between the legislature and the interest groups, and it does so because the regulators get cozy with the industry. The legislature that creates a regulatory commission can try to limit the amount of coziness through any number of rules. It might, for example, prohibit commissioners from working in the regulated industry for some number of years after leaving the commission. It might also prohibit commissioners from communicating with industry leaders outside of a narrow set of official channels. But no matter how many rules the legislature makes, there always exists the possibility that the ideological or economic backgrounds of future regulators will undo the legislature's original commitments.[3]

[3]While historical studies of regulatory commissions provide numerous examples of industry capture, they also suggest that industry capture is not inevitable. Moreover, to the degree that regulatory commissions have been captured in the past, it is not always producers who capture them. There are examples of consumers capturing the regulatory apparatus. The most famous of

Municipal Ownership

Municipal ownership is subject to the following three types of corruption. First, the assets of public utilities are long-lived, with distribution systems lasting fifty to one-hundred years before they are fully depreciated. Yet, the time horizons of local politicians and voters—i.e., those who the control the assets under municipal ownership—are relatively short. Politicians come up for election every few years, and most voters move once or twice in a lifetime. This means that confronted with a choice between the long-term viability of the utility system, and an immediate short-term payoff, such as reduced rates for consumers or well-paying jobs for political supporters, politicians would invariably chose the short-term payoff. Investments that payoff ten to twenty years down to road, are of little use to politicians concerned with the next election, or for voters with weak ties to the municipality served by the utility system in question. The incentive to sacrifice the long-term viability of the capital stock for short-term payoffs can be minimized by granting control over investment and finance decisions to federal authorities (while most voters move from town to town, relatively few move from country to country) or by creating an oversight agency that is immune to short-term political cycles (as are many state judiciaries). The problem with these solutions is that they are, by their construction, immune to democratic forces, even though one of the standard justifications for public ownership is that it allows for a more democratic and egalitarian distribution of resources.

A second and related concern is the idea that municipal ownership supports a giant patronage scheme: perhaps politicians garner support

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these is Albro Martin's (1971) study of farmers and the Interstate Commerce

by giving away jobs at the local gas and electric companies. Nobody said it better than George Washington Plunkitt, the inimitable boss of Tammany Hall (Riordon 1994, p. 78):

> Some of the reformers are sayin' that municipal ownership won't do because it would give a lot of patronage to the politicians. How those fellows mix things up when they argue! They're givin' the strongest argument in favor of municipal ownership when they say that. Who is better fitted to run the railroads and the gas plants and the ferries than the men who make a business of lookin' after the interests of the city? Who is more anxious to serve the city? Who needs the jobs more?

Commission during the early twentieth century.

Progressive era conservatives worried that as the number of municipally-owned utilities grew, so too would the number of municipal employees. Eventually municipal employees would come to dominate local politics. "One day," prophesized Robert Porter, the "unconsidered trifles who cluster round the local authority" would grow into a political "Frankenstein," a collective monster "so huge" that its "creators would not be able to control" it.[4]

Fears that municipal employees could eventually acquire significant political power were not without foundation. In an exhaustive study of municipal ownership in Great Britain at the turn of the twentieth century, Frederick C. Howe offered this ironic observation:

> The growth in the number of city employees has been looked upon in some quarters as a cause for disquiet . . . . It has been tentatively suggested that the employees should be disenfranchised in order to minimize their influence in elections. Thus far the fear of such activity has not been justified. The city of Glasgow has from 15,000 to 16,000 employees in all of its departments. This is one-tenth of the voting population.

Howe, an outspoken advocate of municipal ownership of public utilities, apparently did not believe that a group of individuals

[4]Porter (1907), p. 109. Although municipal ownership might have facilitated patronage arrangements, it was not a prerequisite for patronage. Private utility companies and local politicians could just trade favors directly: "you hire our friends and political supporters, and we'll go easy on you the next time the city sets gas rates." In describing the situation during the late nineteenth and early twentieth century, Yearly (1970, pp. 117-18) observes that in return for favors from local politicians, private utility companies "were obliged to respond not only with cash but also with places for those who, though deserving, could not be accommodated on the public payroll."

representing 10 percent of all voters was a powerful constituency (United States 1906, p. 17).

The third concern with municipal ownership relates to the transition from private to public ownership. Consider the case of a city trying to purchase a private water company.
Because the water company's capital is fixed, the city can use its power to regulate and tax strategically to reduce the water company's asking price. This difficulty is compounded by the fact that in nearly all situations there is a bilateral monopoly problem: there is only one seller (the private utility company); and only one buyer (the city). Of course, to the degree the municipality and the water company anticipate these difficulties, they can devise their primary contracts accordingly and minimize some of the problems associated with the transition from private to public ownership. Unfortunately, in practice, it was difficult for parties to anticipate every possible contingency and some contracts simply were not allowed by the courts. Consequently, the actual transition from private to public ownership has, at least in the United States, frequently resulted in litigation—during the early twentieth century, about one-third of all attempts by cities to municipalize private water companies in their jurisdictions culminated in litigation (Troesken and Geddes 2003).

IV. Corruption and the Evolution of Public Utility Regulation: An Overview

The sections below provide a detailed history of corruption in public utility industries and its relationship to regulatory and ownership regimes. But before turning to that detailed history, it is useful to provide a more compact overview of the relevant historical changes. Consider first the use of municipal franchises, a process whereby cities auctioned off the right to operate within their

jurisdictions. This process was characterized by regulatory ineffectiveness and rampant corruption in the form of municipal politicians accepting bribe money in return for awarding lucrative franchises to particular companies.

Consider next the rise and fall of state utility commissions. As explained below, before the creation of state regulatory commissions, municipal politicians frequently extorted bribes from local utility companies, particularly gas and electric companies, in return for less onerous regulations and taxes: “pay us off or we’ll force you to charge very low rates.” Over time, as local markets expanded and the sunk investments of local utility companies grew, the extortion grew increasingly common and severe, adversely affecting both consumers and producers. State regulatory commissions were created to prevent this sort of explicit bribery and corruption, and at least initially, did a reasonably good job protecting both consumers and producers from the extortionate practices of local politicians. State regulation, however, gave rise to another form of corruption, notably regulatory capture by utility companies. Under regulatory capture, the bribes were more subtle, and took the form of packing commissions with regulators with close personal and financial ties to the utility companies. Through the deregulation movement of the 1970s and 80s, the unholy relationships between state regulators and utility companies were destroyed, and governance mechanisms akin to those that dominated during the late nineteenth century were rehabilitated.

Finally, consider the rise and fall of municipal ownership, an institutional mechanism commonly used to govern the behavior of urban water companies throughout the twentieth century. Reformers ostensibly sought municipal ownership of local water systems to combat the monopolistic practices of private utility companies, and to

eliminate the corrupt extortionate practices of municipal politicians described above (see, generally, Glaeser forthcoming). And initially, municipal ownership appears to have worked not just well, but wonderfully: it reduced the price of water for consumers, resulted in expanded service, and dramatically cut waterborne disease rates, especially for the poor. Municipal ownership, however, gave rise to equally severe problems, such as patronage and politicians whose short electoral time horizons prevented them from adequately investing in and maintaining local utility systems over the long run. By the 1970s, municipal water and sewer systems across the country had been so poorly maintained that they were unable to meet EPA standards on environmental quality, and had to be privatized in order to raise the funds necessary to bring the systems into compliance with federal law. The regulatory environment that had preceded municipal ownership was rehabilitated to combat the years of neglect in investing in long-term capital wrought by municipal ownership.

V. Corruption and Franchise Bidding Schemes, 1850-1905

During the nineteenth and early twentieth century, cities and private utility companies contracted through municipal franchises, an arrangement that mimicked the franchise-bidding scheme proposed by Demsetz (1968). Through municipal franchises, cities and private utilities exchanged legally-binding promises about their respective future behaviors. For example, franchises included provisions limiting the ability of city governments to impose onerous rates and taxes, while at the same time including provisions that set quality standards and rate ceilings (Jacobson 2000; Troesken 1996; and Wilcox 1910).

In theory, franchise bidding schemes sounded great. If the private utility (city) refused to agree to the rate ceiling (limits on

regulatory authority), the city (private utility) could have turned to another private company (city) that was more amenable to such promises. Their actual historical performance was much less satisfactory, however. In practice, there was a dearth of firms competing for the right to enter specific urban markets, and more seriously, the absence of even a single firm willing to enter with only the promise of competitive returns. All potential entrants seemed to realize that there were substantial risks of *ex post* opportunism, no matter what cities might have promised in writing. Consequently, as compensation for this risk, private firms generally refused to enter unless there was a real possibility of recouping most of their investments within a relatively short time span. This meant that to attract private capital, cities typically had to permit utility companies to charge rates at or near monopoly levels (Troesken 1997; and Troesken and Geddes 2003).

The promise of high profits, even it came with risks, was sufficient to attract private investors. For monopolistic franchises with few regulatory constraints, private companies were willing to pay handsomely and it was this willingness to pay that helped finance much corruption. To highlight the connection between monopolistic franchises and corruption, consider the following examples. During the early 1900s, in Grand Rapids, Michigan, the mayor and multiple members of the city council were implicated, and eventually convicted, in a scheme to sell a lucrative franchise to a private water company. The bribes the promoters of this company paid to local politicians were substantial, around $3,000 (or about $42,000 in current dollars) per politician. The politicians and the promoters of the water company were eventually caught, tried, and convicted. Their trials garnered nationwide attention and were front page news in cities as

far away as New York and Phoenix. At one point during the trials, at least one defendant tried to bribe jury members to vote against conviction.[5]

In Chicago in 1894, the promoters of a local railway company spent lavishly to secure passage of a valuable franchise that faced widespread voter opposition. Four members of the city council received $25,000 each (roughly $350,000 each in current dollars) for their votes in favor of the franchise, and other members of the council received $8,000 each for their votes. One particularly important Chicago politician received $100,000 ($1.4 million) for his role in securing passage of the franchise. W.J. Onahan, for two years the Comptroller for the City of Chicago, believed that all of the bribery and graft associated with the sale of franchises cost the city millions of dollars that otherwise could have been used to lower taxes:[6]

> If the city . . . had received proper annual compensation for all the franchises that have been ignorantly and corruptly disposed of for nothing, Chicago would today have income enough to run its affairs without levying a dollar of taxation on real estate or personal property. . . . The street railways, the gas companies, the electric lighting companies, the telephone companies, the water privileges, the dock privileges . . . every one of these favored

[5]See *Arizona Gazette* (Phoenix), December 1, 1903, p. 1, and December 2, 1903, p. 1; and the following issues of the *New York Times*: November 15, 1903, p. 2; November 22, 1903, p. 1; December 1, 1903, p. 1; December 2, 1903, p. 3; and December 27, 1903, p. 2. For some of the legal issues surrounding the trials of the men convicted in this scheme, see the following court cases: *People v. Albers*, 137 Mich. 678 (1904); *People v. Mol*, 137 Mich. 692 (1904); *People v. McGarry*, 136 Mich. 316 (1904); and *People v. Salsbury*, 134 Mich. 537 (1904).
[6]The information and quotation in this paragraph are from Stead (1894), pp. 176-177 and 199.

> interests, which secured their privileges by bribing Aldermen and corrupting officials, ought to [pay] millions in annual tribute to the city.

In St. Louis in 1898, the promoter of a local railway company paid bribes between $3,000 and $17,500 to local politicians in return for securing a franchise to operate in the city. In the end, the promoter paid about $250,000 (about $3.5 million in current dollars) in bribe money, none of which was returned to the city. The promoter, however, was eventually convicted and sentenced to five years in prison, as were several prominent St. Louis politicians. The same basic story obtained when St. Louis granted lighting franchises. Once, in the midst of all this graft and corruption, a newly elected member of the city council expressed concern that if voters discovered such schemes he and other politicians might be voted out office. His colleagues "laughed" and "assured him that the political power of the boodlers was too great."[7] The histories of Chicago, St. Louis, and Grand Rapids, while perhaps exceptional in terms of the richness of the historical record and the detailed information about the amount of money that changed hands, are representative of a much larger pattern of graft and corruption associated with the granting of franchises to private utility companies.[8]

IV. Corruption and Municipal Regulation, 1900-1915

It is important to be clear that municipal franchises were contracts. They imposed obligations on both the city and the private utility company and required the consent of both parties. City authorities could not unilaterally dictate the terms of the franchise. Indeed, in most areas, state constitutions prohibited municipal

[7]These events are recounted in an article published by a St. Louis district attorney, Folk (1903).

[8]See, for example, Brown (1905), National Civic Federation (1907), National Municipal League (1896), Rosewater (1903), Zueblin (1918) and Steffens (1964). See also, Troesken (1996, pp. 45-49) for the corruption associated with the

governments from directly and unilaterally regulating the rates charged by gas companies and other utilities without express legislative permission. As one federal court explained: “the regulation of the prices to charge consumers by gas companies is not one of the powers essential to municipal government, and is not included in general powers conferred on cities . . . (*Mills v. City of Chicago, et. al.*, 127 Fed. 731 1904, p. 731).” The same court went on to explain that unless the state legislature explicitly granted regulatory powers to city governments, only the state could regulate gas rates: "and such power cannot be exercised by a city unless it has been delegated by the state in express words, or by fair implication from a power expressly granted (*Ibid.*, p. 731).”

But at the turn of the twentieth century, many states began to pass laws authorizing municipal governments to directly regulate the rates charged by gas and electric companies, as well as other utilities (Troesken 1997). These new municipal regulation laws meant that once a utility company’s franchise contract with the city expired, city authorities could unilaterally dictate rates; gas and electric companies did not have to consent to the rates in order for them to become legally binding. Although the political origins of this form of municipal rate regulation have not been studied extensively, the existing evidence seems to suggest that it was consumers and local politicians who pushed state legislatures to authorize municipal governments to regulate utility rates unilaterally (Troesken 1996, pp. 55-63). Consumers saw municipal regulation as a way to get lower utility rates while local politicians saw it is a way to extract rents from the industry more effectively. Unfettered municipal rate regulation probably helped to reduce utility rates to

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granting of gas company franchises in Chicago.

consumers, but it did not eliminate the presence of corruption, and might have even exacerbated it.

Describing municipal regulation of urban transit systems during the late twentieth century, Pashigian (1976, p. 1258) writes: "With some exceptions, the regulatory agencies [at a local level] have been captured not by the transit firms of the industry but by the riders." Observers of the early twentieth century gas industry said the same thing. In a speech before the Pacific Gas Association, an officer of a San Francisco gas company stated:[9]

> When the time for the regulation of rates arises, a [city] councilman or supervisor, elected on a platform that calls for a reduction in the gas and electric rates, is hardly in a proper frame of mind to listen to evidence and impartially vote thereon. No matter what the evidence is, if he does not vote for a reduction a large number of citizens, and all of the daily papers, will accuse him of being biased in favor of the corporation.

Forrest McDonald, biographer of Samuel Insull and noted historian, concurs: "At the turn of the century, public utilities were regulated by municipal governments. Such regulation was governed largely by political concerns; shrewd politicians . . . recognized . . . that voters were often inclined to respond favorably to attacks on utilities (McDonald 1957, p. 117)."

A few examples illustrate the politicized and often corrupt nature of municipal regulation. In 1905 Illinois granted the Chicago City Council the authority to regulate gas rates. A few years later, Carter Harrison ran as a Chicago mayoral candidate. Harrison, and several candidates for city council, promised that, if elected, they would reduce gas rates in the city from 85 cents to 70 cents. After

[9]From a speech delivered before the Pacific Gas Association at its annual convention in the fall of 1908. The speech was reprinted in the *American Gas Light Journal*, September 28, 1908, p. 527.

Harrison and his friends won they launched an investigation into the costs of manufacturing and distributing gas. The expert they hired, W.J. Hagenah of the Wisconsin Public Utilities Commission, recommended a 77-cent rate. According to Hagenah, anything lower than 77 cents would not allow producers a reasonable rate of return. Chicago authorities promptly fired Hagenah and hired Edward Bemis. After paying Bemis five times the salary they paid Hagenah, Chicago authorities got the result they wanted. Bemis recommended, and the city eventually passed, a 70-cent rate ordinance. Ironically, earlier in his political career Carter Harrison had opposed attempts by the city to regulate gas rates, arguing that the city would use the power to regulate rates only as a way of "blackmailing" Chicago gas companies—if the gas companies did not payoff the city council, the city would order them to reduce rates (Troesken 1996, pp. 67-73).

On May 4, 1891, the Cleveland City Council passed an ordinance requiring the city's two gas companies to reduce their rates from $1.00 to $0.60. The ordinance grew out of a plan launched by Cleveland's newly elected mayor. The mayor thought the city paid too much to light streets and public buildings. He directed several members of the city council to meet and devise a plan to lower the city's gas bill. At one of these meetings, one council member suggested that private consumers also paid too much for their gas. Someone else said that the price of gas for private consumers should be reduced to 60 cents. The other council members agreed that 60 cents was a good rate. Within a few days, and without any investigation into the costs of manufacturing gas, the council passed an ordinance setting rates at 60 cents.[10] Officials in other cities

[10]The following issues of the *Cleveland Leader and Herald* describe the battle between the city council and the gas company: May 5, 1891, p. 8; August 11, 1891, p. 8; August 12, 1891, p. 5; August 25, 1891, p. 8; August 28, 1891, p.

exhibited a similarly cavalier attitude. In 1887, Tennessee authorized Memphis officials to regulate gas rates, subject to the provision that they never set rates below $1.50. A few years later, without any investigation into the costs of producing and distributing gas, the Memphis City Council ordered the New Memphis Gas Company to reduce its rates to $1.50.[11]

Perhaps the most flagrant abuse of power occurred in San Francisco. In 1906, fifteen of the city's sixteen supervisors took bribes from the Pacific Gas Light and Coke Company in return for reducing gas rates to 85 cents per 1,000 cubic feet. These supervisors had been elected on the Union Labor platform which during the preceding election had promised voters that rates would be reduced to 75 cents (Jacobson 2000, p. 99).

Although substantive due process[12] protected utility companies from the most egregious forms of municipal regulation, securing that protection was neither cheap nor timely. Recall the story about Chicago and the 70-cent gas ordinance. After the city enacted the ordinance, Chicago gas companies sued for injunctive relief. They claimed, among other things, that 70 cents was a confiscatory rate. Litigating in every state and federal court imaginable, the city and Chicago gas companies battled for nearly two decades before the gas companies won (Troesken 1996, pp. 71-2). Litigating substantive due

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8; November 14, 1891, p. 8; and June 1, 1892, p. 1.

[11]See *New Memphis Gas & Light Company v. City of Memphis*, 72 Fed. 952 (1896).

[12]Substantive due process, which grew out of the Fourteenth Ammendment, protected private utility companies against confiscatory rate regulation—regulation that set rates so low that firms could not earn a reasonable rate of return. The famous *Reagan* and *Smyth v. Ames* decisions established the rule: when regulators set rates too low, they violated producers' Fourteenth Amendment rights. Adopted in 1868, reconstructionists intended the Fourteenth Amendment to protect recently emancipated slaves from the ravages of Jim Crow. As it read, the amendment guaranteed all persons "equal protection of the laws" and forbade governments from depriving "any person of life, liberty, or property, without due process of law." Whatever its original purpose, though, by the late nineteenth century, the Fourteenth Amendment protected all industries against overzealous regulatory policies. See, generally, Hovenkamp

process questions took so long, in part, because of the rules adopted by the courts. For example, the courts granted immediate injunctive relief only when there was overwhelming evidence that regulators had set confiscatory rates. In more ambiguous cases, the courts allowed the rates to go into effect. If after the rates went into effect the company continued to find them confiscatory, it could file another claim.[13]

Municipal rate regulation undermined the operation and long-term viability of private utilities in much the same way as termites destroy a home: slowly eating away at unseen support structures. Once local politicians acquired the ability to regulate utility rates unilaterally, they abused that authority to win election or extort bribes from private utility companies. This raised the costs of operating private utilities and discouraged future investment in utility industries. As Troesken (1996, pp. 74-6) shows, the implementation of municipal regulation of gas rates in Chicago was associated with a dramatic slow down in investments in new gas lines in the city. Other studies show that onerous municipal regulations discouraged capital formation in the gas and water industries throughout the United States (Troesken 1997; and Troesken and Geddes 2003). In the case of water, under-investment posed serious public health risks, leaving cities vulnerable to epidemics of typhoid, cholera, and diarrheal diseases (the leading cause of death for children under the age of two around 1900).

One might ask if the examples from Cleveland and Memphis truly illustrate corruption. They clearly illustrate bad public policy but this is not necessarily the same thing as corruption. What happened

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(1988).

[13]See *William R. Wilcox v. Consolidated Gas Company of New York*, 29 S.Crt. 192 (1908) and *Des Moines Gas Company v. City of Des Moines*, 35 S. Crt. 811

in Cleveland Memphis was corrupt in the following sense. Local politicians used gas rates as a way to score short-term political points at the expense of the longer-term and broader interests of voters in both cities. One might also argue that had voters been fully aware and informed of the long-term consequences of such capricious regulatory behavior they would not have tolerated such actions.

V. Corruption and State Regulation, 1907-1970

Between 1907 and 1922, nearly thirty states created statewide commissions to regulate public utilities (Stigler and Friedland 1962; Stotz and Jamison 1938, p. 450). Legislators created regulatory commissions largely in response to the lobbying efforts utilities. Utilities lobbied for state regulation because they saw it as a politically expedient way to undermine the periodic shakedown schemes implemented by local authorities. Testifying before the Illinois legislature, an official of the Peoples Gas Light and Coke Company (of Chicago) pleaded (*Chicago Tribune*, April 28, p. 6):

By city regulation you place it in the hands of the people interested to sit in judgement of their own case. Despite their protestations of fairness they could not restrain from giving themselves the best of it. Therefore we fear city regulation. . . . [W]e do not want to be at the mercy of the city. Let there be a commission appointed, a state commission appointed by the governor . . . . Let this commission examine books and investigate accounts, let the commission fix rates.Blackford (1970 and 1977), MacDonald (1957, 1958 and 1962) and others document the same patterns in many other states.

Although utilities supported state regulation because they believed it would undermine the onerous policies of local regulators, it is important to be clear that in a perfect world they would have preferred to have been subject to no rate regulation whatsoever. Furthermore, there is evidence that consumers and municipal governments played an instrumental role in shaping the creation of

(1914).

state public utility commissions. Indeed, state commissions represented, at least initially, a compromise position among utility companies, local governments, and consumer groups (Troesken 1996, pp. 79-89). The nature of this compromise was highlighted by the Illinois General Assembly (1913, p. 861) when they recommended the creation of a state regulatory commission:

> If municipalities are incapable of protecting their citizens for any reason from the unjust exactions of public service corporations, it is the duty of the State to protect them in such a manner it deems right and proper. Conversely, if the citizens of a municipality, through their representatives, take such action as will destroy or confiscate public utility investments, it is likewise duty of the State to assert its paramount authority to the end that justice may be accorded to citizens interested in such concerns.

In short, state regulatory were designed to protect the interests of both consumers and producers from the opportunistic behavior of competing parties.

During the early years of state regulation, it appears that the regulatory commissions did a reasonably good job balancing the interests of consumers and producers. Existing studies of the effects of utility regulation during the period from 1915 through 1940 find that the commissions kept rates substantially below their monopoly levels, but at the same time, not so low that they were confiscatory (see, for example, Troesken 1996, pp. 81-93; and Twentieth Century Fund 1945).

This early optimism, however, eventually gave way to pessimism, and since the 1960s a series of studies have emerged suggesting that regulation during the late twentieth century has been much less effective. In a seminal paper, Stigler and Friedland (1962) compare electric rates in states with and without state utility commissions;

their data come from the early twentieth century when regulatory regimes varied across space. Stigler and Friedland find that rates and profits were not significantly lower in states with utility commissions. From this, they conclude that state regulation allowed utility companies to charge high rates and earn monopoly profits. Similarly, Moore (1970) estimates demand and cost equations to isolate the effects of regulation. Moore uses a cross section of electric utilities operating in 1962. He finds that state regulation lowered rates from monopoly levels by only 3 percent.[14]

The evolution suggested by the extant literature is that state utility regulation grew increasingly pro-producer over time and that state commissions gradually came to be captured by the interests of private utility companies. Although the origins of the deregulation movement of the late 1970s and early 1980s remains puzzling to many students of political economy (e.g., Peltzman 1989), one possibility is that industry capture and corruption became too costly to be sustained and that deregulation was pursued as a means to reduce these costs. It is still too early to tell if the deregulation of private utility companies was a complete success (see Joskow 1997). Nonetheless, if history is any guide, it would seem that to the extent current governance frameworks mirror those that were tried in the past (i.e., franchise bidding schemes), they too will give way to problems of corruption.

VI. Corruption and Municipal Ownership, 1880-1970

[14]A study by Meyer and Leland (1980) is slightly more sanguine and finds that state regulation can, in some cases, have a substantial effect on utility rates. Meyer and Leland pool data from 48 states over the period 1969 through 1974. These data, and the estimating procedure used, allow for the possibility that the effectiveness of regulation varies over time and across space. Allowing for this possibility, distinguishes Meyer and Leland's study from earlier work. They find "pervasive differences" in "regulatory impact across states." In a few states, state regulation significantly reduced utility rates; in other states it did not.

The rise of municipal ownership began slowly during the late nineteenth century and grew quickly during the early twentieth century. As means of governance, municipal ownership was much more common in the water industry than in the gas and electric industries. These patterns can be seen in Figure 1 (2) which plots the number (proportion) of electric, gas, and water companies that were municipally-owned. Rather than building utility networks themselves, city authorities often purchased systems directly from private companies that were already operating. In 1915, roughly one third of all municipal water companies had been privately owned and operated at one time.[15]

Largely a response to concerns about corruption, the move to public ownership was, at least initially, associated with dramatic and observable improvements in the operation of utility industries. In particular, public acquisition was associated with dramatic price reductions; expansions in service to previously under-served neighborhoods; and, in the case of water, reduced disease rates especially for poor socioeconomic groups. In terms of the effect of public ownership on prices, consider the following. In 1899 the federal government conducted a survey of the rates charged by public and private water companies. Including nearly one-third of all water companies then operating in the United States, the survey found that the rates charged public water companies were, on average, 24 percent lower than the rates charged by private companies (United States 1899). However, the discount offered by public companies varied with size; small public companies offered large discounts from comparably-

[15]For cities with populations exceeding 30,000, the census shows that 201 of these cities owned and operated their own water companies. Sixty-two of these companies had, at one time, been owned and operated by private companies. See United States. Department of Commerce. Bureau of the Census. *General Statistics of Cities: 1915*., pp. 144-45.

sized private companies while large public companies offered little, if any, discount from comparably-sized private companies. Historical time series data suggest the same interpretation: utility prices fell sharply after public acquisition (see, for example, Thompson 1925). Formal econometric studies comparing the rates of public and private utility companies during the late twentieth century provide further corroboration: publicly-owned utilities tend to charge significantly lower rates than privately-owned utilities (e.g., Peltzman 1971; and Kwoka 2002).

The experiences of Billings, Montana, and New Orleans, Louisiana illustrate the dramatic improvements service quality and waterborne disease rates that often followed public acquisition. Before being taken over by the city, the Billings Water Company had no purification plant and only a limited system of mains. After acquiring the company in 1915, city officials immediately began raising funds to build a purification plant and extend mains to all areas of Billings (*Engineering News*, February 18, 1915, p. 365).

In New Orleans, the New Orleans Waterworks Company began operations in 1878. A private corporation chartered by the State of Louisiana, the company was the exclusive supplier for the portion of New Orleans located on the north side of the Mississippi River. Court documents and government investigations indicate the company distributed water from the Mississippi unfiltered. Because thousands of municipalities upstream of New Orleans dumped raw and untreated sewerage into the Mississippi, failure to filter and chlorinate water generated serious outbreaks of waterborne diseases such as typhoid fever and infantile diarrhea. (Diarrhea was the leading cause of death among infants in most American cities, including New Orleans, in 1900). In addition to being tainted by disease, the water distributed

by the New Orleans Waterworks Company was visibly muddy. Consequently, almost no one used the water for drinking and instead most city residents purchased bottled water or used cisterns to collect rain water. When the National Board of Fire Underwriters visited New Orleans at the turn of the century, they found the city's water system wholly inadequate, and recommended the city take immediate steps to extend mains and increase the number of fire hydrants.

During the 1890s, residents of New Orleans grew so dissatisfied with the high rates, poor service, and rampant political corruption associated with the New Orleans Waterworks Company that they began pushing to have the company's charter revoked. These efforts were successful and the state supreme court appointed a receiver to liquidate the company's assets in 1901. The city initiated proceedings to acquire the New Orleans Waterworks Company in 1903, and acquired the water system in 1908.[16]

Soon after the city acquired the water company, there was a rapid and unprecedented expansion in service. This can be seen in figure 3, which plots miles of water mains and miles of water mains per 10,000 persons: between 1905 and 1915, the city's water system grew 4.5 times. Besides extending mains to all areas of the city, local officials also installed a costly and highly effective water filtration system immediately after acquiring the waterworks in 1908—the new filtering system employed sedimentation, coagulation, slow sand filtration, and mechanical filtration. Plotting typhoid rates over time suggests that the installation of filters and the extensions in service reduced waterborne disease rates in New Orleans. As figure

[16]This paragraph is based on the following sources: *State v. New Orleans Waterworks Company* 107 La. 1 (1901); New Orleans, *Water Purification*; and National Board of Fire Underwrites, *New Orleans*.

4 shows, in the years before New Orleans municipalized the water system, typhoid rates in the city rose steadily, but after the system was municipalized in 1908, the trend was reversed and typhoid rates began a permanent downward trend. That blacks appear to have benefitted as much as whites in terms of disease reduction is notable, and representative of a much broader trend. Drawing from multiple data sources, Troesken (2001) shows that the public acquisition of private waterworks reduced black waterborne disease rates much more than it did for whites.

But the initial benefits of public acquisition eventually gave way to problems as politicians began using municipally-owned utility systems to win short term political payoffs and in the process allowed the associated infrastructure to deteriorate. In particular, investments in patronage and unremunerative rate structures steadily displaced investments in upkeep and new equipment. Nathan Matthews, a Boston mayor, lent credence to this hypothesis as early as 1894 when he argued that local politicians derived electoral benefits by setting water rates at municipal plants below those that would have prevailed at private plants: “there have been deliberate attempts in various cities . . . to reduce rates below the point of profit . . . for the mere purpose of deriving some temporary popularity for the administration that happens to be in power (Matthews 1894, p.3).” Matthews believed that this practice would, in the long run, undermine the financial viability municipal utilities and city finances, and delay the construction of needed improvements in utility systems.

In terms of using employment at municipal utilities to garner political support, there is much historical evidence to suggest that patronage was a serious problem. Exploiting a sample of nearly 90,000 workers in turn-of-the-century America, Troesken (1999) provides

evidence that in cities where patronage was widespread, state and local employees earned 40 percent more per hour; worked 16 to 17 percent fewer hours; and earned 22 percent more per week than comparable workers in the private sector. Similarly, a study conducted by the National Civic Federation—a lobbying group that strongly favored municipal ownership— claimed that municipal employees often had to pay sizeable annual assessments to incumbent politicians. Such assessments were intended to defray the costs of local elections. Workers that failed to pay their assessments were fired. Data reported by the National Civic Federation suggest that the size of assessments ranged between 2 and 4 percent of a worker's annual salary depending on the worker's occupation (National Civic Federation 1907, pp. 488-92).

In addition, the federation found that employees of publically-owned utilities were often required to work in local elections. Politicians also hired more workers than needed just so that they would have more supporters come election time. Describing conditions at the Wheeling Gas Company, a municipally-owned and operated firm, the federation wrote (p. 492):

> The Superintendent of the Gas Works requires his employees to assist in the primaries and the elections. It is partly on account of the political usefulness of these gas workers that the Superintendent has employed about 20 per cent more men than are needed to do the work. He makes his appointments as much as possible to conciliate the Councilmen.

Elsewhere in its report, the federation wrote of the same gas plant (p. 156):

> The management is honeycombed with politics. Appointments in the gas department are parceled out and controlled by the councilmen. All employees are supposed to belong to the party in power. Should that party change, it is probably true that the whole force in the department would change. All employees are regularly assessed for

> campaign purposes . . . the assessment ranging from $2 to $75.

The federation (pp. 149-152) found the same level of patronage and political influence at the municipally-owned and operated gas works in Philadelphia.

The cumulative effect of patronage and unprofitable rate structures was a long-term decline in service quality. By the late 1970s, municipally-owned water systems in the United States were in such disrepair that many were unable to meet federal guidelines for water quality. The response to this was privatization; by privatizing these systems officials hope to inject new capital and life into urban water supplies, in much the same way that municipalization had done some fifty to seventy years earlier. The long-term effects of patronage and low rates has been even more dramatic in lesser developed countries. In a recent and widely cited paper Gertler et al. (2003) describe the motivation and effects for privatization of municipal water systems in Argentina. They show that municipal companies had such bloated payrolls that those companies were unable even to replace or repair existing water mains when they burst. As a result, whole urban neighborhoods were often without water service for weeks at a time. Infant mortality rates from diarrheal diseases were extraordinarily high until the water systems were privatized and patronage employment eliminated. Gertler et al. (2003) present strong econometric evidence that infant mortality rates fell by as much as 25 percent following privatization, and that these reductions were particularly large for the poorest segments of society.

VII. Concluding Remarks

In conclusion, it is useful to contrast the findings of Gertler et al. (2003) and Troesken (2001). Gertler et al. (2003) present

clear and incontrovertible evidence that privatizing water systems in Latin America had a large and beneficial effect on waterborne disease rates and that these benefits were particularly large for the poor. In contrast, Troesken (2001) shows that municipal acquisitions in the United States some one hundred years earlier had the same effect: they reduced waterborne disease rates substantially and this was particularly true for the poor. How does one reconcile the findings of Gertler et al. with my earlier work? Or more precisely, why would one expect privatization do reduce waterborne disease rates in one context, and municipalization (the exact opposite process) to reduce disease rates in another context?

This paper has offered one possible avenue of reconciliation. Based on the historical evidence presented above it appears that corruption, and the necessity to eliminate corruption when it gets too costly, accounts for the efficacy of regime change. In this context, the direction of regime change–-from public to private, or private to public—is of second-order importance. What matters is some radical reshuffling of the institutional matrix to disrupt the underlying corrupt relationships. Unfortunately, this disruption is only temporary and gradually new forms of corruption emerge and must again be broken down by institutional change.

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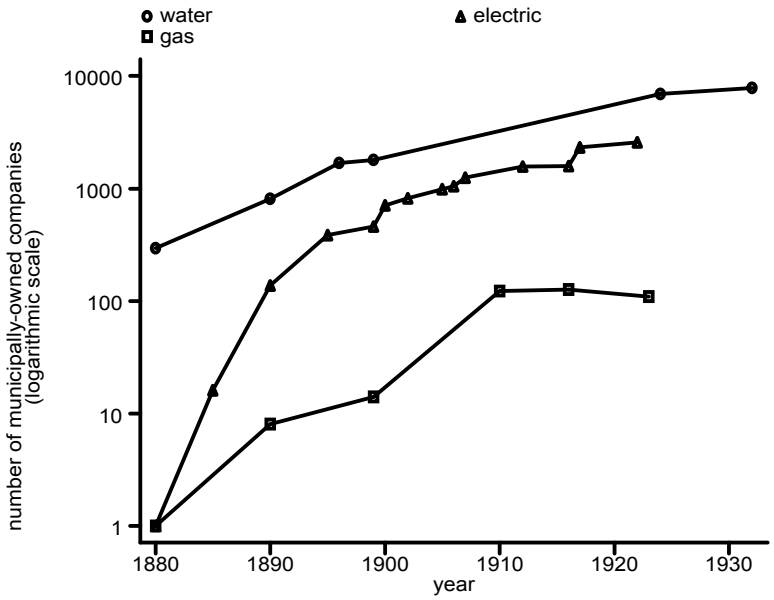
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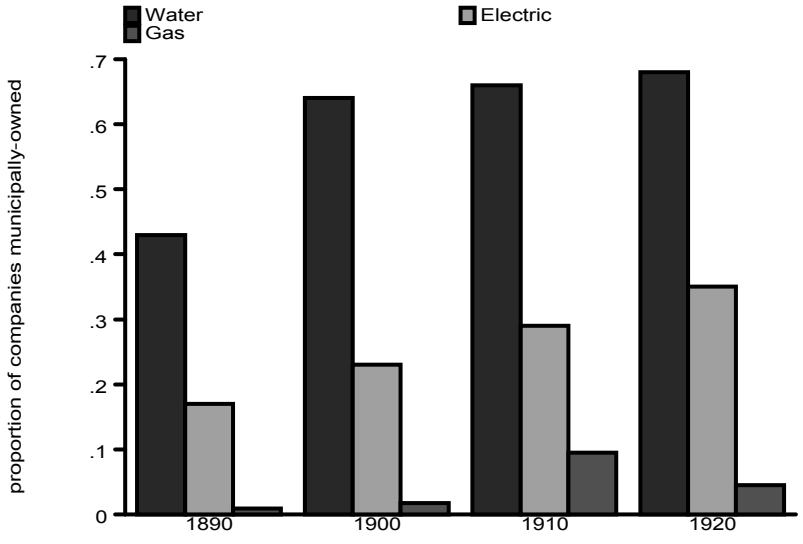
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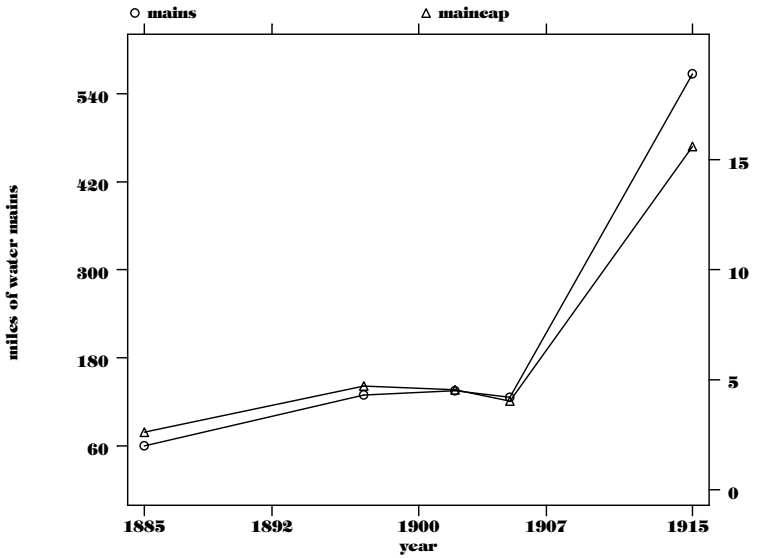
.6
.5
.4
.3
.2
.1
0
proportion of companies municipally-owned
1890
1900
1910
1920

Figure 1. Number of Municipally-Owned Companies

Source: Troesken (2001).

Figure 2. Proportion of All Companies Municipally Owned

Source: Troesken (2001).


mains
maincap
miles of water mains
miles per 10,000 persons
540
420
300
180
60
15
10
5
0
1885
1892
1900
1907
1915
year

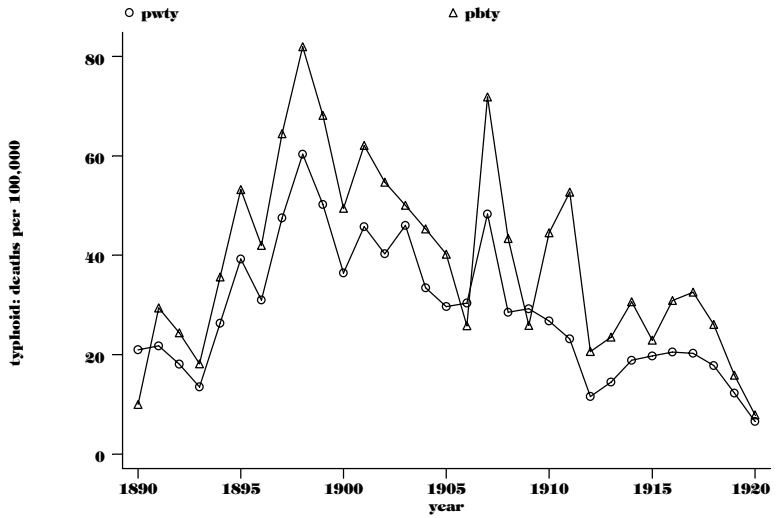

pwty
pbty
typhoid: deaths per 100,000
80
60
40
20
0
1890
1895
1900
1905
1910
1915
1920
year

Figure 3: Main Mileage and Main Mileage Per Capita: New Orleans, LA., 1880-1920
○ - miles of water mains
[a] - miles of water mains per 10,000 persons

Source: Troesken (2001).

Figure 4: Deaths from Typhoid Fever per 100,000 Persons in New Orleans, 1885-1920
[a] - death rate for African Americans (1892-1899 observations are estimates.)
○ - death rate for whites.

Source: Troesken (2001).