A Political Theory of Public-Private Partnership (P3) Performance

Abstract

In the past few decades, *Public-private-partnerships* (P3s) that transfer management of a publicly owned agency to a single private-sector firm have grown exponentially in the delivery of public provisions. This article advances a political theory of P3s that accounts for the performance of private-sector managers under the constraints of public ownership. I argue that private-sector managers managing public agencies operate in a distinct environment with disparate political constraints and incentive structures that modify managerial context in ways that generate inferior performance. My empirical subjects are P3 compliance with the U.S. Safe Drinking Water Act. I find that P3s perform, on average, no different or worse than their fully public and private counterparts, respectively. The findings highlight the importance of understanding the environment in which managers operate, and how it may incentivize differing levels of investment and cost-cutting that have consequences for performance.

Public-private-partnerships (P3s) that transfer "operations and management" of a publicly owned agency to a single private-sector firm while retaining ownership have played an important role in the delivery of public provisions since the early 1990s. Among the chief concepts that brought these arrangements into fruition was Public Choice theory (Boyne 1998). The implications of the theory suggest that the external delivery of public provisions will lead to improved performance (Boyne 1998; Niskanen 1971). A vast literature has devoted considerable effort to assessing the efficacy of P3s, yet, offers little theoretical leverage on what to expect, in terms of performance, when a publicly owned agency is managed by private-sector firms.

The idea that environmental constraints shape the internal context of an organization has a long history and is well established in political science and economics (Simon 1957). Organizational theorists consider political constraints to be important determinants of managerial behavior since they place limitations on managers (Donaldson 2001; Johansen and Zhu 2013; Pfeffer and Salanick 1978; Scott 2001). Recent research also links political constraints to divergent decision-making and priorities among public and private managers (Johansen and Zhu 2013).

Building on research that links political constraints and managerial behavior, the present study advances a theory that accounts for the performance of private-sector managers under the constraints of public ownership. I ask, does P3 performance vary from that of similar public and private organizations? Does private-sector delivery improve public agency performance? I theorize that private-sector managers managing public agencies (P3s) operate in a distinct political environment which engenders constraints and incentives that modify managerial context in ways that negatively impact performance. Unlike private-sector managers managing private firms, private-sector managers managing public agencies (P3s) are politically constrained from

raising revenues and making capital investments that may help address performance challenges. P3s are also subject to unique tax instruments which direct management's profit-maximization strategy—leaving managers with limited autonomy and flexibility to shape agency objectives. Similarly, unlike public-sector managers who lack profit incentives, private-firms managing public agencies (P3s) must balance clear standards of profitability with the competing priorities of elected officials. Specifically, I argue that P3s confront greater constraints created by political and profit incentives that ultimately restrict their ability to enhance performance. While P3s have been hailed as a mechanism for combining the 'strong sides of the public and private sectors' (Graeme and Greve 2005, 3), I theorize that the unique combination of political constraints and profit incentives leads to the poorest of performance by P3s.

The result is a *political* theory of P3s, in which performance at P3s turns not to the impact of private-sector delivery on performance, but rather to the distinct political and regulatory incentives that modify managerial context in ways that negatively impact performance. One implication of this theory is that private-sector managers managing P3s will not necessarily enjoy the improved performance seen in fully privatized firms (Konisky and Teodoro 2016). Another implication of the theory is that, contrary to public choice notions, P3s will perform no different than their fully public counterparts.

I test my theory of P3 performance by comparing regulatory compliance with the federal *Safe Drinking Water Act (SDWA)* at P3, public and private facilities. A growing trend in environmental management has seen hundreds of public water systems regulated under the federal SDWA come under P3 arrangements that transfer management of a public water utility to a single private firm. Organizations regulated under the SDWA provide an excellent empirical context to test for differences in performance since public, private and P3 utilities provide similar

services, confront similar regulatory obligations, and are sufficiently numerous to provide statistical traction. To be sure, the purpose of the present paper is not to measure how differing 'political constraints' and 'incentives' effect managerial behavior at public, private and P3 facilities. The present study identifies and gives an illustrative account of important distinctions in the political constraints and incentives confronting P3 and theorizes how these disparities in managerial context are driving organizational outcomes. If my theory is correct, P3's will perform, on average, worse or no different than their fully public and private counterparts.

Konisky and Teodoro (2016) argue for several political mechanisms that explain differences in performance between public and private water utilities. Absent from their study, however, is how performance at P3s would be affected. My findings show that, P3s perform, on average, significantly worse than their fully private counterparts, and no different from fully public agencies. The findings highlight the importance of understanding the environment in which managers operate, and how it may influence managerial context in ways that have consequences for performance.

The balance of this paper proceeds as follows. In the next section I give a brief overview of P3s and their history. In the following section I discuss the theoretical literature that brought P3s into existence and the corresponding empirical evidence testing their validity. In the next section I explicate the logic of performance and lay out a series of theoretical expectations about the *quality* of services provided, measured as compliance with the SDWA, at Public, Private and P3 utilities. My empirical analysis of SDWA compliance follows. After reporting the results, I conclude with a discussion on the contributions and implications of this study for management theory.

Public- Private-Partnerships (P3s)

P3s are loosely defined as cooperative long-term institutional arrangements between public and private sector actors (Hodge and Greve 2007). Achieving what Hodge and Greve (2008; 2) refer to as "iconic status" within public administrations around the world, P3s have been used as a management and governance tool in a wide range of settings from schools to correctional facilities at the federal, state and local levels.

Although widely varying in form, the P3s under study in this paper are under long-term operation and management agreements. In such agreements, a government maintains ownership of a public asset while the private sector partner assumes responsibility for operating, maintaining, and managing the asset with agreed upon returns for services and investments made **(**Arnold 2009). Where P3s are used, governments retain control over utility regulation regarding *rates*, services, and policy decisions involving organizational targets and investments to ensure that "public interests are protected" (EFAB 2008). Under the terms of such an agreement, the private partner accepts responsibility for operating the public facility in compliance with all applicable federal, state, and local environmental regulations (WRC 2003). Regulation can take the form of drinking water quality standards, requirements for universal access, local government oversight of rates and charges or any number of other contractual provisions specified (EFAB 2008). Formally, P3s are described as: "…. contractual, institutional, or other relationship between government and a private sector entity that results in sharing the duties, risks, and rewards of providing a service in which the government has an interest, recognizing that the government retains ultimate responsibility for insuring that social needs and objectives are met (EFAB 2008)."

The private-sector management of publicly owned organizations have dramatically increased following President Ronald Reagan's 1981 initiative "to promote private sector

leadership and responsibility for solving public needs, [by way of] … fostering greater public-private-partnerships (Berger 1986)." Several subsequent federal actions in the 1990s played a key role in the evolution of P3s generally, and more particularly in the water sector.

In 1996, the U.S. Environmental Protection Agency (EPA) released a report that identified the need for improvements in water infrastructure. Coinciding with the EPA's report, legislation to fund these projects was introduced in Congress. The legislation required utilities to consider alternate *management* options, including "public-private partnerships", as one of the eligibility requirements for federal funding. Following these actions, in 1997 the Internal Revenue Service (IRS) altered language in the tax code which extended a city's privatization contract limits from five to 20 years, therefore facilitating private firms to seek long-term management agreements for public provisions. Notably, guidelines under the new rules stipulate that private firms managing public agencies "may not share in any net profits from system operations, but may instead share in *cost savings* or revenue enhancements[1], but not both" (Arnold 2004). As I will discuss later, this meek line in the tax code later proves to be instrumental in generating perverse incentives that conflict with organizational performance.

In the decades since, the U.S. has seen a growing number of long-term partnerships with private firms to operate and manage the delivery of public provisions. For example, one report showed that from 1997 to 2000, seventy cities entered into long-term partnerships with private firms to operate and manage their local wastewater and water systems. By 2007, that number jumped to nearly 600 cities in 43 states (IATP 2007). Given these rising trendlines and growing concern over drinking water quality in the U.S., the need for assessing the performance at P3

[1] In this context, 'revenue enhancements' would entail raising water rates on rate payers.

utilities and developing a theoretical framework on the determinants of such performance cannot be overstated.

Perspectives on Performance

P3 management arrangements for the delivery of public provisions have been widely used in the past few decades as a mechanism for reforming some of the perceived inefficiencies of public-sector organizations. The theoretical linking of organizational form and performance was largely derived from public choice scholarship which assumes better quality and higher efficiency when public services are managed by private-sector firms (Niskanen 1968, 305; Aucoin 1996; Rho 2013). At its simplest, public choice is a theory of 'government failure', where government bureaucracies are looked upon as exploiters of the citizenry. Public choice proffers that public managers are self-interested utility maximizers that seek to increase the size of their budgets and bureaus. As Lindsay (1976) further clarifies, "…. the larger is the bureau or the budget, the more productive is presumed to be the manager. In other words, the levels of some or all inputs are used as a proxy for the value of manager services and these data alone enter in the manager's reward function…. That is, if managers perceive their own earnings to be solely dependent upon the level of their budget or the size of their bureau, then such a variable becomes a logical maximand." Following this line of argument, if public service delivery is a monopoly in the hands of politicians and public managers, the result will be oversupply and inefficiency; since services will be managed with the objective of budget growth and political power (Bel et al, 2010).

By contrast, the external management of public service deliveries by private-sector partners would create market structures that link cost-savings, efficiency and service quality to the salaries of managers and firm profits (Boyne 1998). Here, while private-sector managers are

pursuing their individual interests of profit-maximization, the interests of the public are also ostensibly served. Conversely, since public managers do not generally obtain direct financial benefits from cost-savings or higher levels of efficiency, they lack the clear standards of profitability to guide their behavior. With profit-motives to guide behavior, efficiency and service quality are expected to be superior for public services managed by private firms. The policy implications of public choice theory as described by Hodge (2000) are that the role of the state should be reduced, and that the delivery of public services should be privatized.

To summarize, the ascendancy of public choice notions into the management reform agenda were based on a normative belief that the private sector is inherently 'better' at management (Brinkerhoff and Brinkerhoff 2011). The fundamental claim of those advocating for P3s is that the replacement of public monopoly with private-sector delivery will lead to enhanced performance. Although the theoretical arguments for improved performance are intriguing, are they supported by systematic evidence?

P3 Performance

The relationship between P3s and performance posited by public choice theory has kindled a robust research effort across a multitude of settings. Boyne (1998) examines the empirical evidence from a variety of studies where public services were contracted to private-sector firms while decision-making authority remained with the local government[2]. The author's intent was to establish whether these arrangements produced superior performance, measured in terms of costs, efficiency, and service quality, as public choice theory would suggest. Boyne (1998) examined studies in service settings extending from fire services to property maintenance. The author found that the general pattern of empirical evidence demonstrated that private-sector

[2] "Teisman and Klijn (2002), Linder (1999), and Savas (2000), all agree that the use of the term "public-private partnership" must be seen in relation to previous, more pejorative terms, such as "contracting out." (Hodge 2007)

delivery leads to cost reductions and higher efficiency (Boyne 1998). Nonetheless, the author cautioned that his results should *not* be taken at face value since most of the studies "…. contain specific methodological flaws that cast doubt on the validity of the evidence on the impact of service contracts, and in some studies, the authors draw conclusions that are not substantiated by their own evidence. Moreover, serious questions are raised by the failure of all of the studies to control for variations in scale."

Hodge's (2000) meta-analysis includes hundreds of studies on the impact of private-sector delivery of public provisions. The analyses revealed an average cost reduction of 6 to 12 percent when services were managed by private-sector firms (Hodge 2000; 233). However, the bulk of evidence examined was in the areas of garbage collection, cleaning and maintenance. For many other services outside of these, little to no savings were found (Hodge 2000; 233). For service-quality impacts, the author was only able to identify three studies on the issue, and finds "quality-related effect sizes have a magnitude not significantly different from zero" (Hodge 2000;156). However, it is worth mentioning that the three studies included in the analysis examined service-quality as a control variable for determining costs. A more efficient method for evaluating contracting impacts on service quality would be to estimate the impact of contracting on service quality in a separate statistical model.

In a more recent meta-analysis of 27 empirical studies, Bel et al, (2010) examined impacts of private-sector delivery on local solid waste collection and water distribution services. Evaluating performance in terms of costs, the authors found no systematic relationship between cost savings and private production of public services (Bel et al, 2010).

Boyne (1998) views P3 arrangements as a "natural experiment that essentially tests the validity of public choice propositions". While there has been a strong research effort to establish

whether P3s produce the putative outcomes public choice models proclaim, results have been mixed (Boyne 1998; Hirsch 1995; Lavery 1999). Public choice models of managerial behavior have been largely unsuccessful in predicting P3 performance since the profit-maximizing assumption, which allows elegant and verisimilar theorizing about private firm behavior, is not applicable in the same manner when applied to private-sector managers managing public agencies due to variations in the political constraints confronted. For example, while both P3s and Private firms are motivated by clear standards of profitability; profit strategy at P3s are set by political rather than competitive pressures. Public choice models of managerial behavior fail to anticipate the separate and unique incentives created by the mix of profit motives and political pressures, and how this combination limits management's ability to enhance performance. Consequently, the ambiguities of existing research leave P3s without an effective model which accounts for the behavior of private-sector managers when under the constraints of public ownership.

A Political Theory of P3 Performance

Private-sector managers under the auspices of public ownership (P3s) are, similar to fully public utilities, subject to strategic political considerations—rendering them inexorably political. Scholars have long highlighted the political nature of P3s as a public policy instrument, describing them to be both a political and managerial entity (Hodge and Greve 2017). Yet, existing research has shown scant interest in probing further into the political nature of P3s and how it may predict performance.

The present paper is not aware of any theoretically motivated, systematic analysis of performance that compares large numbers of P3s under long-term management agreements to their public and private counterparts. Here, I offer a generalizable theory that accounts for the

decisions and subsequent performance of private-sector managers under the constraints of public ownership (P3s). My theory builds on existing research, but it seeks to clarify the political and regulatory mechanisms at work, and how they shape management context in ways that ultimately shape organizational performance.

As discussed earlier, public choice notions were instrumental in bringing P3 arrangements into fruition. P3 arrangements in the water sector have substantially grown over the past few decades, largely based on public choice claims of cost savings and improved service quality. However, empirical studies examining public choice claims find mixed results (Boyne 1998; Domberger and Jensen 1997; Domberger and Rimmer 1994; Rho 2013).

The logic of performance set out in this section contrasts with public choice predictions, and illustrates why, taken together, P3s should perform no different or worse than their public and private counterparts, respectively. The sources of the predicted poor performance at P3 utilities diverge from the impact profit-incentives and political constraints have on similar public and private utilities. Given these diverse impacts, a discussion on the distinct political and regulatory environments met by managers at the three utility types, and their implications for performance is warranted. Moreover, while this study investigates P3s set at water utilities, the generalizability of the theory is far reaching for several reasons. First, much of the regulatory and political constraints theorized to be driving performance are consequences of perverse incentive structures created in the tax code, and therefore apply to all entities who delegate management of public provisions to private firms. Second, the present study measures performance with an indicator relevant to the objectives of most public organizations seeking to correct a type of market failure: regulatory compliance.

The logic of Performance

Private utilities. The structural character of the water industry is strongly connected to the nature of economic regulation (Beecher and Kalmbach 2013). Privately owned water utilities are regulated by a Public Utility Commission (PUC)[3] at the state level. One purpose of the commission is to prevent monopoly pricing by private firms. State pricing regulation for the water sector follows the traditional rate-base/rate-of-return (RBROR) methodology in order to ascertain a fair rate of return permitted to firms; formally,

$R = (B \times r) + E + d + T$

where R is the amount of revenue required in order to cover the firm's costs in its entirety, B is the "rate base", or the amount of capital expended by the firm in order to provide its services, r is the cost incurred by the firm to finance its rate base including debt and equity, E is the cost of operating expenses (typically for that fiscal year) including capital and labor, d is the amount spent on accounting for depreciation of its capital (in that fiscal year) and, T is the amount of taxes incurred and not distributed by the firm.

Given the pricing regulations, privately owned water utilities are incentivized to innovate and continuously upgrade said water systems, since they can earn a rate of return on investments made, formally known in the economics literature as the "gold-plating effect" (Averch and Johnson 1962). Here, firms will engage in undue capital accumulation, which in turn increases the rate level permitted. By "gold-plating" their water systems, a private firm's revenue requirement (*R*) will increase since there is an increase in operating expenses (*E*). That is, by over-investing capital, private firms are justified by PUC's pricing standards to increase rates, which subsequently leads to greater revenue for private firms. Put simply, the more investment private firms make in upgrading their water systems, the more potential there is to increase

[3] Along with water, a state's PUC may also regulate pricing for energy, telecommunications, and transportation among others.

revenue (Averch and Johnson 1962). One implication of this incentive structure is that compared to publicly owned utilities, private utilities are more likely to have advanced, state-of-the-art water systems that can more readily comply with regulatory requirements, as Konisky and Teodoro (2016) confirm. Another implication is that water rates will be higher for ratepayers served by private utilities (for examples see CBO, 1982; Levin et al. 2002; Narvaez et al. 2008)[2].

Public utilities. Unlike private firms, public water utilities must secure political support for any upgrades necessary for their water systems. The implications of this obligation for public utility performance is illustrated best by Levin et al. (2002): "It is harder for public systems to set rates that maintain their systems properly…. [that] the rate payers are also voters provides a constant downward pressure on rates. The limited terms of most politicians add to the myopia, as the benefits of system upgrades will only appear after they have left office." Therefore, while private firms are incentivized to upgrade water systems, politicians with shrinking budgets and growing municipal demands will likely avoid costly and politically unpalatable decisions (e.g. costly upgrades to water systems) that may increase water rates and subsequently upset voters. Konisky and Teodoro (2016) echo these sentiments by suggesting that the cost of regulatory compliance is greater for public organizations since public managers must secure resources through political processes. Konisky and Teodoro (2016) further observe that such political processes impose constraints on investments that may help mitigate regulatory challenges, while managers at private firms may simply pass these costs on to customers (Lindsay 1976). One implication of these political constraints is that public utilities will undercut water rates and forgo needed upgrades, which then yield inferior regulatory performance relative to private firms (Konisky and Teodoro 2016; Lindsay 1976; Oates and Strassman 1978).

P3 utilities. With respect to P3s, recall the earlier discussed guidelines under the 1997 tax code stipulating that private firms managing public agencies (P3s) "may not share in any net profits from system operations, but may instead share in *cost savings* or *revenue enhancements*, but not both (Arnold 2004)". To be sure, profit-maximizing firms managing P3 utilities are legally permitted one of two options for securing profits: *option 1)* "enhance revenues", which in this context means raising rates on ratepayers; or *option 2*) "cost savings" (i.e. cost-minimization, cost-cutting etc.).

Recent research has shown that managerial decision-making and priorities can be attributed to the organization's external political constraints (Johansen and Zhu 2014). Building on Johansen and Zhu (2014), I theorize that given the political constraints confronted by managers at P3 utilities, a profit-maximization strategy involving the raising of rates (i.e. 'revenue enhancement') on ratepayers may not be feasible. As a result, private-sector managers managing P3 utilities respond rationally to the political constraints confronted, and modify their behavior to focus on cost-minimization or "cost-savings" (*option 2*) as their profit-maximization strategy. Such cost-minimization efforts have been shown to negatively affect organizational performance (O'Toole and Meier 2004b). Consequently, I argue that private-sector managers managing public agencies (P3s) are situated in a distinct political environment that engender perverse incentives that generate performance challenges for reasons detailed below.

First, since P3s remain under public ownership, the authority to set water rates is retained by the local government (WPC 2003). P3s are therefore under the same persistent political pressure as fully public utilities to keep water rates low for voters. Accordingly, proposed measures that may increase water rates 'enhance revenues' (i.e. *option 1*) on voters would be politically infeasible since rate setting authority remains under the local government. As a result,

P3s will likely pursue cost saving (i.e. *option 2*) as their profit-maximization strategy. Thus, in addition to the political pressures of keeping costs down, P3s are also incentivized to cut costs in order to return a profit.

Similar to public utilities, P3s must also take a number of other considerations into account which may have negative implications for utility performance. For example, managers at P3s must secure political consent for any capital investments or increases in operating expenditures that utility water systems may require to improve performance (Konisky and Teodoro 2016; Lindsay 1976). However, requests for increases in operating expenses or investments in infrastructure would likely be rejected by local authorities who must authorize such expenditures. That is, since such expenses would likely raise rates on voters and reallocate funds from more qualitatively discernable programs such as policing and education. Alongside the political constraints on capital investments that may improve utility performance, private firms managing public utilities would rationally see little incentive in investing in an asset that will revert to the government at the end of their contract. As Alchian and Demsetz (1973) explain, "individuals do not invest if the fruits of their investments are seized by others (Besley 1995)". Domberger and Jensen (1997) similarly observe government's ownership and control over an asset while delegating management to external entities as problematic since it creates problems with respect to maintenance and investments: "[T]he contractor has little incentive to maintain the vehicles to a level that extends their economic life beyond the contract term. The same will be true of 'relationship-specific investments'—sunk expenditures by the contractor that enhance the operational characteristics of the vehicles." In other words, under-investment may be a significant problem if the asset remains under public ownership (Domberger and Jensen 1997)

Given the political constraints confronted, P3s will direct efforts towards cutting costs or 'cost-minimization' as their profit strategy. Critically, such cost-minimization efforts have been shown to negatively affect organizational performance, especially in terms of service quality (see for example Hart et al. 1997; O'Toole and Meier 2004b). Moreover, with both profit motives and political incentives to consider, P3s will likely forego costly system upgrades that may help address regulatory challenges. That is, P3s will avoid system upgrades since the asset will be returned to the government at the close of their contract, and because politicians will want to avoid capital investments which may increase water rates on voters.

Last, although cost-minimization efforts are expected to negatively affect utility performance with respect to service quality, past research offers reasons to expect the costs of regulatory non-compliance to be relatively low for P3s. Konisky and Teodoro (2016) observe that regulators respond differently to SDWA violations depending on utility ownership—viewing publicly owned organizations as harder to penalize than privately owned firms (Berg 2013; Davies and Probst 2001). Konisky and Teodoro (2016) highlight that when faced with non-compliance violations, a publicly owned agency may seek exemptions through political channels at relatively low costs and with a high probability of success (Davies and Probst 2001; Konisky and Teodoro 2016; Wilson and Rachal 1977). Consequently, P3 managers may view the non-compliance cost implication from their cost-minimization strategy as negligible.

Therefore, managers at P3s must balance profit-maximization decisions against the *political* costs their choices may provoke. The option with the lowest political costs (i.e. *option 2:* 'cost-cutting') presents perverse incentives that result in differing levels of investment and cost-cutting compared to their fully private counterparts. Moreover, the political institutions that govern privately owned and publicly-owned utilities (P3s being in the ladder group) are

fundamentally different, and so present utilities with very different financial and political consequences. Consequently, the political theory of P3 performance advanced here depicts performance as a consequence of differing managerial context. I theorize combination of political incentives to cut costs and P3's incentive to maximize profits generates a managerial context that leads to the poorest of performance by P3 utilities.

Given the logic of performance discussed above, a set of simple and corresponding hypotheses follow:

H1: P3s will perform significantly worse than *private* Water Utilities regulated under the SDWA

H2: P3s will perform significantly worse or no better than *public* Water Utilities regulated under the SDWA

Since P3s remain under public ownership, the present paper theorizes that many of the political pressures related to costs at fully public utilities also persist at P3 utilities. Therefore, P3s may perform similar to their fully public counterparts in some cases. At the same time, public utilities are legally proscribed from using water utilities as profit centers, and lack financial incentives to cut costs. Consequently, contrary to public choice predictions, P3s may perform poorly since their profit incentives linked to cutting costs may come at the expense of quality. Moreover, unlike their fully private counterparts, P3s have an added layer of complexity since they must balance the competing priorities of elected officials and firm investors.

Figure 1. Summary of managerial context

	Constraints	Profit incentives
P3s	- managers must receive political support for any increases in expenditures - politically constrained from raising costs or making capital investments that may help address performance challenges due to prospective costs on voters. - investors/ private firms managing P3s will likely forgo any needed upgrades to water systems –sunken costs –since they do not own the asset.	- cost-*cutting* = profits
Private	- largely insulated from political pressures on costs. - utility costs are regulated by a state commission board using a standard rate-base/rate-of-return for determining costs/ revenues.	- capital investments, system upgrades, "gold-plating" systems = higher allowable rate of return / profits for firms
Public	- managers must receive political support for any increases in expenditures - politically constrained from raising costs or making capital investments that may help address performance challenges due to prospective costs on voters.	- No financial incentive to *cut* costs or increase expenditures

Empirical Setting and Research Design

This paper evaluates these hypotheses with statistical analyses of regulatory compliance among water utilities regulated under the SDWA. The key independent variable throughout the analysis is *P3* water utilities regulated under the SDWA, which I measure with a dummy coded one if the water utility is a P3 (i.e., publicly owned, privately managed), two if the utility is public and three if the utility is private, with P3s as the excluded/ reference group. This approach permits a direct test of how P3s compare with both public and private utilities.

Dependent Variable

The phenomenon of interest in this study is water utilities' compliance with the SDWA, measured separately as *health violations* and *management violations* committed by a water utility. Water utilities regulated under the SDWA must meet certain health-based federal standards for contaminants in order to ensure the provision of safe potable water to citizens. If a utility's drinking water exceeds these limits, it commits a *health violation*. Health violations occur when a utility is unable to keep the contaminants in the water below designated levels. Included in this category are treatment technique violations, which occur when a utility does not use acceptable or agreed upon methods for treatment of their water supply. In addition to this, the SDWA also establishes water quality testing, reporting, and public communication protocols. These tasks include what the EPA terms as "monitoring and reporting" requirements. The SDWA requires water samples to be sent to certified laboratories that conduct required analyses of drinking water samples collected by public water systems at certain time intervals, the issuing of boiled water notices, or distribution of an annual report to communities they serve. In accordance with past studies this paper terms violations of these requirements: *management violations* (see Teodoro, Haider and Switzer, *forthcoming*; Teodoro and Switzer 2016).

Given the major difference in SDWA requirements, the present study analyzes health and monitoring violations separately. When a utility is found to be in violation of either the health or management requirements of the SDWA, the responsible agency (either state or federal) must decide on the appropriate action to bring the utility back into compliance. The SDWA has clear levels of enforcement stringency which apply to all regulated utilities—allowing researchers to investigate differences in compliance across public, private and P3 utilities.

Data

Data was drawn from EPA's national Safe Drinking Water Information System (SDWIS) database for compliance activities conducted under the Safe Drinking Water Act. The SDWIS includes data on a number of utility characteristics, including utility size, source of water, utility ownership, location, and compliance and enforcement records for all public water systems in the United States. The present analysis includes all water systems serving populations of 3,300 or more, covering the period of 2010-2013. These comprise all utilities that the EPA classifies as medium size or larger. Together, these systems serve approximately 279 million people, or 88% of the U.S. population that receives drinking water utility services. Demographic data were drawn from 2013 American Community Survey (ACS)[4].

Model Specification

A significant value of the data analyzed in this study is that they include the entire populations of U.S. drinking water systems for the period of the analysis. With such a dataset, statistical regression analysis helps isolate differences in performance across the three utility

[4] Each year the ACS produces data pooled to produce 5-year estimates for geographic areas in the U.S., ranging from neighborhoods to congressional districts to the entire nation. Data for each release of the 5-year estimates were collected over a 5-year period ending December 31 of the reference year (2013) (e.g., data in the 2010-2015 5-year estimates were collected January 1, 2010 - December 31, 2015).

types from the other correlates of violations since the entire populations are included in the analysis. That is, the observed correlations are true for the population; "statistical significance" in this analysis refers to the confidence with which we can discern correlations from unobserved or random processes that created the data.

The analysis of utility compliance with the SDWA employs two dependent variables in order to model compliance with the distinct health and monitoring/reporting responsibilities of utilities. Health violations is a count of the number of "maximum contaminant limit" and "treatment technique" violations a utility received in a given year, while management violations are a count of the number of "monitoring and reporting" and "other" violations. The separation of violations into these distinct categories is supported by their very low correlation over this time period (p. 052). Since the measure of compliance is a count of the number of violations in a given year by a utility, the present study uses a negative binomial regression model for both health and management violations. Since the count of SDWA violations are over-dispersed a negative binomial model proves the appropriate estimator[5]. Similar to past studies of SDWA compliance, a lagged dependent variable is included in each model, along with EPA region dummy variables and year fixed effects (Teodoro et al, forthcoming).

The present analysis also includes several control variables. First, utilities may vary with respect to their inputs (i.e. water sources) which can impact violations. For example, groundwater tends to have fewer contaminants than surface water, so utilities that use surface water are expected to have more health violations than those that use groundwater (Wallsten and

[5] The alpha was significantly different from zero in the management model, but not in the health models: LR test of alpha=0: chibar2(01) = **9.6e+04** Prob >= chibar2 = **0.000**. In an effort to be parsimonious, both models employ a negative binomial: As a robustness check, the models for health violations were also ran using a poisson regression –results were largely similar.

Kosec 2008). For utility's main source of water supply, the analysis codes one for groundwater and zero for surface water. Similarly, utilities that purchase their water from wholesale water suppliers are expected to have fewer health violations, as the wholesale provider is responsible for initial source quality and treatment (Teodoro 2014; Wallsten and Kosec 2008). To control for these effects, included in the analysis is a dummy variable coded one for purchased water and zero for water produced by the utility itself.

Utility age could also be expected to affect compliance with the SDWA, since older systems may have aging technology and infrastructure that may increase the likelihood of violations. The SDWIS contains no information on water systems age. As an alternative for systems age, the analysis created a new system variable coded 1 if the system existed in the SDWIS database in 1981 (the SDWIS's first year), and 0 if it entered the system at a subsequent date (Teodoro and Switzer 2016; Teodoro, Haider and Switzer, *forthcoming*). Also, included in the analysis is a variable for the size of the population served by the utility, since smaller utilities may lack adequate capacity to comply with regulatory requirements of the SDWA (Scheberle 2004; Teodoro and Switzer 2016). Lastly, the models include a set of contextual variables that measure demographic and economic circumstances in the area surrounding each water utility. These variables include the percentage of the county population that is non-white, the percentage of the population with at least a bachelor's degree as well as median household income and the unemployment rate. Descriptive statistics for SDWA variables can be seen in Table 1.

Results

Table 2-3 report the results of the two negative binomial regression models predicting health and management violations of the SDWA from 2010 to 2013. Table 2 shows the results for the model predicting management violations, while Table 3 shows the results for health

violations. Consistent with H1, P3s and privately-owned utilities significantly differ in management violations. After controlling for utility characteristics and EPA region fixed effects privately-owned utilities were found to have 30 percent less management violations (IRR, 0.7) than P3 utilities. Similarly, consistent with H1, privately-owned utilities were found to have significantly less health violations than P3 utilities. Privately-owned utilities had 32 percent less heath violation (IRR, 0.68) than P3 utilities. The analysis suggests that P3 do not necessarily enjoy the enhance performance see in fully privatized utilities, and that P3s struggle with meeting the regulatory requirements of the SDWA relative to their private counterparts.

Consistent with H2, P3s and contrary to public choice notions of "improved" performance when public services are externally managed, P3s did not significantly differ in management or health violations from their public counterparts. Taken together, P3 utilities perform no better or significantly worse than their fully public and private counterparts, and struggle with meeting the regulatory requirements of the SDWA.

The results for the control variables largely conformed to expectations. Utilities that utilize purchased water averaged fewer health and management violations. Utilities with relatively newer systems complied with both health and management requirements at a higher rate. Utility size also had the expected effect, as larger utilities performed better than smaller ones. With respect to the demographic variables, utilities with higher rates of unemployment and larger minority populations were associated with more SDWA violations, while more educated populations were associated with fewer health and management violations.

Taken together, these results indicate that P3s perform worse, as indicated in 3 of the four models, or no better than their public and private counterparts. The markedly lower compliance

findings for P3 utilities strongly suggests that communities served by P3 utilities receive, on average, inferior quality of service.

Discussion and Conclusion

The present paper has advanced a political theory of P3s that accounts for the performance of private-sector managers under the constraints of public ownership. The paper posits that what matters most for performance is not whether public services are provided externally by private-sector managers; but rather the political environment which engenders incentives that limit a managers' ability to help address performance challenges (i.e. utility non-compliance).

I argue that P3s are situated in an environment with disparate political constraints and incentive structures that affect managerial context in ways that generate inferior performance. To discern the disparate effect political constraints and regulatory incentives have on managerial context and performance, I compared the performance of P3s, measured in terms of the quality of drinking water provided (i.e. compliance with the *SDWA*), against their fully public and private counterparts. Taken together, P3s deliver a poor quality of services', in terms of safe drinking water. P3s perform no better than their fully public counterparts. P3s also performed significantly worse in both health and management violations relative to their private-sector counterparts managing fully private utilities. Notably, private-sector managers managing publicly owned agencies (P3s) are not immune to the effects of political constraints on managerial context and subsequent performance. This perspective is established by the findings that private-sector managers at P3s differ significantly in performance from private-sector managers managing private utilities.

The present study contributes to management theory and research in several ways. First, the study adds to the literature on the determinants of organizational performance. Despite the large literature on the link between performance and the political environment of managers', there is scant attention paid to how managers at P3s may diverge in performance from their private counterparts under differing ownership constraints. Similar to prior studies on the importance of context on managerial and organizational performance, I illustrate that P3 performance is largely attributed to the organization's political environment (Andrews et al. 2005; Johansen and Zhu 2013; Meier and O'Toole 2008). I expand management theory by linking heterogeneous performance at water utilities regulated under the SDWA, to the decisions of managers subject to strategic political considerations. The findings that P3s performed significantly worse in both health and management violations relative to private-sector managers managing fully private utilities speaks to the publicness literature (Johansen and Zhu 2013). I show that performance at the three utility types diverge due to differences in managerial context rather than the sector of managers managing the utility.

While public choice notions assume that market pressures incentivize managers in all sectors to act similarly, the present study casts doubt on the ability of financial incentives to motivate better utility performance, especially in terms of quality. In particular, the present study shows that profit incentive may drive performance in dissimilar ways amongst private-sector managers at P3s and fully private firms. Although both private sector-managers managing P3s and private-sector managers managing private firms have clear standards of profitability that are theorized to enhance performance, the profit-maximization strategy of P3s is driven largely by strategic political considerations. Therefore, the mix of management's fiduciary responsibilities

to shareholders/ investors and political pressures and constraints create complexities that negatively, in the case of P3s, affect performance.

The present study also highlights the distinct nature of publicly owned, privately managed organizations (P3s). Konisky and Teodoro (2016) for example, categorize P3s as "public" in their analyses of public-private disparities in compliance. However, as this study has shown, although P3 are publicly owned, many of the most important internal and external determinants of managerial behavior and performance are distinct, and therefore should be categorized as a third, separate entity.

With few exceptions, studies examining the private delivery of public provisions have largely focused on cost reduction and other financial indicators of performance. The present study contributes to our understanding of P3's effect on the delivery of a public provision by utilizing a unique performance indicator that speaks to the primary objectives of most regulatory agencies: regulatory compliance. Against the various promises of P3s, how might future studies measure whether P3s are performing effectively? The present study underscores why future research should focus on performance indicators corresponding to the organizations *primary* objectives and why economic measures alone may prove inappropriate for assessing organizational performance.

Beyond its unique measure of performance and theoretical significance, the present results have important practical implications for environmental policy given the persistent trend of governments delegating service responsibility to private firms. P3s as a management tool in the water sector have been judiciously growing in the past few decades. Unwittingly, despite their relative poor performance, P3s have shown incredible sustaining power with nine out of 10 municipalities renewing their long-term arrangements with private firms (*Public Works* Water

Outsourcing Report 2016). Still, while embraced as both a managerial strategy and governance tool for achieving better organizational outcomes, nearly 30 years on, little evidence existed up until now about their impact on performance (Hodge 2000). This study begins to fill some of this knowledge gap by demonstrating that the quality of service and drinking water in communities served by P3 arrangements lag far behind other water systems in the U.S. Critically, these disparities carry troubling implications for the health and safety of the nation's drinking water. To see if systematic noncompliance exists on a wider scale among P3 facilities, the present analysis might be expanded to additional environmental programs such as the CAA and CWA. If ongoing regulatory failures are found, then policy reforms may be necessary.

Table 1: Summary Statistics

Continuous Variables	Mean	Std. Dev.	Min	Max
Management Violations	0.87	4.93	0	301
Health Violations	0.17	1.14	0	75
% Non-White	28.81	20.37	0.57	98.75
% Unemployed	9.68	2.91	1	27.1
Median Income (Thousands)	52.16	14.16	19.99	122.24
% with Bachelor's Degree	25.05	10.39	5.1	74.4
Logged Population Served	9.40	1.07	8.10	15.89
Other Variables	Percentage			
P3 Utilities	2.05			
Private Utilities	11.0			
Ground Water	35.21			
Purchased Water	20.64			
New System	33.89			

N=25,873

Table 2: Negative Binomial Regression Predicting Management Violations 2010-2013

	Management Violations		
	Coefficient	p-value	IRR
P3s vs. Public	-0.05	.68	0.95
	(0.13)		
P3s vs. Private	-0.36	.01	0.70
	(0.14)		
Lagged-Management Violations	0.07	.00	1.07
	(0.00)		
% Minority	0.00	.00	1.00
	(0.00)		
Unemployment	0.01	.00	1.01
	(0.00)		
Median Income	0.00	.00	1.00
	(0.00)		
% with Bachelor's Degree	-0.01	.00	0.99
	(0.00)		
Ground Water	-0.01	.80	0.98
	(0.05)		
Purchased Water	-0.38	.00	0.68
	(0.05)		
New System	-0.16	.02	0.85
	(0.05)		
Logged Pop. Served	-0.14	.00	0.87
	(0.02)		
Constant	-1.48	.00	
	(0.32)		
Observations	25,873		
LR chi2(62) = 4161.45	Prob > chi2 = 0.0000		
LR test of alpha=0:	chibar2(01) = 6.2 e+04	Prob >= chibar2 = 0.0	

Note: Standard Errors in parentheses. Models also include state and year fixed effects.

Table 3: Negative Binomial Regression Predicting Violations Health 2010-2013

	Health Violations		
	Coefficient	p-value	IRR
P3s vs. Public	-.07	0.68	.93
	(0.18)		
P3s vs. Private	-0.39	.04	.68
	(0.19)		
Lagged-Health Violations	0.82	.00	2.3
	(0.02)		
% Minority	0.00	.25	1.00
	(0.00)		
Unemployment	0.01	.55	1.01
	(0.01)		
Median Income	0.00	.08	1.00
	(0.00)		
% with Bachelor's Degree	-0.02	.00	0.98
	(0.00)		
Ground Water	-0.38	.00	0.68
	(0.06)		
Purchased Water	-0.40	.00	0.67
	(0.07)		
New System	-0.28	.00	0.75
	(0.09)		
Logged Pop. Served	-0.17	.00	0.85
	(0.03)		
Constant	-0.91	.02	
	(0.41)		
Observations		25,873	

Wald chi2(62) = 1797.87 Prob > chi2 = 0.0000

Note: Standard Errors in parentheses. Models also include state and year fixed effects.

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