

Political vs managerial control and public service prices: Evidence from Austrian water utilities

Michael Klien*

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As an alternative to privatization, corporatization implies a shift of control rights over a firm from a politician to a manager while the public retains ownership. Although organizations with such features are fairly common, both in Europe and the US, there is little empirical work trying to assess the effects of corporatizations. This paper tries to fill this gap by analyzing the effect of corporatization on the price setting behavior of public firms. Based on a simplified version of Shleifer and Vishny (1994), I test the hypothesis that a corporatization decreases political interference in price setting. The empirical evidence from a dataset on Austrian water providers largely corroborates this hypothesis. Specifically, the effect of the political business cycle and partisan politics on price setting is significantly restrained in corporatized firms. This result is confirmed by a series of robustness and sensitivity tests.

*WU Vienna University of Economics and Business, michael.klien@wu-wien.ac.at

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1 Introduction

Most of the discussion about institutional alternatives for the provision of public services has centered around the issue of privatization. While state-owned enterprises are deemed inefficient, transferring ownership from the public to private investors is typically considered to raise efficiency (see e.g. Boycko et al. (1996)). Indeed, transferring ownership to private shareholders is accompanied by two crucial but distinct changes. First, as argued by many papers considering privatization as a make-or-buy problem (see Hart et al. (1997), Williamson (1999) or Levin and Tadelis (2010)), private and public sector are characterized by high-powered and low-powered economic incentives respectively. The change in economic incentive intensity may therefore lead to a different behavior of the firm and a different outcome. Second, and rather from a political economy perspective, public firms are often also pursuing political goals.¹ Privatizing these firms potentially reduces political interference because decisive control rights over business decisions are no longer under the control of a politician. Hence, the dual function of privatization is to increase economic incentives and at the same time decrease political interference.

Privatization of public enterprises is, however, not the only possibility for public sector reform. Especially in the case of public infrastructure utilities, we are often confronted with high transaction cost (e.g. specific investments), high degrees of contractual incompleteness and monopolistic structures. In such cases the welfare consequences of contracting-out government services to private partners are far from clear (see e.g. Auriol and Picard (2009)).² As an alternative to privatization, it has been suggested to corporatize public firms. 'Corporatization' or 'commercialization' refers to institutional arrangements, where the public retains ownership but the control rights over business decisions are handed over from a politician to a manager. And indeed, organizations with these features are not uncommon in public service and infrastructure provision – both in Europe and the United States. In water distribution for example, the dataset used in this paper shows that by 2000 more than 40% of large Austrian cities have corporatized the task. Similarly, public authorities, which have substantial administrative and fiscal independence from general purpose local governments, play a significant role in public infrastructure in the US.³

¹See Shleifer and Vishny (1994) for examples.

²Under certain circumstances, e.g. quality shading à la Hart et al. (1997), it may be preferable to keep a public service in the public sector although the low-powered incentives do not induce cost or productive efficient behavior.

³See Frant (1996) and Levin and Tadelis (2010). Although only a rough proxy, 14% of US cities delegate water treatment to other public agencies and authorities.

The question arises as to what extent corporatization matters for firm performance and behavior. Unlike full privatizations, equity remains publicly held and it is therefore unclear why a commercialization should lead to different results than a politically managed public enterprise. As argued by Shleifer and Vishny (1994), the answer to explain the consequences of corporatization is related to the extent of political interference under the different governance structures. While the economic incentive intensity may be similar after a corporatization, control rights are no longer in the hands of politicians. The theoretical model developed in Shleifer and Vishny (1994) predicts that shifting the control rights away from a politician to a manager typically decreases political influence. There is, however, hardly any empirical evidence about the consequences of corporatization on firm performance.

In the underlying paper I try to fill this gap by using a simplified version of the Shleifer and Vishny (1994) model and test the derived hypothesis using a dataset of Austrian water providers. The theoretical model is slightly adapted to analyze the effect of corporatization on public service prices instead of excess employment. The derived hypotheses is nevertheless analog to the original model and predicts that a corporatization decreases the political influence on prices. Regarding the empirical part, I estimate a series of panel data estimations to assess the effect of commercialization on water prices. Unlike prior research, however, I do not model the treatment effect of adopting an alternative governance form (corporatization) as a sole structural shift, i.e. an intercept.⁴ Instead, in addition to the structural shift I add interaction effects of corporatization and municipal characteristics like natural resources or the political situation. Apart from allowing more flexibility, this approach has the advantage that the interaction effects can help to identify the channels through which corporatization works. In the underlying case, the theoretical model mentioned above predict that important differences arise with respect to political interference. The coefficients of the interaction effects then represent a direct test of that hypothesis.

Analyzing the effect of corporatizations on the level of municipalities is important and interesting for several reasons. First, the sheer size of budgets involved in public

⁴Such an approach implies that one of the two governance structures is always superior. Hence, depending on the sign of the coefficient a service should either always stay inhouse or always be corporatized. The empirical strategy applied here tries to take account of the basic rationale of transaction cost economics (TCE), namely that the performance of a governance structure depends on the transaction characteristics. Masten (1993) highlights that if this is the case, it is not clear what we are actually estimating when the coefficients are restricted between the governance structures. In the econometric literature on treatment effects, this assumption is called a homogeneous treatment effect.

contracting on the municipal level makes it interesting for economic policy. According to Levin and Tadelis (2010) local government spending accounts for about one percent of GDP in the United States. In Austria local government spending amounts to almost five percent of GDP. Second, the role of the public sector has changed remarkably in recent years, especially in the European Union. What we observe is a paradigm shift from a state producing public services to a guarantor state, only bearing final responsibility (see Obermann (2007)). In such an environment, where public production is only one among many possible institutional solutions to provide public services, the government is more and more faced with typical make-or-buy decisions. Hence, analyzing the consequences of delegating public services is important for public policy when it comes to choose an organizational structure for public service provision. As new institutional arrangements like public-private-partnerships are unlikely the panacea, it is indispensable to understand the pros and cons of existing governance types like inhouse production, intermunicipal associations or government corporations. Third, the absence of real privatizations in the Austrian water sector provides an ideal setting because it facilitates the isolation of the treatment effect of corporatization.⁵ And fourth, municipalities produce a rich amount of observations for statistical inference.

The contribution of this paper is threefold. First, it is another empirical contribution analyzing the consequences of different institutional arrangements like Chong et al. (2006) or Bel and Warner (2008). It goes, however, one step further in its focus on political interference and corporatization, which is also mirrored in the empirical application. Second, the paper tries to overcome the typical dichotomous view of privatization, which considers the distinction between public and private as the decisive feature. There is virtually no private involvement in the Austrian water sector, but still, municipalities can and effectively do choose between an array of institutions to provide this service. The consequences of these choices have hardly been examined empirically. Finally, interpreting the great variety of existing institutional solutions as a managerial error to choose the correct governance type is certainly an untenable assumption. This paper is among a few empirical contributions explicitly modeling the idea that the optimal governance structure critically depends on the characteristics of the associated transaction. Thus, there is no generally superior organizational type and the empirical model is specified accordingly.

The paper is organized as follows. Section 2 develops a simple model of corporatization along the lines of Shleifer and Vishny (1994). The empirical analysis for a panel

⁵The handling of multiple unordered treatments can be very cumbersome and the results are often highly sensitive; see Fröhlich (2004).

of Austrian water providers is presented in section 3. Section 4 discusses the results and concludes.

2 Corporatization of Public Firms: political vs managerial control

A simplified version of the model in Shleifer and Vishny (1994) is used to illustrate the effect of corporatization and derive hypotheses for the empirical analysis.⁶ The two players in the game are a politician and the manager of the firm, who bargain over firm price setting. Let P denote a price reduction for the good produced by the public firm and q be the quantity of the good sold, which is taken as exogenous here. A very low elasticity of demand is not unrealistic for many publicly provided goods and services like drinking water.

The politician derives a political benefit from a lower price, denoted by $B(P)$. Various types of political benefits from price reductions would be possible. Theories of partisan politics would predict that politicians try to satisfy the preferences of its constituency, whereas classical downsian models or models of political business cycles consider a politician who uses fiscal instruments to signal performance and gain votes. π refers to the benefit of the manager before reducing prices. For the simplified model here, it does not really matter what the manager derives utility from.⁷ But it is just assumed that if the manager is in control, he will leave his optimum (e.g. by decreasing prices) only if he is rewarded for.

Now, to persuade the manager to lower prices, the politician can subsidize the firm through a transfer (T). To fund the transfer, e.g. through raising additional tax revenue, the politician has to bear political costs of $C(T)$.⁸

⁶Two major simplifications arise: First, I consider only cases where ownership remains public and thus ignore privatizations in terms of a change in ownership. Second, I do not allow for bribes. The results are nevertheless basically the same as those of the richer model by Shleifer and Vishny (1994).

⁷In Shleifer and Vishny (1994) it is assumed that even if a manager does not directly benefit from higher profits, it is easier to extract rents for personal consumption (cars, carpets, housing) if a firm is more profitable.

⁸As Shleifer and Vishny (1994) I assume that the political cost of spending a dollar of public money to the politician is less than a dollar $C(T) > T$

The according utility function of the politician is:

$$U_{pol} = B(P) - C(T) \quad (1)$$

with the price reduction increasing and the financing costs of the transfer decreasing the politicians utility. The utility function of the manager is given by

$$U_{mgr} = \pi + T - qP \quad (2)$$

where the initial benefit and the transfer increase manager utility, while a price reduction has the opposite effect. If we assume that there is no corruption, the size of P and T depends on who has control rights over prices. In the case of direct public management, the politician controls both P and T. Maximizing his utility function under the constraint that the manager receives at least a reservation utility of zero, amounts to the following first-order conditions:

$$T = qP - \pi, \quad (3)$$

$$B'(P) = qC'(T). \quad (4)$$

The politician will reduce prices, consuming both the transfer and the initial benefit (e.g. initial firm profits) of the manager. He will continue to reduce prices until the marginal political benefit equals the marginal cost of raising funds to pay for the transfer.

Now, if a firm is corporatized, the control rights over P are shifted from the politician to the manager. Two scenarios arise. Firstly, in the noncooperative Nash equilibrium, the players choose $T = P = 0$. Thus there is no price reduction and no transfer. Secondly, if we allow for coordination between the parties, cooperative solutions such as the jointly efficient outcome are possible. The jointly efficient equilibrium can be derived along the following utility function

$$B(P) - C(T) + \pi + T - qP. \quad (5)$$

yielding the following first-order conditions

$$B'(P) = q, \quad (6)$$

$$C'(T) = 1. \quad (7)$$

Regarding the price reduction, the politician and the manager jointly decrease price until its marginal political benefit equals its marginal cost. Since demand is assumed to be inelastic here, the marginal cost of a price decrease is equal to the sold quantity. The transfer on the other hand is increased until its marginal cost of raising funds is exactly equal to a dollar.

To analyze how corporatization affects the behavior of the firm, especially with regards to price setting, the different equilibria are compared. A convenient way to do so is by looking at the manager's utility in the different situations. When the politician has control rights over P , the initial managerial utility π is spent on price reductions and therefore zero. If on the other hand the manager has control over P , his utility is at least π because he can always choose the noncooperative equilibrium with a utility of π . Because π is not spent on price reductions, the price reduction P is lower under management control. Although the price reduction may not be zero if the politician and the manager can trade P and T (i.e. a cooperative equilibrium like the jointly efficient case above), the price reduction will never be as large as in the case of political control.

Hypothesis: Transferring control rights over prices from a politician to a public firm manager leads to a decrease in politically motivated price reductions.

In the next section, I will test this hypothesis using a dataset of Austrian municipal water provision.

3 Empirical Analysis

3.1 Overview of the Austrian Water Sector

According to Austrian law the main water-juridical competences lie with the 9 federal provinces. Organization of the service itself is, however, carried out on the municipal level and the municipality is finally responsible for the provision of the service. One important and typical feature of (local) public services is compulsory connection and usage. This means that by law, households cannot choose a provider but are connected to the local net and are obliged to use only the respective service. Water supply is thus characterized by (local) municipal monopolies. How the local authority organizes and operates the service is, however, up to the respective municipality. Thus in principle, municipalities are free to adopt virtually any governance mode – also contract out the service to a private party or use any type of Public

Private Partnerships (PPP). In reality, however, private sector involvement is still very rare in Austria.⁹ The provision of water is a highly sensitive issue in Austria. As surveys show, the perceived quality of drinking water is very high. According to the AQA water report, 97% of the interviewed persons rank Austrian water as number one in Europe (see OVGW (2008)). The respondents also showed a high degree of confidence in municipalities and public water providers. Consequently, political sensitivity regarding changes and the prospect of liberalizations/privatizations is quite high. Any move towards private sector involvement is therefore usually met by strong public objections.

The usual and still predominant case is direct provision of the water services by the municipality, i.e. a public bureau (see Schönböck et al. (2004)). Under such a governance arrangement, the service is provided within the municipal administration, typically a department, by its own civil servants. The two most important alternatives to direct provision by the municipality are water associations and government corporations. In the latter case, the municipality retains ownership but the task is operated by the management of a company under private law. Although ownership wise these spin-offs are identical to direct management, important differences arise with respect to the competences of its managers as well as the used employment and incentive schemes (see Edeling et al. (2004)). Regarding competences, the management of government corporations is typically not only in charge of basic management functions but also deciding upon investments and tariffs. Moreover, dispute settling is more complicated than for direct management where disputes are settled by a clear hierarchy. Very often, not only a single task but a wide range of municipal services are provided by these publicly owned private companies. Government corporations, especially on the municipal level, are usually expected to be self-financing through revenues associated to the delegated tasks.

The second alternative are public-public-partnerships in the form of water associations. Public-public-partnerships usually mean that a non-profit entity is set up by a group of municipalities, who share ownership. Management tasks regarding the water provision in the member municipalities are delegated to the association. Similar to government corporations, water associations are therefore special purpose entities, who manage and operate water provision. A distinct feature of water associations is, however, that they typically operate in a multi-principal environment. In addition, while government corporations are often found in major cities, public-

⁹Solutions involving a private partner are being discussed but have been implemented only in a handful of cases. Interestingly the 'private' partners in these PPPs are mostly subsidiaries of public/publicly-owned companies. See Schönböck et al. (2004)

public-partnerships like associations are common in rural and less densely populated areas.

Although alternatives to direct provision have become more and more popular over the last decades, the overall structure of the sector is fairly stable over time. The static evolution is mainly due to the huge investments and long-term usage of water-facilities. Consequently developments materialize rather slowly. An additional feature of the water sector in Austria is the small average scale of operational units (see Puwein et al. (2002)). This structure is mainly a result of the federal system in Austria, which emphasizes local and regional self-determination. A controversial report by the consulting company PriceWaterhouseCoopers attributed a major stake of existing inefficiencies to these small scale operations (see PriceWaterhouseCoopers (2001)). The report recommended a system of concessions, possibly involving private sector companies, comprising larger regions. In spite of the public discussion following these recommendations, the system of water provision remained almost unchanged and federal government subsidies for investments in the water and sewage sector rather helped to fortify the existing structures (see Kommunalkredit Public Consulting (2007)).

Not only the range of organizational alternatives but also water prices themselves are highly political in Austria. Together with sanitation and waste, tariffs for drinking water are one of the few discretionary fiscal instruments available to local governments. Similar to Germany, fiscal autonomy is generally rather low on the municipal level in Austria. While other sources of revenues are either not controllable or already exhausted, revenues from local services are an alterable and important source of finance.¹⁰ Since water tariffs change rather frequently and have to be paid by every household annually, they are likely more visible to citizens/voters than other taxes. Combined, these reasons make water prices a prime fiscal and political instrument for local governments.

3.2 Data and Variables

To evaluate whether and how strongly the chosen governance structure affects municipal water prices I use a dataset from the Austrian statistics office, which compiles annual data on major Austrian cities (see Statistik Austria (2007)) In addition, the

¹⁰The most important sources of finance are shares from the fiscal equalization scheme (33%), own tax sources like business and property tax (16.7%) and tariffs for public services (17.4). See Statistik Austria (2008).

adopted governance types and changes since 1990 were obtained by contacting the cities through email questionnaires and phone interviews.¹¹ This leads to a panel data set of 74 cities – all of which have a population above 10.000 – from 1992 to 2006. After accounting for data gaps and implausible values an unbalanced panel dataset of roughly 900 observations, depending on the used control variables, remains.¹²

Waterprice

The dependent variable in the following estimations is *waterprice*, which is the annual cost of water for the representative household.¹³ This measure is very often used instead of a sole m^3 price in order to account for two part tariffs.¹⁴ The typical two part tariff in Austria is composed of a fixed part per year and a variable part depending on the consumed amount of water. Although other measures than prices may be of interest too, prices are readily available and informative from an allocative perspective. Regardless of productive efficiency, if a change in the governance structure, e.g. corporatization, leads to an increase in prices, the resulting situation is inferior from a consumer perspective (see Auriol and Picard (2009)) A similar point is taken by Chong et al. (2006), who also use prices as their dependent variable for an analysis of the French water sector. Thus if gains in productive efficiency through privatizations or commercializations don't materialize in lower prices, the overall welfare effect is unclear. From a distributional perspective, higher water prices as a consequence of outcontracting are certainly questionable.

Governance structures

Following the arguments of the previous section, governance structures may be distinguished by political and management control. As hypothesized above, transferring the control rights from the politician to the public firm manager should decrease politically motivated price changes. With regards to direct management, control rights over prices are allocated with the local government, which decides upon prices in the city council. Conversely, delegation of the task to associations or government corporations transfers the major business control rights to the respective firm management. Corporatization through these special purpose entities should therefore reduce politically motivated price setting. Influencing tariff decisions is certainly more difficult compared to the case of direct management, when the prices are decided upon directly by the politicians. Governance structure is thus represented by a binary variable *governance*, where 0 indicates political control and 1 indicates that the local water provision has been corporatized and is run by a firm manager, who

¹¹Phone interviews were used in case of non response.

¹²Observations have been eliminated if impossible, e.g. negative values for water losses.

¹³The average household is characterized by a $150m^3$ consumption of water.

¹⁴E.g. also by Chong et al. (2006).

has control rights.

Political factors

As argued in section 2, political incentives may influence pricing decisions in public firms. Since different sources and intensities of political benefits are consistent with the used theoretical model, three potential channels are chosen in this paper. Political business cycle, partisan politics and majority confidence. In the first step, I use simple dummy variables to indicate the presence of either situation. Political business cycle theories go back to the works of Nordhaus (1975), Rogoff and Sibert (1988) and Rogoff (1990) and emphasize electorally motivated cycles in tax and expenditure policy. In a nutshell, political business cycle models assume that politicians strategically manipulate fiscal policy instruments to ensure reelection. They try to 'signal' good performance to voters with asymmetric information by lowering taxes or increasing (visible) expenditures. To capture the political business cycle I include the variable *election*, which is 1 in an election year and 0 otherwise. Political business cycle models would predict lower prices/lower price increases in election periods.

Theories of partisan politics, on the other hand, stress the influence of party ideological differences on the economy. Abandoning the idea of purely opportunistic political parties, Alesina (1987) suggests that political and economic cycles are connected through preference differences between parties. Different parties have different priorities when in power and the economy may react accordingly. While the direction of the effect is not quite clear, partisan models therefore usually predict that the economy behaves differently, depending on the ideological consistency of the ruling political party. *partisan* is a dummy variable indicating that the strongest party is a left-wing party. Because water prices are consumption taxes, which have a regressive effect on income distribution, they should be lower in left-wing dominated municipalities. Finally, I add *majority*, which indicates if the leading party has more than 50% of the seats in the city council. Since a simple majority is required for most legislation, parties with more than 50% may be more confident about re-election. This may in turn lead to a different price setting pattern because the political benefit associated with a price reduction is different. The direction of the effect is, however, a priori unclear.

To gain further insights into the channels through which politics affect the price-setting behavior of organizations, a different set of political variables is applied. Instead of simple dummy variables, I add structure to the postulated relationships by quantifying the strength of the effects. Instead of *election*, I use *electioncycle*, indicating the number of years till the next election. It ranges between 6 and 0 years,

where 0 indicates an election year. Prices are expected to be higher, the more time is left until the next election. *partisan* is substituted by *partisan_{strength}*, which equals the percentage of seats held by a governing left-wing party. The partisan effect should be larger, the stronger the party and its constituency are. Instead of *majority*, I include *majoritydif*, which indicates the percentage difference between the leading party's number of seats and a simple majority (50%). Higher values of *majoritydif* are expected to increase the re-election confidence of a party.

Control variables

Apart from the governance structure and political factors, the control variables in X represent environmental factors and municipal characteristics, which could influence prices. First, the percentage of population connected to the distribution system *connect*, because connecting more remote households to the central water system may be more expensive than covering only the densely populated areas. Second, water leakage in percent of the total amount of water delivered (*leakage*) is an important indicator for the condition of the distribution network *leakage*. Third, the annual average of nitrate pollution (*nitrate*) is included to directly control for quality. Other indicators of pollution would be desirable, but nitrate is the only one available for the municipalities and time periods in our dataset and is reportedly the most important source of contamination.¹⁵ In addition, *source* and *external*, the percentage of water coming from source water or from an external provider, to indicate different production costs compared to ground water are included.¹⁶ Water consumption per capita (*watercap*) proxies for industry or tourism, because such factors will increase the average consumption. In this respect, *watercap*, along with population (*pop*) and area (*area*) are included to account for economies of scale and density.¹⁷ The financial stance may force a municipality to operate at lower cost or increase prices. Such pressures are proxied for by including debt per capita (*debt*). Finally, differences between provinces, e.g. laws or financial constraints or subsidies, are caught by province dummies and overall trends are modeled by including time fixed effects.

To improve upon identification for IV and the selection equations (see below), I follow Chong et al. (2006) and include a dummy variable, which equals 1 if a municipality

¹⁵See BMLFUW (2009) for details.

¹⁶External providers are typically neighboring municipalities. The percentage of ground water is excluded because together with source water and external provision it adds up to 1 and the coefficient would therefore not be identified.

¹⁷Data on population and area are from 2001 and the same for the whole observation period. As most specifications include municipality fixed effects, the variables are 'swept' away and not included in these estimations.

has chosen the same organizational form for providing sanitation services. From a theoretical point of view, if the local government has a general preference for some organizational type, this may also influence the choice the institutional arrangement for water distribution. The mere preference is, however, unlikely to have a direct impact on prices. Hence, the instrument list Z includes all variables from X and in addition the *sewageorg* dummy. Summary statistics and pairwise correlations are available in tables 1 and 2.

[Tables 1 and 2 about here]

3.3 Model and Methodology

To evaluate the effect of corporatization on water prices, I estimate the following model

$$price_{it} = g_{it}\gamma + X_{it}\beta + g_{it}(X_{it} - X_i)\delta + \alpha_i + \epsilon_{it} \quad (8)$$

where $price_{it}$ is a linear function of the governance structure g_{it} , the covariates X_{it} , the interaction term $g_{it}(X_{it} - X_i)$, municipal fixed effects α_i and an unexplained part ϵ_{it} . The inclusion of the interaction effects is an important feature of the model, because it allows to directly test the hypothesis that corporatization reduces political price setting behavior. As the overall effect of corporatization now depends at which X it is evaluated, the covariates vector X of the interaction term is demeaned to ensure the interpretation of γ as average treatment effect (see Wooldridge (2002), p.625ff). A corporatization therefore affects water prices both through the dummy g_{it} and the interaction terms $g_{it}(X_{it} - X_i)$.

An important econometric issue in estimating the effect of government contracting on water prices is a possible endogeneity problem due to self-selection. The problem of evaluating the impact of a treatment, e.g. job training, union membership or governance mode, comes from the non-random selection into treatment (i.e. governance type). It has been shown by Heckman (1979) that ignoring such self selection leads to the same consequences as misspecifying a model by omitting relevant explanatory variables from a regression. A possible solution to the problem arises simply through the availability of panel data. If the self-selection occurs on the permanent municipality specific component, a fixed effects approach yields consistent estimates of the impact of corporatization on water prices (see Heckman and Hotz (1989)). Theoretically, this is not unlikely in the present case of water provision, because many transaction characteristics like investment or natural resources are fairly over

time. The baseline model exhibited by equation (1) should therefore be able to deal with self-selection into a governance type and produce consistent results.

In addition to the baseline model, a series of sensitivity and robustness tests is applied to address potential specification issues. First, an alternative set of political variables is used to assess if the results are sensitive to the definition of the variables. The alternative set substitutes the dummy variables by cardinal variables indicating the strength of the respective political factor. This is not only interesting as a test of sensitivity but can also give additional insights regarding the relationship between politics and water prices. Second, since the fixed effects estimator may not purge all endogeneity related to the self-selection into *governance*, an additional correctional procedure is used. The control function estimator of Wooldridge (2002) (Procedure 18.4, p.631) can be extended to panel data along the lines of Wooldridge (1995).¹⁸ Including two correction terms allows to test whether an ordinary fixed effects approach really controls for the self-selection process. If the coefficients on these selection terms are significant, endogeneity is present. Otherwise the more efficient (standard) FE estimator can be used instead. To deal with endogeneity and reverse causality more generally, a third robustness test lags the right-hand side variables by one year.¹⁹ If e.g. raising tariffs and issuing debt are considered substitutes in terms of financing the municipal budget, lagging debt by one period should ensure sequential exogeneity. With the relatively long panel at hand ($T=15$), the bias of FE estimators in the absence of strict exogeneity may be minimal anyway (see Wooldridge (2002), p.301). Fourth, to avoid the possibility that the results are an artifact of an overspecified model I drop all variables, which have not been statistically significant at the 10% level in the baseline model. This type of robustness test may be especially important given the large number of covariates and interaction terms. Finally, in the above model the overall effect of delegation is evaluated at means of X . To study the sensitivity of γ , I reestimate the model at different values of X .

To robustify inference, all regressions are estimated using heteroscedasticity and cluster-robust standard errors. Therefore, standard errors are fully robust with respect to arbitrary serial correlation within municipalities, as well as general heteroscedasticity (see Stock and Watson (2008)).

¹⁸The two step procedure first estimates the governance choice by probit using all covariates X and the instrument Z . Two (period-specific) selection terms, one for selection into treatment and one for selection into non-treatment, are then calculated and added to the outcome equation.

¹⁹Potentially, all right hand side variables except those related to election dates are endogenous. Lagging these variables would also be inconsistent with theory, since water prices would be affected only a year after the elections. Thus, variables indicating the election cycle do not enter the specifications lagged.

3.4 Results

[Table 3 about here]

The results for the baseline FE specification are shown in the first column of Table (3). To start with, the original variables, not interacted with governance, are considered. Regarding the characteristics of water provision, source water has a negative impact on waterprices. An increase in source water by 10% reduces annual waterprices on average by 1.6 Euro. None of the other control variables has a statistically significant effect on water prices. The high R^2 of the model indicates that the time and municipality fixed effects explain a large part of price variations. F-Tests on both types of fixed effects are highly significant. This is not surprising since water facilities are characterized by a large share of fixed cost. After the investment has been undertaken, changes in the environmental variables only have a minor effect on cost and therefore prices. Conversely, the water prices seem to be significantly influenced by political factors. In an election year for instance, the price of water is 6.87 Euro less than in non-election years. Given that coefficients of the time dummies increase every year (omitted here), the result indicates that price increases are much smaller in election years. In the same vein, if the leading party is from the left, waterprices are roughly 20 Euro smaller than with a conservative or right wing government. This can be expected since consumptive taxes hurt low income households, representing an important share of left wing constituency, more. Moreover, the price setting behavior changes if the leading party has a majority. Prices increase on average by 7.00 Euro if a government holds more than 50% of the council seats. A party in power that feels reassured by elections is therefore more likely to increase prices. As these results show, waterprices appear to be strongly influenced by political factors if a municipality provides the service inhouse.

Now, we turn to the crucial point in the empirical analysis, the effect of corporatization. Regarding the hypothesis from section 2 that the delegation of a service reduces politically motivated price setting, the interaction effects of the political variables would need to be inverse to the original coefficient. Indeed I find strong evidence that corporatization has a strong and significant effect on the degree of politically influenced prices. The coefficients on the interaction terms are inverse to the original coefficients, meaning that the effect of these politics is much smaller when control rights are in the hands of a manager. *election_inter* e.g. is the interaction effect of *election* and *governance*. The coefficient of the interaction effect, which has to be interpreted as a contrast to the original coefficient for *election*, shows that election

years have a very different impact for corporatized water services. This is true for all three political determinants. Also the effect of a majority and of partisan politics is reversed. T-tests do not reject the null hypothesis that the effect of the political variables is zero in the case of corporatized water provision. Thus, as hypothesized in the theoretical model, delegating a service to another institution decreases the political impact on prices. A similar interpretation arises regarding the interaction effect of *source*. While source water decreases prices for inhouse production, the effect is not significantly different from zero when a service has been corporatized.²⁰

Finally, the overall effect of *governance* exhibits a statistically insignificant effect of -5.8 Euro. This implies that for the average transaction, i.e. a municipality with average percentage of external water, average percentage of source water, an average distribution of council seats etc., I find no statistically significant difference between inhouse production or a corporatized firm. Thus, although the governance structures differ especially with respect to the political price setting behavior, the overall effect on water prices is not statistically significant when evaluated at means.

Sensitivity and Robustness

The first alternative specification, exhibited in the second column of Table (3), uses different definitions of the political variables. Instead of the dummy variables in the baseline specification, variables indicating the strength of the effect are used. E.g. instead of the election year dummy, the price setting behavior is assumed to change the closer the next elections. For each year further away from an election, prices increase by roughly 1 Euro. So, everything else being the same, the sole distance till the next election leads to different water prices. Similarly, the stronger a government majority or a left wing governing party, the larger the effect on prices. Water prices increase by 0.7 Euro for every percent the majority of the leading party increases. If the leading party is left wing, an increase in the percentage of council seats decreases water prices by 0.6 Euro. The interaction effects of the political variables are, however, again inverse and thus confirm the results of the baseline specification. Transferring the control rights over price setting away from political control does significantly decrease the effect of politics on prices.

²⁰Again, this can be shown by summing the coefficients for *source* and *source_{inter}* and conducting a t-test. Two possible explanations exist, why the share of source water does not change prices when a task is delegated. First, the cost structure of the subcontractors is insensitive because operations are even more fixed cost dominated. Second, the linkage between cost and prices is rigid due to the contractual relationships. Any subcontractor, be it water associations or government corporations, may choose to retain cost savings to subsidize other activities or set aside for future investments.

The third column of Table (3) displays the results of a FE estimation, where I use a variant of the selection correction for panel data from Wooldridge (1995). As fixed effects may already be taking care of the endogeneity problem associated with self selection, the coefficients on the correction terms *h_mills* and *h_sel* are indicators of additional endogeneity beyond the permanent component. Because both coefficients are statistically insignificant at a sufficiently high level, it appears that standard panel data models do effectively purge the endogeneity in the present context. If such a correction is not necessary, it is justified to use a more efficient OLS estimator.²¹

To address the problem of endogeneity more generally, the specification in column four of Table (3) uses lagged values of the right hand side variables (except the election year dummy). This approach should help to rule out the possibility that the obtained results are an artifact of reverse causality and endogeneity. The results are again very much in line with those of the baseline specification. Only in the case of *majority* and *source*, the use of lagged variables renders the coefficients statistically insignificant. The qualitative implications of the results remain, however, basically unchanged. As already noted, a large part of the control variables do not seem have any influence on water prices. I thus drop all covariates, which have not been found statistically significant in any of the previous specifications at $p < 0.10$. Column five in Table (3) clearly shows that the baseline results are not driven by an overspecified model.

Lastly, since the interaction effects reveal significant differences between inhouse production and corporatized services, it is useful to re-evaluate the effect of *governance* for specific combinations of the covariates. Hence, departing from evaluating the effect at means, I test the sensitivity of the overall effect of *governance*. Table (4) shows the coefficient of *governance* using the baseline FE model, evaluated for different municipal situations instead of the sample average.²²

[Table 4 about here]

The results in Table (3) correspond to the coefficients of the interaction terms in Table (2) and support the claims that commercialization of a public firm may lead to very different outcomes, depending on the local environmental and political situation. E.g. if a municipality has no access to source water, corporatizing the service typically leads to significantly lower prices. Regarding the political variables,

²¹The results are very similar to those of the baseline FE specification anyway.

²²The approach is similar to Lee (1978).

corporatization is favorable in terms of prices when there is non-partisan majority government. Conversely, when a municipality is governed by a partisan party without a majority, commercialization will lead to increase in water prices. In addition and as expected, corporatization in election years has an upward effect on expected price changes, regardless of the political situation.

4 Discussion and Conclusion

The effect of commercialization of a public firm may not be easily pinned down. In the underlying study for example, prices are not significantly different between direct management and corporatized services in all above specifications. That said, the price setting between the two governance types is nevertheless markedly different. While political determinants are important when politicians have control rights over price setting, commercializing a firm and shifting the control rights to managers leads to a strong reduction of political influence. This result applies not only to some, but to a whole series of political determinants tested in this paper. As such, this paper empirically corroborates the theoretical predictions of Shleifer and Vishny (1994) that commercialization of public firms reduces politically motivated practices. Apart from political factors, also the natural resources available to a municipality are differently affecting prices depending upon the governance structure. The uncovered significant interaction effects strongly support Masten (1993), who stresses that modeling the effect of a change in the governance structure by an intercept is an imperfect translation of the theoretical predictions into empirical models. By allowing the governance effect to depend upon the municipal characteristics, the empirical specification is therefore consistent with both property rights and transaction cost approaches.

Concerning economic policy, neither governance type dominates the other in terms of consumer prices. Hence no general recommendation as towards which governance structure should be chosen arises. More importantly, however, the results show that commercialization is an effective mean to reduce the impact of political influence. The relevant question for economic policy then boils down to whether we want political incentives to influence the behavior of organizations providing public services. In Shleifer and Vishny (1994) political benefits are considered net welfare losses, which represent only transfers from their political competitors. Thus, *ceteris paribus*, reducing political control over business decisions such as prices would be desirable. Removing high powered political incentives may, however, come at a cost. Depoliticizing a task reduces administrative control and therefore accountability. Elections

may after all help to increase allocative efficiency by increasing the probability that public services and goods are closer to the preferences of the voter-citizen (see Frant (1996)). This link may be lost when a public service is no longer part of the political process (e.g. in the budget). Especially political scientists have long stressed this issue in the debate over the limits of privatization and the demarcation between public and private sectors (see e.g. Moe (1987), Sullivan (1987) or Gilmour and Jensen (1998)).

The resulting implications for public policy could therefore be described as follows. Commercializing public services and reducing political influence comes at the cost of decreased flexibility and accountability of the politician ultimately responsible for provision of the service. Thus the potential distortions from political opportunism should be sizable to justify the decreased control possibilities. In terms of the model of section 2, this may especially be the case when the political benefit from a measure is large or when the political cost of raising funds for the measure is small. Political benefits are typically large when a tax or spending item noticeably affects voters, preferably the own constituency. A prime instrument for a politician seeking reelection would therefore be a spending category or a tax, which benefits a large part of the (own) constituency. Since public service charges like water prices are among the few local taxes, which qualify for this requirement, we would expect the opportunistic potential to be large. Another case for commercialization could be made when the cost of funds to engage in vote-seeking is low. Instead of really raising new taxes, politicians may rather shift expenditures from less visible to highly visible uses. If, e.g. citizens have difficulty judging the quality of infrastructure like water or sewage lines, a vote-seeking agent may relocate funds from infrastructure investment to politically more beneficial uses like water prices (see Frant (1996)). In such a case, the political costs of raising funds for, e.g. a price reduction, are small because they typically go unnoticed. It is therefore no coincidence that commercializations in the form of special purpose organizations like public authorities are particularly present in activities which build and maintain public infrastructure. This is not only the case for Austria and continental Europe, but also the U.S. Further research in this direction may compare the effect of commercializations with those of privatizations, as two distinct institutional alternatives. In general, breaking up the overly polar distinction between public and private provision of infrastructure could bring additional insights as to which features are responsible for different performances.

5 Literature

References

- Alesina, A. (1987). Macroeconomic policy in a two-party system as a repeated game. *The Quarterly Journal of Economics*, 102(3):651–678.
- Auriol, E. and Picard, P. M. (2009). Government outsourcing: Public contracting with private monopoly*. *The Economic Journal*, 119(540):1464–1493.
- Bel, G. and Warner, M. (2008). Does privatization of solid waste and water services reduce costs? a review of empirical studies. *Resources, Conservation and Recycling*, 52(12):1337–1348.
- BMLFUW, B. (2009). Österreichischer trinkwasserbericht 2005 - 2007. Vienna.
- Boycko, M., Shleifer, A., and Vishny, R. W. (1996). A theory of privatisation. *The Economic Journal*, 106(435):309–319.
- Chong, E., Huet, F., Saussier, S., and Steiner, F. (2006). Public-private partnerships and prices: Evidence from water distribution in france. *Review of Industrial Organization*, 29(1):149–169.
- Edeling, T., Stölting, E., and Wagner, D. (2004). *Öffentliche Unternehmen zwischen Privatwirtschaft und öffentlicher Verwaltung*. Interdisziplinäre Organisations- und Verhaltensforschung. Leske + Budrich Verlag.
- Frant, H. (1996). High-powered and low-powered incentives in the public sector. *Journal of Public Administration Research and Theory*, 6(3):365.
- Fröhlich, M. (2004). Programme evaluation with multiple treatments. *Journal of Economic Surveys*, 18:181–224.
- Gilmour, R. S. and Jensen, L. S. (1998). Reinventing government accountability: Public functions, privatization, and the meaning of "state action". *Public Administration Review*, 58(3).
- Hart, O., Shleifer, A., and Vishny, R. W. (1997). The proper scope of government: Theory and an application to prisons*. *Quarterly Journal of Economics*, 112(4):1127–1161.
- Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica: Journal of the econometric society*, 47(1):153–161.
- Heckman, J. J. and Hotz, V. J. (1989). Choosing among alternative nonexperimental methods for estimating the impact of social programs: the case of manpower training. *Journal of the American Statistical Association*, pages 862–874.

- Kommunalkredit Public Consulting (2007). Bundesförderung im leitungsbezogenen Siedlungswasserbau. St. Veit.
- Lee, L. F. (1978). Unionism and wage rates: a simultaneous equations model with qualitative and limited dependent variables. *International Economic Review*, 19(2):415–433.
- Levin, J. and Tadelis, S. (2010). Contracting for Government Services: Theory and Evidence from US Cities. *The Journal of Industrial Economics*, 58(3):507–541.
- Masten, S. E. (1993). Transaction costs, mistakes, and performance: Assessing the importance of governance. *Managerial and decision economics*, 14(2):119–129.
- Moe, R. C. (1987). Exploring the limits of privatization. *Public Administration Review*, 47(6):453–460.
- Nordhaus, W. D. (1975). The political business cycle. *Review of Economic Studies*, 42(2):169–90.
- Obermann, G. (2007). The role of the state as guarantor of public services - transaction cost issues and empirical evidence. *Annals of Public and Cooperative Economics*, 78(3):475–500.
- OVGW, s. (2008). Aqa Wasserreport. Vienna.
- PriceWaterhouseCoopers (2001). Optimierung der kommunalen wasserver- und abwasserentsorgung im rahmen einer nachhaltigen wasserpolitik.
- Puwein, W., Kletzan, D., Köppl, A., and Url, T. (2002). Nachhaltige Nutzung der Wasserressourcen: Institutionelle und ökonomische Voraussetzungen. Österreichisches Institut für Wirtschaftsforschung (WIFO).
- Rogoff, K. (1990). Equilibrium political budget cycles. *The American Economic Review*, 80(1):21–36.
- Rogoff, K. and Sibert, A. (1988). Elections and macroeconomic policy cycles. *Review of Economic Studies*, 55(1):1–16.
- Schönbäck, W., Opolzer, G., Kraemer, R., Hansen, W., and Herbke, N. (2004). International comparison of water sectors. comparison of systems against a background of european and economic policy. Bundeskammer für Arbeiter und Angestellte.
- Shleifer, A. and Vishny, R. W. (1994). Politicians and firms. *The Quarterly Journal of Economics*, pages 995–1025.
- Statistik Austria (2007). Österreichs Städte in Zahlen 2007. Vienna.

- Statistik Austria (2008). Isis database. Vienna.
- Stock, J. H. and Watson, M. W. (2008). Heteroskedasticity-Robust standard errors for fixed effects panel data regression. *Econometrica*, 76(1):155–174.
- Sullivan, H. J. (1987). Privatization of public services: A growing threat to constitutional rights. *Public Administration Review*, 47(6):461–467.
- Williamson, O. E. (1999). Public and private bureaucracies: a transaction cost economics perspectives. *Journal of Law, Economics, and Organization*, 15(1):306.
- Wooldridge, J. M. (1995). Selection corrections for panel data models under conditional mean independence assumptions* 1. *Journal of Econometrics*, 68(1):115–132.
- Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. The MIT press.

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
waterprice	144.027	45.466	39	273.84
governance	0.387	0.487	0	1
external	0.109	0.261	0	1
source	0.331	0.415	0	1
nitrate	10.223	7.988	0.700	44
leakage	14.177	11.057	0.109	60.143
watercap	211.758	51.703	102	885
connect	95.489	7.081	44	100
debt	1.484	0.836	0.162	7.045
pop	0.464	1.69	0.017	15.501
area	0.64	0.653	0.045	4.147
election	0.182	0.386	0	1
electioncycle	2.315	1.587	0	6
majority	0.603	0.49	0	1
majoritydiff	3.297	10.203	-20	33.871
partisan	0.539	0.499	0	1
partisan_strength	40.175	18.429	4.762	83.871
N		931		

Table 2: Cross-correlation table

Variables	waterprice	governance	external	source	nitrate	leakage	watercap	connect	debt
waterprice	1.000								
governance	0.022	1.000							
external	0.183	0.232	1.000						
source	-0.225	0.031	-0.270	1.000					
nitrate	0.108	-0.115	0.057	-0.466	1.000				
leakage	-0.154	-0.018	-0.120	0.157	-0.078	1.000			
watercap	-0.189	-0.011	-0.004	-0.080	0.040	-0.103	1.000		
connect	0.017	0.013	-0.061	-0.220	0.023	-0.027	0.290	1.000	
debt	0.221	-0.184	-0.159	-0.238	0.241	-0.141	0.233	0.161	1.000
pop	0.188	-0.042	-0.037	0.131	-0.061	-0.064	0.028	0.044	0.050
area	0.173	-0.191	-0.029	0.275	-0.078	0.002	-0.128	-0.169	0.022
election	-0.004	0.021	0.009	-0.002	-0.051	0.027	0.066	0.029	0.026
electioncycle	-0.016	-0.007	-0.011	0.058	0.065	0.024	-0.063	-0.046	-0.069
majority	-0.012	-0.027	0.111	0.001	-0.026	-0.193	0.094	0.067	0.141
majoritydiff	-0.011	0.014	0.103	-0.076	0.058	-0.154	0.046	0.040	0.122
partisan	0.042	0.004	-0.047	-0.099	0.185	-0.041	-0.184	-0.191	0.037
partisan_strength	0.114	0.037	-0.021	-0.168	0.212	-0.033	-0.140	-0.165	0.129
pop	1.000								
area	0.623	1.000							
election	0.001	-0.020	1.000						
electioncycle	-0.026	0.014	-0.687	1.000					
majority	-0.052	0.066	0.035	-0.063	1.000				
majoritydiff	-0.131	-0.026	0.039	-0.068	0.805	1.000			
partisan	0.142	0.206	-0.045	0.037	0.178	0.164	1.000		
partisan_strength	0.043	0.089	-0.015	0.017	0.307	0.385	0.861	1.000	

Table 3: Estimation Table

	(1)	(2)	(3)	(4)	(5)
governance	-5.843 (5.697)	-6.145 (5.314)	-3.664 (5.987)	-2.815 (5.190)	-6.471 (5.061)
external	25.107 (21.021)	34.793* (18.443)	20.044 (21.707)	29.057 (19.940)	25.418 (20.675)
external_inter	-16.052 (21.664)	-26.055 (19.200)	-11.595 (22.740)	-23.443 (20.715)	-19.242 (20.446)
source	-15.745** (7.138)	-16.769** (7.758)	-16.184** (7.010)	-2.571 (9.021)	-14.004* (7.440)
source_inter	21.895** (8.967)	18.981** (8.142)	21.890** (8.972)	15.927* (9.268)	18.051** (7.133)
nitrate	0.185 (0.348)	0.102 (0.321)	0.201 (0.353)	0.219 (0.392)	
nitrate_inter	-0.211 (0.387)	-0.123 (0.375)	-0.243 (0.395)	-0.170 (0.403)	
leakage	0.017 (0.125)	-0.026 (0.124)	0.032 (0.121)	-0.027 (0.119)	
leakage_inter	-0.243 (0.217)	-0.136 (0.191)	-0.266 (0.211)	-0.141 (0.199)	
connect	-0.314 (0.444)	-0.185 (0.423)	-0.290 (0.432)	-0.070 (0.525)	
connect_inter	0.079 (0.647)	-0.141 (0.602)	0.059 (0.637)	-0.099 (0.695)	
watercap	-0.006 (0.017)	-0.009 (0.016)	-0.005 (0.018)	0.000 (0.017)	-0.007 (0.019)
watercap_inter	-0.092* (0.056)	-0.083 (0.054)	-0.091 (0.055)	-0.097* (0.051)	-0.085* (0.052)
debt	0.636 (2.329)	0.826 (2.257)	0.708 (2.271)	0.422 (2.345)	
debt_inter	-0.272 (2.593)	-1.099 (2.929)	-0.389 (2.593)	-0.033 (2.633)	
election	-6.865*** (1.125)		-6.851*** (1.133)	-6.417*** (1.048)	-6.841*** (1.093)
electioninter	4.500*** (1.660)		4.479*** (1.652)	3.191** (1.508)	4.261** (1.668)
electioncycle		0.982*** (0.305)			
electioncycleinter		-0.958** (0.486)			
majority	7.013** (3.416)		6.815** (3.416)	5.692 (3.960)	6.623** (3.370)
majorityinter	-8.545** (4.187)		-8.875** (4.178)	-8.368* (4.695)	-8.191** (3.824)
majoritydiff		0.728*** (0.258)			
majoritydiffinter		-0.857*** (0.271)			
partisan	-20.113** (9.933)		-21.016** (9.954)	-11.709*** (4.529)	-19.374** (8.921)
partisan_inter	20.142** (9.647)		20.977** (9.650)	15.495** (6.666)	18.788** (9.053)
partisan_strength		-0.616** (0.269)			
partisan_strengthinter		0.722** (0.287)			
h_mills			-0.513 (2.652)		
h_sel			4.082 (2.874)		
<i>N</i>	931	931	931	931	872
<i>r</i> ²	0.743	0.741	0.741	0.744	0.704

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Effect of *governance* for different scenarios

	election year	non-election year	100% source water	No source water
majority partisan	3.7 (5.4)	-0.8 (5.5)	14.7 (7.8)	-7.2 (6.4)
majority non-partisan	-16.4 (10.1)	-20.9** (10.3)	-5.5 (10.9)	-27.4** (11.2)
non-majority partisan	12.3*** (4.2)	7.8* (4.1)	23.2*** (7.9)	1.3 (4.5)
non-majority non-partisan	-7.9 (9.7)	-12.4 (9.8)	3.1 (11.2)	-18.8 (10.3)

Cluster and heteroscedasticity robust standard errors in parentheses

Coefficients based on Fixed Effects Model