What happened to costs savings from privatization?

A meta-regression analysis for solid waste and water services

Germà Bel, Xavier Fageda and Mildred Warner [1]

Summary

Privatization of local government services was assumed to deliver cost savings due to competition and better alignment of managers' incentives under private ownership. However, empirical evidence from around the world does not show strong or systematic support for lower costs under private delivery. We conduct a meta-regression analysis of all econometric studies of water distribution and waste collection and find differences in study results are explained by differences in time period of analysis, service characteristics and policy environment. We do not find a genuine empirical effect of cost savings from privatization. More recent studies are less likely to find cost savings (suggesting any efficiency gains erode over time). Cost savings are more likely to be found in the solid waste sector where market and policy conditions encourage more competition. To ensure cost savings, more attention should be given to industrial organization and policy environment, rather than a debate over public vs private delivery.

Abstract

Privatization of local government services was assumed to deliver cost savings but empirical evidence from around the world is mixed. We conduct a meta-regression analysis of all econometric studies of water distribution and waste collection and find differences in study results are explained by differences in time period of analysis, service characteristics and policy environment. We do not find a genuine empirical effect of cost savings from privatization. To ensure cost savings, more attention should be given to industrial organization and policy environment, rather than a debate over public vs private delivery.

Key words: Meta-regression analysis, privatization, contracting-out, costs, local governments
JEL codes: L33, R51, H72, C25

[1] Germà Bel is Professor at Universitat de Barcelona and Guest Professor at Barcelona Graduate School of Economics. Departament de Política Econòmica, Avd. Diagonal 690, 08034 Barcelona, Spain, gbel@ub.edu.
Xavier Fageda is Assistant Professor at Universitat de Barcelona. Departament de Política Econòmica, Avd. Diagonal 690, 08034 Barcelona, Spain, xfageda@ub.edu.
Mildred Warner is Professor at Cornell University. Department of City and Regional Planning, 215 W. Sibley. Cornell University. Ithaca, NY 14853, USA; e-mail mew15@cornell.edu .

I. INTRODUCTION

One of the promises of privatization was that it would offer efficiency gains and lead to lower costs for public service delivery. After more than three decades of experimentation with contracting out local government services, however, the evidence on cost savings is mixed. Some studies find that private ownership implies lower costs, but other works do not find statistically significant differences between public and private ownership. Descriptive meta-analyses by Boyne (1998), Hirsch (1995) and Hodge (2000) find savings in some cases and not in others, and the weight of the evidence is not in support of cost savings under private service delivery. Most of the empirical econometric literature has focused on solid waste services and water distribution, the two local government services with the widest experience with contracting out. Recent descriptive meta analysis for these two services finds limited evidence for cost savings,– especially among the more recent studies (Bel and Warner 2008). What explains these mixed results?

In this paper we employ a statistical meta-regression analysis to determine what explains the variation in results across studies. Meta-regression analysis is a statistical technique that was introduced into the economic literature in the late eighties (Stanley and Jarrell 1989). This technique has been increasingly applied to examine a great array of issues, such as the effects of public subsidies on business research and development (García-Quevedo, 2004), the β convergence hypothesis (Abreu, de Groot and Florax, 2005), the efficiency of urban public transport (Brons, Nijkamp, Peels and Rietveld, 2005), the income elasticy of money demand (Knell and Stix, 2005), the effect of immigration on wages (Longhi, Nijkamp and Poot, 2005), the effect of common currency on international trade (Rose and Stanley, 2005), the natural rate hypothesis (Stanley, 2005a) or the international gender gap (Weicheselbaumer and Winter-Ebmer, 2005).

In our study, we conduct a meta-regression analysis for empirical studies that analyze local privatization and its impact on costs. We focus attention on empirical works that use multivariate methods and that refer to the two local services in which there has been the most experience: solid waste collection and water services. To date around thirty studies have been conducted in the U.S, the U.K. and around the world, which we include in our analysis. These include all the published papers we are aware of as well as recent working papers. By statistically analyzing characteristics of each regression model we are able to determine what explains differences in outcome and assess the weight of the evidence regarding cost savings under privatization.

Costs are a driving factor in the decision on service delivery form (Bel and Fageda, 2007). Our objective is to analyze whether privatization (private delivery)[2] is an effective service delivery alternative to save costs in solid waste and water distribution at the metropolitan scale. In section 2 we look at four theoretical perspectives that suggest a basis for cost savings under privatization: public choice, property rights, transaction costs and industrial organization. In section 3 we present a meta-regression analysis of study results. Section 4 presents a discussion of results given our theoretical concerns.

From our meta-regression analysis we find that cost savings under privatization are not supported. The reasons for this are several. Most of the expectations of cost savings come from the notion that competition increases pressures for efficiency and reduced costs. Water distribution is a service with high asset specificity and as such tends toward natural monopoly. Thus, competition is not expected. This may explain why we have seen less privatization in water. In solid waste collection, competition is more likely and privatization has become much more common. However, we have seen considerable concentration in the waste sector over the last twenty years (Bel and Costas, 2006; Davies, 2007; Dijkgraaf, and Gradus, 2008; Warner and Bel, 2008). Therefore, in neither service area is competition expected to persist over time.

Competition and managerial incentives were the primary theoretical reasons cited for expected cost savings. Our meta-regression analysis shows that these features are important, but so too is the policy framework and market structure of the service sector under study. A broader theoretical framing which encompasses all these features is needed to understand variation in costs under public or private delivery. We believe the more comprehensive theoretical approach of industrial organization theory, which focuses both on actors and incentives as well as market and regulatory structure, is most useful in understanding why privatization has not delivered sustained cost savings.

II. THEORETICAL BACKGROUND

We present four theoretical perspectives that could provide a basis for cost savings under privatization. Public choice and property rights theories look at incentives to managers and the role of competition (Niskanen, 1971), or providing stronger incentives for cost reduction under private property (Shleifer, 1998). Transaction costs and industrial organization theories look more at the

[2] Privatization or contracting out separates the provision decision (which remains public) from the production or actual delivery of the service (which can be contracted out or privatized). Pure privatization of municipal services, or service shedding, is rare. All studies in our sample look at cost differences between public production and private production (via a contract or concession agreement). In both cases, government retains responsibility for service delivery.

nature of the service and structure of the market noting the importance of the costs of contracting and monitoring (Williamson, 1999), or the importance of economies of scale (Donahue, 1989).

1. Public Choice

Public Choice theory gives primary emphasis to actors' motivations based upon the view that politicians and bureaucrats would seek to maximize their personal utility and interests (Niskanen, 1971). Public service monopolies would oversupply public services at higher costs as politicians and bureaucrats seek to extract material rents and political power (Savas, 1987).

Public Choice proposes to replace public monopoly with competition to restrict excessive supply and lower costs. This can be achieved by competitive contracting with external producers, or by promoting competition between governmental units (Tiebout, 1956; Osborne and Gaebler, 1992). Public choice is a theory of non-market failure and provides a strong rationale to expect cost savings under privatization – if competition is present. However, public services are at best quasi-markets with a limited number of alternative private suppliers (Lowery, 1998; Sclar, 2000). Government must play a role in creating competition in public service markets and ensuring careful monitoring to ensure cost savings (Warner and Hebdon, 2001; Warner and Hefetz, 2008).

2. Transaction costs

The transaction costs approach takes the choice to 'make' or 'buy' within a private firm framework and applies it to public service delivery. Production will occur inside the firm (or government bureaucracy) when market transactions incur higher costs (Ronald Coase, 1937). Transactions have three basic dimensions: 1) Uncertainty on how the transaction develops and its results; 2) The frequency with which transactions are repeated; 3) The relative requirement of long-term investments specifically related to the transaction, or sunk costs (Williamson, 1999). Because of these factors, the institutional organization required to specify and monitor contracts can be very complex.

Theoretical analysis of privatization and contracting out uses the concept of transaction costs in an open sense, which includes administrative costs as well as costs from incomplete contracts. The main factor explaining the choice between public and private production is the transaction costs derived from the delegation of authority (Sappington and Stiglitz, 1987). Monitoring and control play a central role, and cost minimization refers to both production costs and the transaction costs of contracting. Cost savings are likely when transaction costs are low. Cost savings expectations from this view are dependent on the nature of the service and local market conditions.

While some authors downplay contracting costs and argue the costs of bureaucracy are higher (Eggers and O'Leary, 1995; Osborne and Plastrick, 1997; Savas, 1987), others find transaction costs to be significant factors in explaining decisions to privatize or reinternalize production (Nelson, 1997; Sclar, 2000; Levin and Tadelis, 2008; Hefetz and Warner, 2007; Bel and Fageda, 2008).

3. Property rights

Property rights theory argues that asset ownership gives the owner control and bargaining power in situations in which the contractor can not perfectly foresee the evolution of the activity (Grossman and Hart, 1986; Hart and Moore, 1990). Ownership is an important factor, because it confers the right to obtain benefits, such as profits, from innovation and efficiency gains.

Hart, Shleifer and Vishny (1997) apply the theory of incomplete contracts and property rights to the choice between public or private production of public services. Under private production incentives exist to reduce costs, but this can occur at the expense of service quality. To ensure quality under privatization requires increased oversight, which can blur the line between public and private ownership (Bozeman 1987; Guttman, 2000). As the difference between public and private ownership disappears the potential for cost savings from private ownership may disappear as well.

4. Industrial organization

Industrial organization focuses on the relationship between incentives and ownership as it affects principals and agents. Differences in the ability to align managerial actions with ownership objectives are the rationale for differences in efficiency between private and public ownership.

Private ownership will be strongly preferred to public ownership when owners benefit from devoting time and money to get the information needed for supervision, when firms can be taken over, and when firms have a risk of bankruptcy (Vickers and Yarrow, 1988). These factors are more common in markets with some degree of competition and not subject to strong regulation by government (Kay and Thompson, 1986; Vickers and Yarrow, 1988). Industrial organization gives primary attention to the design of contracts and properly specified bidding conditions that stimulate dynamic competition and, thus, reduce the likelihood of monopolization (Laffont and Tirole, 1993; Bolton and Dewatripont, 2005)

5. Theoretical Expectations

The empirical studies we analyze draw from these four theoretical basis. Theoretically, we might expect cost savings in both water and waste if competition were present. For waste collection, property rights theory suggests private production could be cheaper due to incentives to invest in new technologies for cost reduction. Public choice theory would emphasize the benefits of

competition in reducing costs. Industrial organization theory would emphasize economies of scale and industry structure. Although complete contracts are more likely in waste collection, transaction costs may still be high. There is the possibility of cost savings under privatization from each of these theoretical perspectives, but the mixed empirical evidence reflects the importance of limited competition and technological process improvement, and the critical importance of market structure.

For water distribution, the theoretical predictions are less optimistic. Property rights would expect cost savings but these might come at the expense of service quality. Competition is harder to realize due to the fixed network infrastructure on which water delivery depends. Industrial organization would emphasize that sunk costs would prevent competitive discipline for private providers. Transaction cost would predict problems due to incomplete contracts. Thus, the theoretical basis for cost savings under private production is even weaker for water distribution.

III. THE EMPIRICAL STRATEGY

The main objective of a meta-regression analysis is to provide a statistical explanation of differences in the reported results of the empirical literature concerning a particular topic (Stanley and Jarrell, 1989). Our goal here is to explain variation in the results obtained in the empirical studies about the impact of local privatization on costs. Additionally, our meta-regression will allow us to obtain some evidence of the genuine empirical effect in the relationship between privatization and costs. From here we will be able to examine predictions of theories reviewed in the previous section.

1. The sample of studies

As far as we know, the sample used here includes all studies, both published and unpublished, that use multivariate regression techniques to examine cost effects of privatizing the delivery of local solid waste collection or water distribution services. In particular, our meta-regression includes articles that have been published in academic journals in the fields of Economics, Political Science, and Public Policy and Public Administration. Additionally, it includes some recent unpublished manuscripts presented in International Academic Meetings specialized in public policy and particularly in local government reform or edited in relevant Working Paper Series (such as Social Science Research Network –SSRN).

All of the studies in our sample are concerned with publicly provided services that are produced either by municipalities (public production) or via government contracts with private firms (private production). All the studies considered in our empirical analysis use total or average costs of producing the service as the dependent variable, and production at the local level as the unit of

analysis. Our explanatory variable of interest concerning costs is the form of service delivery (i.e, public or private production).

Individual studies may provide several observations, if they contain several estimations containing different data sets or different explanatory variables. Table 1 provides a list of studies used in our analysis and key differentiating characteristics. Studies included in our analysis use local municipality data, have a cost variable for which we can use the T-statistic in our meta-regression, and involve cross sectional data in a linear regression, log linear regression, two stage estimation or maximum likelihood analysis. We could not include studies that do not use an explicit cost variable. Bel and Warner (2008) provide a recent narrative review of the empirical literature about privatization and costs. Some of the papers examined there could not be included in the meta-regression because they follow different estimation procedures than the studies of our sample.[3]

Insert Table 1 about here

2. The meta-regression equation

The linear equation to estimate is as follows:

$$T = \alpha + \beta_1 Sample\_size + \beta_2 Year + \beta_3 Functional\_form + \beta_4 Service + \beta_5 US + + \beta_6 UK + \varepsilon \quad (1)$$

where the dependent variable measures cost differences under public and private ownership. The dependent variable is the t-statistic *(T)* of the dummy variable for private ownership in the corresponding cost equation estimated.

Some studies find cost savings under privatization so the t-statistics associated to the variable that measures the relationship between costs and private production takes a takes a negative value. However, other works obtain the opposite result: public ownership implies lower costs and so the corresponding t-statistics is positive. To make the interpretation of results for the explanatory variables easier, we normalize the t-statistic using the following rule. We subtract the value of 2.0 from all t-statistics obtained across studies. This value refers to the highest positive t-statistic obtained in any study in our sample (Kirkpatrick, Parker and Zhang, 2006). With the normalization rule, the t-statistics for the latter study is zero being this the maximum value of all normalized t-

[3] The works of Ashton (2000a, 2000b) and Saal and Parker (2000, 2001) are excluded since they examine cost determinants using time series data at the national level. Several studies estimate a production function to obtain productivity or efficiency indicators, so their dependent variable is not homogeneous with our cost variable target. These works are Feigenbaum and Teeples (1983), Fox and Hofler (1986), Teeples and Glyer (1987), Lyink (1993), Bhattarcharyya et al. (1994, 1995), and Jones and Mygind (2000). Finally, we must exclude from the meta-regression analysis Szymanski's (1996) study in the UK as he jointly considers the effects on costs of public and private ownership and the use (or not) of a competitive tendering process.

statistics. The rest of normalized t-statistics takes a negative value. Table 2 provides descriptive statistics of the study characteristics in our meta-regression analysis.

Insert table 2 about here

The explanatory variables of the meta-regression equation, usually called moderator variables, concern particular characteristics of the empirical studies. Given our normalization rule, a negative sign in the coefficient of an explanatory variable of the equation means that a higher value of that variable increases the likelihood of finding cost savings from privatization. A positive sign means that a higher value of that variable makes cost savings less likely.

A typical moderator variable used in meta-regression analysis is the number of observations in each estimation of each study, *Sample_size*, as studies with larger numbers of observations are considered more robust. Indeed, the reported effects are expected to be closer to the true effect when the sample is larger. Thus, the statistical significance of the variable for sample size allows us to test to what extent the hypothesis of cost savings under privatization is true. If the sample size variable is negative and significant then we have some evidence of lower costs under private production. Given that one of the contributions of the meta-regression may be to find evidence about the genuine empirical effect of the relationship between privatization and costs, we conduct some tests to obtain further insights about this issue.

Note that the quality of data used in cross sectional analysis may not be as high as in longitudinal analysis. However, very few longitudinal studies examine the effects of privatization on costs and only two studies in our meta-regression analysis (Domberger, Meadowcroft and Thompson, 1986; Dijkgraaf and Gradus, 2007).

Another moderator variable typically used in meta-regression analysis is the year in which data were collected, *Year*. We are interested in examining whether differences between public and private ownership have followed a systematic time trend. If differences in costs between public and private production erode over time, then the year variable will be positive. This could reflect rising costs among private producers (Ohlsson, 2003), the potential for collusion (Dijkgraaf and Gradus, 2007), or efficiency gains under public production (Bel and Costas, 2006).

We also account for the role of the functional form in explaining variation in the reported results across studies by using a dummy variable, *Functional_form,* that takes the value one when the linear form is used, and zero in other cases (usually the double-log form). This is another typical moderator variable used in meta-regression analyses. However, we do not expect substantial differences in results obtained in our sample of studies due to the choice of the functional form. That choice could

influence on the estimated magnitude of the impact of privatization on costs but not necessarily on its statistical significance.

Our data set contains studies of both solid waste collection and water distribution, so we include a dummy variable that takes the value one when the service analyzed is solid waste collection, and zero when the service is water distribution. These services have different cost structures. Fixed assets are required for producing both services, but water distribution has network features that are associated with a high level of sunk (and specific) investments. Hence, transaction costs of privatizing the service should be higher for water distribution. Additionally scale economies (related to output) affect solid waste collection, while density economies (related to population density) are critical for water distribution. Note that aggregating studies for solid waste collection and water distribution could imply some estimation bias as the estimations refer to two different services. To account for that we also estimate equation (1) for the sub-sample of studies that analyze solid waste collection. Eighty percent of the studies cover solid waste.[4]

We also include moderator variables for the geographical area analyzed. We include two dummy variables that take the value one when the study refers to United States (*US*) or the United Kingdom (*UK*), respectively. These are the two countries that account for the highest number of observations in our sample of studies, and they are the countries where these reforms in local public services have been most widely tested. Note that both countries are usually characterized by having a competitive market framework (in comparison to other countries) in the delivery of local services.

3. Results

Table 2 shows descriptive statistics for the variables included in the meta-regression equation. The mean t-statistic (before normalization) is negative which shows that private production typically implies lower costs than public production but we see great dispersion in the value of the t-statistic. Hence, cost differences between public and private production may not be statistically significant. Our sample of studies covers estimations made for the period that goes from 1960 to 2005.[5] Table 3 shows the results from the estimation of the first meta-regression equation for all studies and table 4 presents results for the second estimation using only studies that focus on solid waste.

Insert table 3 about here

Insert table 4 about here

[4] We do not have enough data to estimate equation (1) for the sub-sample of studies that analyze water.

[5] When a study uses a data set with a cross-section and time-series form, we compute the first year of the period for the moderator variable, *year*. Dijkgraaf and Gradus (2007) use data collected between 1998 and 2005, so 1998 is the year computed in our analysis. This is why the maximum value for *year* is not 2005.

Importantly, the coefficient of the variable for *Sample Size* is negative but not statistically significant. This means that larger sample studies are not more likely to find cost savings from privatization. Thus, we conclude there is no statistical support for an empirical effect of privatization on costs. This is true for studies that analyze solid waste collection and water distribution, and for studies that just analyze solid waste collection. In the next sub-section, we implement several tests that confirm this result.

The coefficient for the variable *Year* has a positive sign and is statistically significant. This means more recent studies are less likely to find cost differences between public and private production. This is true for studies that analyze solid waste collection and water distribution, and for studies that just analyze solid waste collection. This could be explained by rising costs of private producers as they capture the market, or improved public sector efficiency. Empirical studies suggest both explanations are true, and we believe the time trend reflects a learning process among public managers over time.

The functional form does not explain variation in study results, while the coefficient of the dummy variable for services is negative and significant. This latter result shows that cost savings of privatization are higher for solid waste collection than for water distribution. We believe this can be explained by differences in transaction costs. Privatizing water distribution involves higher transaction costs for local governments, whereas privatizing the delivery of solid waste collection may allow for exploitation of scale economies.

Our geographic variable shows the US studies are less likely to find differences between public and private production in both meta-regression estimations. This is also the case for UK studies in the meta-regression on solid waste collection. Both countries have given considerable emphasis to improvement in public management including promoting competition. These reforms include competitive bidding, contracting, benchmarking and other forms of internal process improvement. These results suggest it is the policy environment encouraging innovation, rather than privatization, that matters in explaining cost differences. There is strong support for competitive markets in the US, and the UK local governments operated under compulsory competitive tendering from 1988-1998. And yet, these two countries are less likely to find cost savings under private production.

4.Meta-regression tests

Publication bias is an important limitation of meta-regression analysis as papers are more likely to be published when significant relationships between the variables of interest are found (Stanley 2005b; 2008).

Stanley (2005b, 2008) indicates that funnel asymmetry tests (FAT) may be appropriate to examine publication bias in a meta-regression. Those tests are based on the estimation between a study's reported effect and its standard errors. Hence, we must estimate the following equation:

$$T_i = \beta_0 + \beta_1(1/SE_i) + \varepsilon_i \quad , \tag{2}$$

where T is a study's reported t-statistic and $1/SE$ is the inverse of the standard error. Stanley (2005b, 2008) suggests that the statistical significance of the intercept in equation (2), β_0, is a test for publication bias and that its sign indicates the direction of this bias. Evidence of publication bias will be found when $\beta_0 \neq 0$. The independent variable, $1/SE$, may have some measurement errors that condition the econometric estimates. Hence, the square root of sample size is used as instrument for the inverse of the standard error. Sample size is not subject to estimation error and standard errors and sample size are highly correlated.

Additionally, the statistical significance of β_1 in equation (2) provides an estimate of the genuine empirical effect. In this regard, the relationship between a study's t-student and its degrees of freedom using the logarithmic form can also serve as a meta-significance test (MST) to identify a genuine empirical effect (Stanley 2005b, 2008). Thus, we should estimate the following equation:

$$\log(|T|_i) = \alpha_0 + \alpha_1 \log(df) + \varepsilon_i \quad , \tag{3}$$

where $|T|$ is a study's reported t-statistic (in absolute values) and df is the corresponding degrees of freedom. In the case where $\alpha_1 = 0$ in equation (3), we have evidence that the genuine empirical effect is zero so the relationship between privatization and costs is not strong.

Table 5 shows results of funnel asymmetry tests (FAT) using both the inverse of standard errors and the square roots of the sample size as independent variables, and results of the meta-significance test (MST).

Insert table 5 about here

We do not find evidence of a genuine empirical effect in the relationship between privatization and costs since our estimates shows that β_1 in equation (2) and α_1 in equation (3) both equal zero. Hence, our meta-regression provides some empirical evidence that privatization does not imply cost savings in the delivery of local services.

In addition, we do not find clear evidence of publication bias since our FAT (1) test shows that β_0 in equation (2) is statistically different from zero when using the inverse of the standard error as independent variable but it is not significant when using the square root of the sample size (FAT (2)). In any case, publication bias may be filtered by estimating a multivariate FAT-meta-regression model.

Thus, equation (1) may be re-estimated including the inverse of standard errors or the square root of sample size instead of sample size as independent variable. This allows us to test whether publication bias distorts our results in relation to the other study characteristics we use to explain variation in results. Table 6 shows the results of these estimates. Our previous results in relation to the moderator variables in equation (1) are confirmed with the only exception being the dummy variable of UK in the solid waste regression. This variable is no longer significant. However, this does not change the policy implications that can be inferred from our meta-regression.

Insert table 6 about here

IV. CONCLUSION

The advantage of a meta-regression analysis is that it allows us to determine overall impacts across a wide range of studies. Previous narrative meta-analyses have shown the evidence is mixed (Boyne 1998, Hirsch 1995, Hodge 2000, Bel and Warner 2008). Our meta-regression analysis allows us to determine which variables explain differences across studies.

Although the mean T-statistic is negative, implying cost savings from privatization on average, this result does not hold up in the meta-regression analysis once we control for sample size. One should be cautious of evidence based on studies with small sample sizes. We also see a clear time trend with cost differences eroding over time. This suggests both reduced savings from private production and increased efficiency on the part of public producers. Cost savings are more likely in solid waste than water as we expected given the lack of competition and higher asset specificity of water services.

What do these results suggest for theory? First, competition matters as implied by public choice theory. However, we see that competition erodes in public service markets and that public managers themselves have incentives for process improvement. So the primary benefits from competition may be the efficiency improvements they generate among public providers due to pressure and benchmarking from potential private competition.

Second, transaction costs are important. We see this clearly in the higher likelihood of savings under solid waste than water. Many public services are natural monopolies with high asset specificity, like water, and contracting out in these cases will not yield cost savings.

Third, our results show ownership does not matter. Lower costs are defined more by time, service characteristics, managerial learning and policy environment. The debate needs to move beyond a discussion of the relative merits of public or private ownership and instead focus on the characteristics of the service (potential for technological improvement, sunk costs), characteristics of

the contract (specification and monitoring, transaction costs), characteristics of the market (competition), and the managerial and policy environment. This brings us to an industrial organization approach which emphasizes the cost structure of an industry sector, role of innovation and propensity for concentration.

Public choice theory, property rights and transaction costs all contribute to our understanding but each only captures one aspect of the costs and service delivery equation. Competition, ownership and transactions costs are important, but what our meta-regression clearly shows is that all operate together and are influenced by broader market structure and policy factors. An industrial organization approach gives explicit attention to the importance of market structure, actors and incentives, and these features are shaped in large measure by the policy environment.

Our meta-regression has shown that even where competition was more likely (US and UK), privatization has not delivered cost savings. Under contracting, pressures for market concentration overwhelm any cost savings from private competition or process efficiency gains.

Across the world, econometric analysis of local government experience with privatization has shown that cost savings are ephemeral. The key to cost savings in public service delivery lies in managerial learning and innovation. How such managerial innovation is encouraged involves more than a simple focus on competition and substitution of private for public ownership. The debate must move beyond the simple dichotomy of public vs private delivery and look instead at the policy environment, market characteristics and managerial incentives that spur innovation and efficiency.

References

Abreu, Maria, de Groot, Henri L. F. and Florax, Raymond J. G. M. (2005). A Meta-Analysis of β-Convergence: the Legendary 2%, *Journal of Economic Surveys*.19: 389-420

Ashton, John K. (2000a). Cost efficiency in the UK water and sewerage industry. *Applied Economics Letters*. 7: 455-58.

Ashton, John K. (2000b). Total factor productivity growth and technical change in the water and sewerage industry, *Service Industries Journal*. 20: 121-30.

Bel, Germà, and Antón Costas (2006). Do public sector reforms get rusty? Local privatization in Spain. *Journal of Policy Reform*. 9: 1-24.

Bel, Germà, and Xavier Fageda (2007). Why do local governments privatize public services? A survey of empirical studies, *Local Government Studies*. 33: 517-534.

Bel, Germà, and Xavier Fageda (2008). Reforming the local public sector: Economics and politics in privatization of water and solid waste, *Journal of Economic Policy Reform*. 11: 45-65.

Bel, Germà, and Mildred Warner (2008). Does privatization of solid waste and water services reduce costs? A review of empirical studies, *Resources, Conservation and Recycling*, forthcoming.

Bhattacharyya, Arunava, Thomas R. Harris, Rangesan Narayanan, and Kambiez Raffie (1995). Specification and estimation of the effect of ownership on the economic efficiency of water utilities, *Regional Science and Urban Economics*. 25: 759-84.

Bhattacharyya, Arunava, Elliott Parker, and Kambiz Raffie (1994). An examination of the effect of ownership on the relative efficiency of public and private water utilities, *Land Economics*. 70: 197-209.

Bolton, Patrick, and Mathias Dewatripont (2005). *Contract theory*. Cambridge, MA: MIT Press

Boyne, George A. (1998). Bureaucratic theory meets reality: Public choice and service contracting in US local government, *Public Administration Review*. 58: 474-84.

Bozeman, Barry (1987). *All Organizations Are Public: Bridging Public And Private Organizational Theories*. San Francisco, CA: Jossey Bass

Brons, Martijn, Nijkamp, Peter, Pels, Eric and Rietveld, Piet (2005). Efficiency of urban public transit: A meta-analysis. *Transportation*. 32: 1-21

Brown, Trevor L., and Matthew Potoski (2003). Transaction Costs and Institutional Explanations for Government Service Production Decisions, *Journal of Public Administration Research and Theory*. 13: 441-68.

Bruggink, Thomas H. (1982). Public versus regulated private enterprise in the municipal water industry: A comparison of operating costs, *Quarterly Review of Economics and Business*. 22: 111-25.

Byrnes, Patricia (1991). Estimation of cost frontiers in the presence of selectivity bias: Ownership and efficiency of water utilities, *Advances in Econometrics*. 9: 121-37.

Byrnes, Patricia, Shawna Grosskopf, and Kathy Hayes (1986). Efficiency and ownership: Further evidence, *Review of Economics and Statistic*. 68: 337-41.

Callan Scott J., and Janet M. Thomas (2001). Economies of scale and scope: A cost analysis of municipal solid waste services, *Land Economics*. 77: 548-60.

Coase, Ronald H. (1937). The nature of the firm. *Economica*. 4: 386-405.

Collins, John N., and Bryan T. Downes (1977). The effect of size on provision of public services: The case of solid waste collection in smaller cities, *Urban Affairs Quarterly*. 12: 333-47.

Crain, W. Mark, and Ashgar Zardkoohi (1978). A test of the property-rights theory of the firm: Water utilities in the United States, *Journal of Law and Economics*. 21: 395-408.

Davies, Steve (2007). Politics and Markets: The Case of UK Municipal Waste Management. (Paper presented at the 2007 APPAM Fall Conference, Washington DC, USA).

Dijkgraaf, Elbert, and R.H.J.M. Gradus (2003). Cost savings of contracting out refuse collection. *Empirica*. 30: 149-61.

---. (2007). Collusion in the Dutch waste collection market, *Local Government Studies*. 33: 573-88.

---. (2008). Institutional developments in the Dutch waste collection market, *Government & Policy*. 26: 110-126.

Domberger, Simon, Shirley A. Meadowcroft, and David J. Thompson (1986). Competitive tendering and efficiency: The case of refuse collection, *Fiscal Studies*. 7: 69-87.

Donahue, John D. (1989). *The privatization decision. Public ends, private means*. New York, NY: Basic Books.

Dubin, Jeffrey A., and Peter Navarro (1988). How markets for impure public goods organize: the case of household refuse collection, *Journal of Law, Economics & Organization*. 4: 217- 41.

Eggers, William D., and John O'Leary (1995). *Revolution at the Roots: Making Our Government Smaller, Better, and Closer to Home*. New York, NY: The Free Press.

Estache, Antonio, and Martin A. Rossi. (2002). How different is the efficiency of public and private water companies in Asia?, *World Bank Economic Review*. 16: 139-48.

Feigenbaum, Susan, and Ronald Teeples (1983). Public versus private water delivery: A hedonic cost approach, *Review of Economics and Statistics*. 65: 672-78.

Fox, William F., and Richard A. Hofler (1986). Using homothetic composed error frontiers to measure water utility efficiency, *Southern Economic Journal*. 53: 461-77.

García-Quevedo, José (2004). Do public subsidies complement business R&D?: A meta-analysis of the econometric evidence. *Kyklos*. 57: 87-102

Grossman, Sanford J., and Oliver D. Hart (1986). The costs and benefits of ownership: A theory of vertical and lateral integration, *Journal of Political Economy*. 94: 691-719.

Guttman, Dan (2000). Public Purpose and Private Service: The Twentieth Century Culture of Contacting out and the Evolving Law of Diffused Sovereignty, *Administrative Law Review*. 52: 859-926.

Hart, Oliver D., and John Moore (1990). Property rights and the nature of the firm, *Journal of Political Economy*. 98: 1119-58.

Hart Oliver D., Andrei Shleifer, and Robert W. Vishny (1997). The Proper scope of government: Theory and an application to prisons, *Quarterly Journal of Economics*. 112: 1127-61.

Hefetz, Amir and Mildred E. Warner (2004), Privatization and Its Reverse: Explaining the Dynamics of the Government Contracting Process, *Journal of Public Administration, Research and Theory*. 14: 171-190.

Hefetz, Amir and Mildred E. Warner (2007), Beyond the Market vs. Planning Dichotomy: Understanding Privatisation and its Reverse in US Cities, *Local Government Studies*. 33: 555-572.

Hirsch, Werner Z. (1965). Cost functions of an urban government service: refuse collection, *Review of Economics and Statistics*. 47: 87-92.

---. (1995). Contracting out by urban governments: A review, *Urban Affairs Review*. 30. 458-72.

Hodge, Graeme (2000). *Privatization. An International Review of Performance. Boulder*, CO: Westview Press.

ICMA (2004). Pragmatism over Politics: Alternative Service Delivery in Local Government, 1992-2002. 8-16 in *The Municipal Year Book 2004*. Washington, DC: International City County Management Association.

Jones, Derek C., and Niels Mygind (2000). The effects of privatization on productive efficiency: Evidence from the Baltic republics, *Annals of Public and Cooperative Economics*. 71: 415–39.

Kay, John A., and David J. Thompson (1986). Privatisation: A policy in search of a rationale, *Economic Journal*. 96: 18-32.

Kemper, Peter, and John Quigley (1976), The Economics of Refuse Collection. Cambridge, MA: Ballinger.

Kirkpatrick, Colin, David Parker, and Yin-Fang Zhang (2006). State versus Private Sector Provision of Water Services in Africa, *World Bank Economic Review*. 20: 143-63.

Kitchen, Harry M. (1976). A statistical estimation of an operating cost function for municipal refuse collection, *Public Finance Quarterly*. 4: 56-76.

Knell, Markus and Stix, Helmut (2005). The Income Elasticity of Money Demand: A Meta-Analysis of Empirical Results. *Journal of Economic Surveys*.19: 513-533

Kodrzycki, Yolanda K. (1994). Privatization of Local Public Services: Lessons for New England. *New England Economic Review*. (May/June 1994): 31-46.

Laffont, Jean-Jacques, and Jean Tirole (1993). *A theory of incentives in procurement and regulation*. Cambridge (MA): MIT Press.

Levin, Jonathan, and Steven Tadelis (2008). Contracting for government services: theory and evidence from U.S. cities, *Journal of Industrial Economics,* forthcoming.

Longhi, Simonetta, Nijkamp, Peter and Poot, Jacques (2005). A Meta-Analytic Assessment of the Effect of Immigration on Wages. *Journal of Economic Surveys*.19:451-477.

Lowery, David. (1998). Consumer sovereignty and quasi-market failure, *Journal of Public Administration Research and Theory*. 8: 137-72.

Mann, Patrick C., and John L. Mikesell (1976). Ownership and Water System Operation, *Water Resources Bulletin*. 12: 995-1004.

Moore, Adrian T. (2004). Don't Believe the Hype: Successful Water Privatization is the Norm, *Privatization Watch*. 28: 6-13.

Morgan, W. Douglas (1977). Investor owned vs. publicly owned water agencies: An evaluation of the property rights theory of the firm, *Water Resources Bulletin.* 13: 775-81.

Mur, Melania (2008). *Contratación externa de servicios locales en Aragón: Residuos sólidos y distribución de agua.* Unpublished doctoral thesis, Universidad de Zaragoza

Niskanen, William A. (1971). Bureaucracy and representative government. Chicago, Il: Aldine.

Nelson, Michael A. (1997). Municipal Government Approaches to Service Delivery: An Analysis from a Transactions Cost Perspective, *Economic Inquiry*. 35: 82-96

Ohlsson, Henry (2003). Ownership and production costs: Choosing between public production and contracting-out in the case of Swedish refuse collection, *Fiscal Studies*. 24: 451-76.

Osborne, David, and Ted Gaebler (1992). *Reinventing Government: How the Entrepreneurial Spirit is Transforming Government*. Reading, MA: Addison-Wesley.

Osborne, David, and Peter Plastrick (1997). *Banishing Bureaucracy*. Reading, MA: Addison-Wesley.

Pier, William J., Robert B. Vernon, and John H. Wicks (1974). An empirical comparison of government and private production efficiency, *National Tax Journal.* 27: 653-56.

Pommerehne, Werner W., and Bruno Frey (1977). Public versus private production efficiency in Switzerland: A theoretical and empirical comparison, *Urban Affairs Annual Review*. 12: 221-41.

Raffie, Kambiz, Rangesan Narayanan, Thomas R. Harris, David Lambert and John M. Collins (1993). Cost analysis of water utilities: A goodness-of-fit approach, *Atlantic Economic Journal.* 21: 18-29.

Reeves, Eoin, and Michael Barrow (2000). The impact of contracting-out on the costs of refuse collection services. The case of Ireland, *Economic and Social Review*. 31: 129-50.

Rose, Andrew K. and Stanley, Tom. D. (2005). A Meta-Analysis of the Effect of Common Currencies on International Trade. *Journal of Economic Surveys* .19: 347-365.

Saal, David S., and David Parker (2000). The impact of privatization and regulation on the water and sewerage industry in England and Wales: A translog cost function model, *Managerial and Decision Economics*. 21: 253-68.

---. (2001). Productivity and price performance in the privatized water and sewerage companies of England and Wales, *Journal of Regulatory Economics*. 20: 61-90.

Sappington, David E. M., and Joseph E. Stiglitz (1987). Privatization, information and incentives, *Journal of Policy Analysis and Management*. 6: 567-82.

Savas, Emanuel, S. (1987). *Privatization. The Key to Better Government.* Chatham, NJ: Chatham House.

Sclar, Elliot (2000). *You don't always get what you pay for. The economics of privatization*. Ithaca, NY: Cornell University Press.

Shleifer, Andrei (1998). State versus private ownership, *Journal of Economic Perspectives*. 12: 133-50.

Stanley, T. D. (2005a). Integrating the empirical tests of the natural rate hypothesis: A meta-regression analysis. *Kyklos*, 58: 611-634

Stanley, Tom D. (2005b). Beyond publication bias, *Journal of Economic Surveys*. 19: 309-345.

Stanley, Tom D. (2008), Meta-regression methods for detecting and estimating empirical effects in the presence of publication selection. *Oxford Bulletin of Economics and statistics*, 70, 103-127

Stanley, Tom D., and Stephen B. Jarrell (1989). Meta-regression analysis: A quantitative method of literature surveys, *Journal of Economic Surveys*. 3: 161-167.

Stevens, Barbara J. (1978). Scale, market structure, and the cost of refuse collection, *Review of Economics and Statistics*. 60: 438-48.

Szymanski, Stefan (1996). The Impact of compulsory competitive tendering on refuse collection services, *Fiscal Studies*. 17: 1-19.

Szymanski, Stefan, and Sean Wilkins (1993). Cheap rubbish? Competitive tendering and contracting out in refuse collection, *Fiscal Studies*. 14: 109-30.

Teeples, Ronald, and David Glyer (1987). Cost of water delivery systems: Specifications and ownership effects, *Review of Economics and Statistics*. 69: 399-408.

Tickner Glen, and James C. McDavid (1986). Effects of scale and market structure on the costs of residential solid waste collection in Canadian cities, *Public Finance Quarterly*. 14: 371-93.

Tiebout, Charles (1956). A Pure Theory of Local Public Expenditures, *Journal of Political Economy*. 64: 416-24.

Vickers, John, and George Yarrow (1988). *Privatization: An economic analysis*. Cambridge, MA: MIT Press.

Wallsten, Scott, and Katrina Kosec (2008). The Effects of ownership and benchmark competition: An empirical analysis of U.S. water systems, *International Journal of Industrial Organization*. 26: 186-205.

Warner, Mildred E. and Germa Bel (2008). Competition or Monopoly? Comparing US and Spanish Privatization, *Public Administration: An International Quarterly*. forthcoming.

Warner, Mildred E. and Amir Hefetz (2002). Applying Market Solutions to Public Services: An Assessment of Efficiency, Equity and Voice, *Urban Affairs Review*. 38: 70-89.

Warner, Mildred E. and Amir Hefetz (2008). Managing Markets for Public Service: The Role of Mixed Public/Private Delivery of City Services, *Public Administration Review*. 68: 150-161.

Weichselbaumer, Doris and Winter-Ebmer, Rudolf (2005). A-Meta Analysis of the International Gender Wage Gap. *Journal of Economic Surveys*.19: 479-511.

Williamson. Oliver E. (1999). Public and Private Bureaucracies: A Transaction Cost Economics Perspective, *Journal of Law, Economics, & Organization*. 15: 306-42.

Table 1 Characteristics of Studies considered in Meta-Regression Analysis

Study	T-statistic (Cost savings from private production)	Sample size	Year (data collection)	Country	Regression method	Number estimations	Service
Hirsch (1965)	-0.8	24	1960	USA	Linear regression	1	Solid waste
Kitchen (1976)	-7.4	48	1970	Canada	Linear regression	1	Solid waste
Kemper & Quigley (1976)	-1.7/-10.7	15/57	1972-74	USA	Linear regression	4	Solid waste
Man & Mikesell (1976)	1.9	214	1976	USA	Linear regression	1	Water
Collins & Downes (1977)	1.5	53	1970	USA	Linear regression Step-wise estimation	1	Solid waste
Pommerehne & Frey (1977)	-2.8/-4.2	103	1970	Switzer.	Linear regression & Log-linear regression	2	Solid waste
Morgan (1977)	-2.3	143	1970	USA	Linear regression	1	Water
Stevens (1978)	-3.6/-4.3	55/112	1974	USA	Log-linear regression	4	Solid waste
Crain & Zardkoohi (1978)	-2.3	112	1970	USA	Log-linear regression	1	Water
Bruggink (1982)	1.6	86	1960	USA	Log-linear regression	1	Water
Tickner & McDavid (1986)	-3.6	132	1981	Canada	Log-linear regression	1	Solid waste
Domberger et al. (1986)	-5.9	610	1983-85	UK	Log-linear regression	1	Solid waste
Dubin & Navarro (1988)	-0.5	261	1974	USA	Linear regression (control selectivity bias)	1	Solid waste
Byrnes (1991)	0.6	154	1976	USA	Log-linear regression Two stages (correcting for selectivity bias)	1	Water
Szymanski & Wilkins (1993)	-1.7/-14.0	165/335	1984-88	UK	Log-linear regression Two stage estimation	5	Solid waste
Raffie et al. (1993)	-2.9	271	1989	USA	Log-linear regression	1	Water
Reeves & Barrow (2000)	-4.6/-7.3	48/144	1993-1995	Ireland	Log-linear regression Panel estimation	4	Solid waste
Callan & Thomas (2001)	1.4/0.96	110	1997	USA	Linear regression	2	Solid waste
Estache & Rossi (2002)	0.0	50	1995	Asia & Pacific	Log-linear regression OLS, OLS corrected & maximum likelihood	1	Water
Dijkgraaf & Gradus (2003)	-2.2	85	1996-97	Holland	Log-linear regression	1	Solid waste
Ohlsson (2003)	1.4	115	1989	Sweden	Log-linear regression	1	Solid waste
Bel & Costas (2006)	0.7/-2.4	39/186	2000	Spain	Log-linear regression	5	Solid waste
Kirpatrick et al (2006)	2.0	76	2000	Africa	Log-linear regression, maximum likelihood	1	Water
Dijkgraaf & Gradus (2007)	-2.3	491	1998-2005	Holland	Log-linear regression	1	Solid waste
Mur (2008)	-0.6	56	2003	Spain	Log-linear regression	1	Solid waste

Table 2: Summary statistics

Continuous Variables	Mean	Standard Deviation	Minimum Value	Maximum Value
T-statistic (not normalized)	-1.73	2.57	-10.69	2
T-statistic (normalized)	-3.73	2.56	-12.69	0
Sample_size	140	125.70	15	610
Year	1983	12.47	1960	2003
Discrete variables	**Number of observations (total = 44)**			
	Variable =1		**Variable =0**	
Functional_form (1 =linear, 0=other)	15		29	
Service (1=Solid waste, 0=water)	36		8	
USA	24		20	
UK	9		35	
Other countries	11		33	

Table 3: Meta-regression estimates (OLS)

Moderator variables	Dependent variable: Cost differences between public and private production (t-statistic normalized)
Sample_size	-0.0038 (0.0034)
Year	0.10 (0.03)***
Functional_form	-0.18 (1.01)
Service	-2.02 (0.92)**
USA	1.79 (0.94)*
UK	1.63 (1.03)
Intercept	-206.17 (69.47)***
R^2	0.24
F (joint sig.)	2.96**
N	44

Note 1: Standard errors in parentheses (robust to heteroskedasticity)
Note 2: Significance at the 1% (***), 5% (**), 10% (*)

Table 4: Meta-regression estimates for solid waste collection(OLS)

Moderator variables	Dependent variable: Cost differences between public and private production (t-statistic normalized)
Sample_size	-0.002 (0.003)
Year	0.13 (0.03)***
Functional_form	0.47 (1.09)
USA	2.23 (0.97)**
UK	1.72 (1.01)*
Intercept	-271.96 (59.96)***
R^2	0.23
F (joint sig.)	4.08***
N	36

Note 1: Standard errors in parentheses (robust to heteroskedasticity)
Note 2: Significance at the 1% (***), 5% (**), 10% (*)

Table 5: Meta-regression tests (OLS)

	FAT (1) Dep variable: t-statistic	FAT (2) Dep variable: t-statistic	MST Dep variable: log (t-statistic in absolute values)
Explanatory variables			
Intercept	-1.74 (0.44)***	-1.97 (1.30)	1.34 (0.71)*
1/SE	-0.003 (0.008)	-	-
sqrt (samplesize)	-	0.022 (0.10)	-
Log(df)	-	-	-0.16 (0.16)
N	43	44	43
R^2	0.0023	0.0017	0.030

Note 1: The work of Collins & Downes (1977) can not be included in some tests since neither coefficients nor standard errors are reported.
Note 2: Standard errors in parentheses (robust to heteroskedasticity)
Note 3: Significance at the 1% (***), 5% (**), 10% (*)

Table 6: FAT-Metaregression estimates (OLS)

Mod. Variables	All Sample		Studies for solid waste	
1/SE	-0.006 (0.008)	-	-0.004 (0.007)	-
sqrt (samplesize)	-	-0.039 (0.11)	-	0.013 (0.11)
Year	0.10 (0.03)***	0.098 (0.035)***	0.13 (0.03)***	0.13 (0.03)***
Functional_form	-0.50 (1.00)	-0.22 (1.00)	0.17 (1.12)	0.56 (1.02)
Service	-2.08 (0.97)**	-1.94 (0.88)**	-	-
USA	1.55 (0.92)*	1.77 (0.94)*	2.00 (0.97)**	2.29 (0.91)**
UK	0.71 (0.98)	1.03 (1.22)	1.09 (0.98)	1.04 (1.25)
Intercept	-202.29 (73.32)**	-198.54 (71.36)***	-272.46 (61.98)***	-266.45 (60.31)***
R^2	0.26	0.22	0.26	0.22
F (joint sig.)	2.19*	2.33***	3.88*	4.24***
N	43	44	35	36

Note 1: Standard errors in parentheses (robust to heteroskedasticity)
Note 2: Significance at the 1% (***), 5% (**), 10% (*)