Contracting for Government Services: Theory and Evidence from U.S. Cities*

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Abstract

Local governments can provide services with their own employees or by contracting with private or public sector providers. We develop a model of this "make-or-buy" choice that highlights the trade-off between productive efficiency and the costs of contract administration. We construct a dataset of service provision choices by U.S. cities and identify a range of service and city characteristics as significant determinants of contracting decisions. Our analysis suggests an important role for economic efficiency concerns, as well as politics, in contracting for government services. *JEL* codes: D23, D73, H11, L33.

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1. Introduction

The last twenty-five years has seen intense debate about whether the private sector can provide a variety of public services more effectively than the government. This debate has touched on services ranging from education, healthcare and transportation to trash collection and street repair. In addition to the normative question of what role government should assume in providing services, it has also raised the positive question of what determines government privatization decisions in practice.

There are at least two accounts of government privatization decisions. One view, which focuses on transaction costs, looks by analogy to the private sector "make or buy" decision (e.g. Williamson, 1985; Hart, Shleifer and Vishny, 1997). In this account, privatization is dictated by efficiency considerations. An alternative view, advanced by Boycko, Shleifer and Vishny (1996) among others, emphasizes the private benefits to politicians of keeping service provision inside the government. This view holds that privatization tends to occur only in response to external pressure such as citizen discontent or tight budgets. An analogous account of the private sector would emphasize the private benefits of control that accrue to managers, and the role of shareholders in disciplining managers.

In this paper, we study the determinants of privatization at the level of U.S. city government. City government is a useful level at which to study privatization for several reasons. First, we observe many cities making decisions about service provision in parallel; in this sense cities are a useful laboratory for making statistical comparisons. Second, cities provide a wide range of services: from mundane services like street repair and trash collection to complex services like law enforcement and education. Third, cities differ in a variety of interesting ways — by size, location, economic conditions and form of government. Finally, local government service provision is important from both an economic and public policy standpoint. Local government spending equals about 5-6% of GDP in the United States, so there are potentially large gains to be realized from efficiency improvements.

We start our analysis by developing a simple model of procurement in which a government must arrange delivery of a service from an agent. The government can write a contract that specifies the time the agent must spend on the job and a set of performance requirements. We assume that specifying and enforcing a time requirement has minimal cost, but that there

are non-trivial costs to establishing and maintaining a set of performance requirements. Provided the government cares only about what is actually delivered, we show that an optimal contract must take one of two forms. The government either pays the agent for meeting a minimal time requirement, or for meeting a performance requirement, but not both. We view these forms of contracting as capturing, in a rough way, the two most common forms of public service provision: inhouse provision using salaried city employees and performance requirements contracts with private sector firms.

In deciding how to provide the service, the government in our model faces a choice between inhouse provision, which is inefficient due to the low incentives of employees, and the costs of specifying and implementing a set of performance requirements for an external supplier. This leads to predictions about how privatization decisions will vary across services. Services for which it is harder to write, monitor or adjust performance standards are more likely to be provided inhouse. The same will be true of services for which city administrators are more sensitive to the ultimate quality provided.

We also argue that the trade-off identified in the model will play out differently across cities. For instance, we implicitly focus on a setting where the city has the requisite size to produce a given service inhouse as well as readily available external providers. This may not be the case for some smaller cities. Moreover, if the relevant city administrator is more politically motivated, he or she may place more emphasize on the benefits provided by supplying a service well (e.g. from higher quality service or from satisfying the demands of a union) and less on the costs of service provision. We show that this will lead to less privatization.

We use our theoretical model to motivate an empirical analysis of privatization by U.S. cities. Our empirical work makes use of survey data collected by the International City/County Management Association (ICMA). The data documents how a set of just over a thousand U.S. cities provide a range of services, from public works and transportation (road construction, street cleaning, residential and commercial waste collection), to safety (fire, police, emergency services), health and human services, parks and recreation, cultural programs and administrative support functions. Over eighty percent of services are provided either inhouse or through contracts with private sector firms. A smaller but still significant set of services is provided through contracts with other public agencies. We view public

contracts as somewhere between the inhouse and private contract extremes — for instance, a substitute for inhouse provision for a city that is too small to provide a certain service effectively, or alternatively, a way to contract for a service while still retaining somewhat more control over production than may be the case with a private provider.

We complement the data on service provision with data gathered from U.S. Census and other sources that describe city demographics, form of governance, political leanings, and so forth. Of course, a central prediction of our theory is that difficulties in specifying and administering performance requirements contracts are likely to reduce privatization. To quantify these difficulties, we surveyed a set of city administrators, asking them to assess thirty city services along a number of salient dimensions. We use this data to construct a measure of performance contracting difficulty.

Our main empirical findings can be summarized as follows. First, services for which it is harder to write and administer performance contracts are less likely to be privatized. The effect is substantial. A one standard deviation change in contracting difficulty is associated with a change in the probability of being privatized of eight percentage points — that is, a forty percent reduction in privatization. Moreover, the effect is greater for some cities than for others. Larger and more urban cities, which presumably have the resources to use inhouse provision and perhaps also a more readily available pool of external providers, appear to be more sensitive to our contracting difficulty measure. Newer cities also appear to be more sensitive to contracting difficulty, consistent with a view that governance in these cities is less political, perhaps due to a smaller public union presence, and more focused on economic trade-offs.

We also find that services that are less frequently provided, and services that are provided primarily by large cities, are more likely to be privatized. This is true even after controlling with city fixed effects. One interpretation of these results is that these services have less of a "public good" nature, or are viewed as less "core" to the public mission of cities. As a result, city administrators may focus more on the costs of provision rather than the benefits. Alternatively, services for which there is a larger private market may simply be easier to privatize.

In addition to the variation across services, our data also reveals a substantial variation in privatization patterns across cities. For instance, cities in the western states are substantially

more likely to contract for service provision, both to the private and the public sector. A similar pattern is observed for newer cities. We also find an interesting pattern in city size. The smallest cities are slightly less likely to provide services inhouse; instead we observe a substantial amount of contracting to other public agencies, perhaps to take advantage of economies of scale. At the same time, large cities are also relatively less likely to provide services inhouse; they make the greatest use of privatization. As noted above, we also find some evidence of political effects. Cities run by an appointed manager, rather than an elected mayor, appear more likely to contract for service provision, although the effect is relatively modest.

Finally, we find somewhat indirect, but still suggestive evidence that there may be spillovers within cities in the use of private sector contracts. In particular, we find that even after accounting for city size and location, cities that provide more services are more likely to contract for a given service. One interpretation that we believe is plausible is that cities that provide many services are more likely to provide at least some services that are easy to contract out, which may allow the city administration to become familiar with writing and administering contracts, lowering the cost of using contracts for other services.

Overall, our results suggest that a simple transaction cost based view of privatization provides a useful framework for explaining local government contracting patterns, at least at the level of U.S. city government. This is not to discount the role of politics, and indeed our evidence is also consistent with a significant role for political forces in privatization decisions. Moreover, our results do not allow us to distinguish very clearly between various different transaction cost stories. In particular, when we try to separate out various contracting difficulties such as problems with performance measurement, holdup problems, or the desire for control and flexibility, we find our measures of these problems to be so highly correlated across services as to be essentially impossible to disentangle. This suggests to us that trying to separate these issues empirically is likely to be a difficult task in almost any setting.

We view this paper as contributing to both the economics literature on contracting and integration decisions and the public administration literature on city practices. In particular, our modeling approach draws heavily on Williamson (1975, 1985) and Holmstrom and Milgrom (1991), in particular Holmstrom and Milgrom's idea that employment is characterized by the employer prohibiting the agent from certain tasks — that is, dictating what are

permissible activities during a contracted time. More broadly, we follow Sclar (2000) and Warner and Hebdon (2001), among others, in taking a transaction cost-based view of local government privatization decisions. In this line of work, the papers most closely related to this one are by Brown and Potoski (2003a,b), who also collect an original survey with an emphasis on contracting difficulties. Our contribution relative to their work is the introduction of a clearly specified theoretical model, and a richer set of empirical findings.[1]

2. Local Government Service Provision: An Overview

Local government spending accounts for about 5-6% of U.S. gross national product and roughly half the expenditure of all government agencies. A typical city in the U.S. provides about 40 distinct services, ranging from public works (street repair and garbage collection), to public safety (police and fire), to animal control and maintenance of public recreation areas. Many city services are relatively labor intensive. Capital equipment required to provide services (e.g. police cars, fire trucks) tends not to be highly specialized to a particular city, although there are exceptions, such as municipal libraries, hospitals or sewage treatment facilities.

City services are provided by a combination of city employees and private and government contractors. Exactly what services a city government is responsible for providing often depends on a variety of historical and institutional factors.[2] Once provision is decided, however, city administrators have some flexibility in determining how best to provide a given service. The city managers to whom we have talked all emphasize that both economic and political factors go into their decisions.

[1] Another related paper is Lopez-de-Silanes, Shleifer and Vishny (1997), which uses U.S. Census data to relate contracting patterns to government characteristics at the level of U.S. counties. They emphasize that state laws restricting political hiring or imposing budget constraints on local governments might affect contracting choices. Their analysis, however, suffers from several shortcomings. For instance, the Census data covers only a small and non-representative set of services, and moreover does not distinguish between public and private contracting. We have nevertheless tried to relate city contracting patterns to a similar set of state laws affecting cities, but have not uncovered robust relationships.

[2] These can be quite idiosyncratic. For instance, the city government of Stanford's neighbor, Menlo Park, California, is not responsible for that city's fire department, which instead is run by an independently elected commission.

There is some variation across cities in the form of governance. The two most common forms for city government are Council-Manager and Mayor-Council (other forms governance such as town meetings and direct ballot referendums are relatively rare). A Council-Manager government consists of an elected city council that is responsible for city policies, and a professional city manager, appointed by the council, who is responsible for administration. The city council is generally prohibited from interfering with the city manager's administration, but can remove the city manager at any time. In contrast, a Mayor-Council government consists of an elected mayor who serves as the city's chief administrative officer, and an elected council that forms the city's legislative body. Cities with a mayor may also appoint a professional city manager, but the mayor has authority over city operations. Whether a city government is headed by an appointed manager or an elected mayor, there is typically a hierarchy of department managers responsible for service delivery. Contracting decisions generally are made by the mayor or manager together with the department head who bears responsibility for implementing the decision.

The ICMA surveys provide a snapshot of how city services are provided. The 1068 cities in our sample provide a total of 42,069 services. Of these, 63% were delivered using only city employees. Just under 21% were provided using at least some private sector contracts. An additional 12% were provided through contracts with another public agency, such as the county or a neighboring city,[3] while the remaining 4% were provided by less common channels, such as franchises, vouchers, or volunteers.

As our analysis in this paper is purely cross-sectional, it is worth commenting on general trends in city contracting. Despite many popular press stories about public school contracts and other high-profile privatization decisions, data from ICMA surveys performed at five year intervals between 1982 and 2002 show little evidence of any aggregate trend in contracting behavior. Ballard and Warner (2000) and Hefetz and Warner (2004) argue that decisions to contract out services are balanced by decisions to bring contracted services back in-house. Based on this evidence, we will adopt the view that the broad pattern of city contracting is roughly stationary, though individual cities are adjusting on the margin.

[3]In some states, cities may also form partnerships to provide services. For instance, in California, two or more public agencies may join together under a joint powers authority (JPA) to provide a service. Fire protection in San Mateo, just north of Stanford, is provided by such an arrangement. We consider this a form of public sector contracting.

3. Contracting for Services: Theory

In this section, we model the choice between external contracting and internal service provision. Our model views this choice as one of contractual form, where we associate external contracting with the use of detailed contracts specifying performance requirements, and internal provision with the use of salaried employees. This view seems particularly appropriate for local government service provision; it may also be useful for thinking about private sector make-or-buy decisions, though we do not address those here.

The model establishes a sharp trade-off between productive inefficiencies that arise from using salaried employees and the costs of specifying and administering performance contracts. We show that this leads to a clear set of empirical predictions on which to base our empirical analysis. In this sense, we view the model as a useful advance over less formal transaction-cost models, which are often very clear about what makes contracting difficult, but less clear on why internal provision mitigates these problems.

A. Technology, Endowments and Preferences

A city administrator, or principal, wishes to procure one unit of a good or service from an agent. For simplicity, we will assume that labor is the only variable input relevant for the quality of service that is provided. Specifically, we assume service quality is given by the production function

$$q = (\rho + e)t,$$

where $t \geq 0$ is time spent on the job, $\rho > 0$ is baseline productivity, and $e \geq 0$ is the agent's effort intensity (e.g. attention to detail, problem-solving activities, or physical exertion).

The agent is endowed with T units of time that can be allocated between working for the principal and working in an outside competitive labor market. When working for the principal, the agent bears a personal cost of effort equal to $c(e)$ per unit of time, where $c', c'' > 0$.[4] The outside job requires no effort intensity and pays a wage $w > 0$ per unit of time.

[4] We treat labor intensity as a one-time choice, but this involves no loss of generality. If instead the agent were to choose a complete time path of effort, the convexity of $c(\cdot)$ would still make it optimal to work at a constant labor intensity.

The agent has preferences over income and labor costs. If he is paid $\overline{w} \geq 0$ and spends t hours on the job at an effort intensity e, his utility is

$$\overline{w} - c(e)t + (T - t)w.$$

The city administrator cares about service quality and the costs of provision. To capture the idea that the value of higher quality can differ across cities and services, we let s denote the administrator's sensitivity to service quality. If the quality provided is q, the sensitivity is s and the costs of provision are k, the principal's net benefit is $V(q, s) - k$. We assume that $V_q(q, s) > 0$ and $V_{qs}(q, s) > 0$. The latter condition means that a city administrator with a high value of s is willing to spend more to secure an increase in quality; that is, she cares more about service benefits relative to costs. To guarantee a unique optimal contract, we also assume that there are decreasing returns to quality, so $V_{qq}(q, s) < 0$.

B. Contracting on Time and Performance

Following common practices in procurement, we assume that the principal can write a contract that specifies two requirements: performance and time spent on the job. For instance, if the principal wanted the agent to provide landscaping services, the contract could specify performance requirements such as the frequency for trimming certain trees and bushes, the amount of weeds allowed per square yard, and what composition of fertilizers were to be used. Alternatively, the contract could specify that the agent spend forty hours a week providing landscaping services as directed by the principal. While time and performance requirements are contractible, however, we assume that labor intensity is not. This implies that a contract cannot precisely specify what is to be done at every moment in time, the agent will always have some discretion.

A contract therefore is a triple $(\overline{w}, \overline{q}, \overline{t})$, where $\overline{t}$ specifies a minimum amount of time the agent must spend on the job, $\overline{q}$ specifies is a minimum quality standard, and $\overline{w}$ specifies the amount the principal will pay the agent if the time and performance standards are met.

We make an important, and in our view realistic, assumption that there are costs both to write and enforce contracts. To keep things simple, we assume that the costs of specifying and monitoring compliance with $\overline{t}$ are minimal, but it is costly to specify and verify compliance

with a quality standard $\overline{q}$. For example, to meet certain quality thresholds several things may need to be described in advance, like lists of instructions and ex post measurement procedures (Bajari and Tadelis, 2001). Furthermore, when the job is delivered, then to verify the delivery of $\overline{q}$ the principal will usually have to rely on a certain monitoring and measurement technology that has its own set-up costs and operating costs (Barzel, 1982).

We assume that to specify a minimal standard of $\overline{q}$, the principal must expend costs equal to $d(\overline{q}, m)$. The parameter m is intended to capture contracting difficulty. For example, m might describe the difficulty of describing performance requirements ex ante, or adjusting them over time. Alternatively, m might describe the difficulty of measuring or monitoring quality. Accordingly, we assume that $d_m > 0$. We also assume that $d(0, m) = 0$ and $d_{\overline{q}} > 0$, so that specifying and monitoring a higher standard is more costly, but there is no cost if no standard is specified. Finally, we assume that $d_{\overline{q}\overline{q}} > 0$, so that for a given service each increase in performance standards comes at increasing cost. This seems natural if specifying and monitoring basic issues is rather simple, but for refined issues it is increasingly difficult to specify standards and verify compliance. (See Bajari and Tadelis, 2001, for a foundational model along these lines.)

C. Optimal Contracts: Employment versus Specific Performance

Suppose the principal and agent agree to a contract $(\overline{w}, \overline{q}, \overline{t})$. If the agent intends to honor the contractual requirements, he chooses his effort e and time on the job t to solve

$$\begin{array}{lll} \max_{e,t} & \overline{w} - c(e)t + w(T-t) & \\ \text{s.t.} & t \geq \overline{t} & (EC) \\ & (\rho + e)\, t \geq \overline{q} & (PC) \end{array}$$

The agent faces two constraints. The *employment constraint* (EC) states that he must spent at least the specified amount of time on the job; the *performance constraint* (PC) states that he must deliver at least the specified quality $\overline{q}$. Given our assumptions, the agent's problem has a unique solution. It is independent of the wage $\overline{w}$, so we can denote the optimal intensity and time as $e^*(\overline{q}, \overline{t})$ and $t^*(\overline{q}, \overline{t})$.

Now consider the optimal contract from the point of view of the principal. This contract

solves

$$\begin{array}{ll} \max_{(\overline{w},\overline{q},\overline{t})} & V(et,s) - \overline{w} - d(\overline{q},m) \\ \text{s.t.} & (e,t) = (e^*(\overline{q},\overline{t}), t^*(\overline{q},\overline{t})) \qquad (IC) \\ & \overline{w} - c(e)t + w(T-t) \geq wT \quad (IR) \end{array}$$

The *incentive compatibility* constraint (IC) states that the agent will allocate his effort and time optimally given the contract. The *individual rationality* constraint (IR) states that the agent prefers to accept and honor the contract rather than not. This second constraint will bind for any optimal contract.

We now use these two optimization problems to prove a useful result. The optimal contract will specify either time on the job or a performance standard, but never both. The intuition is as follows. Because contracting is costly, it could only be optimal to specify both requirements if this resulted in both the employment and performance constraints binding for the agent. But if both constraints were to bind, then by revealed preference, the agent could deliver the same quality at lower utility cost by substituting effort for time. As the principal cares only about performance and money, he would do better to drop the time requirement and lower the wage.

Proposition 1 An optimal contract $(\overline{w},\overline{q},\overline{t})$ either has the form $(\overline{w},0,\overline{t})$ or $(\overline{w},\overline{q},0)$.

Proof. By way of contradiction, suppose the optimal contract $(\overline{w},\overline{q},\overline{t})$ has $\overline{q}>0$ and $\overline{t}>0$. If (PC) binds at the solution to the agent's problem, then the contract $(\overline{w},\overline{q},0)$ will result in the same quality $\overline{q}$ at marginally lower contracting cost. Alternatively, if (PC) does not bind at the solution to the agent's problem, then the contract $(\overline{w},0,\overline{t})$ will result in the same quality at lower contracting cost. *Q.E.D.*

This result not only simplifies the problem, but adds meaning to the agent's contractual constraints, and to the way these constraints will bind in equilibrium. Namely, if (EC) binds but (PC) does not, then the optimal contract $(\overline{w},0,\overline{t})$ looks very much like an *employment relationship* in which the agent agrees to spend a fixed amount of time on the job, and cares little about what needs to be done as long as he is not asked to provide costly effort intensity. In contrast, when (PC) binds but (EC) does not, the optimal contract $(\overline{w},\overline{q},0)$ looks very much like a *contracting relationship* (or specific-performance relationship) in which

the agent has all the discretion over how to allocate his time and effort, and he is bound by the performance specifications of the contract.[5]

D. Characterizing Optimal Contracts

We now turn to a more precise characterization of optimal contract. We start by identifying the least cost way to procure an arbitrary level of quality q. We then consider the optimal choice of quality.

To obtain quality q with an employment contract $(\overline{w}, 0, \overline{t})$, the principal must specify $\overline{t} = q/\rho$ and pay the agent

$$W(q|EC) = \frac{w}{\rho} q.$$

To obtain quality q with a performance contract $(\overline{w}, \overline{q}, 0)$, the principal must specify $\overline{q} = q$, in which case the agent's problem is

$$\begin{aligned} &\max_{e,t} \overline{w} - c(e)t + w(T-t) \\ &\text{s.t. } (\rho + e)\, t \geq q. \end{aligned}$$

The optimal effort level solves $c'(e) \cdot (\rho + e) = c(e) + w$. It is independent of q, so we denote it by e^*. The optimal time allocation is $t^*(q, 0) = q/(\rho + e^*)$. To make the contract acceptable, the principal must pay the agent

$$W(q|PC) = \frac{w + c(e^*)}{\rho + e^*} q.$$

Because the agent's choice of production inputs is constrained under an employment contract, the labor cost of producing quality q is lower under a contract that simply specifies a performance requirement. Consequently, we have the following result.

Proposition 2 For all $q > 0$, $W(q|PC) < W(q|EC)$ and $\frac{dW(q|PC)}{dq} < \frac{dW(q|EC)}{dq}$.

[5] The view of employment that we adopt here is reminiscent of Holmstrom and Milgrom (1991), who emphasize that employment is characterized by *exclusion*. In our model, a salaried employee is excluded from working in the outside market, meaning that on the job he will do what is desired, only at a low baseline productivity.

Proof. The first inequality follows from revealed preference. The input mix e^*, $t^*(q,0)$ is the agent's least cost way of producing quality q, so it must be that $W(q|PC) < W(q|EC)$. The second inequality follows directly from the first. *Q.E.D.*

Proposition 2 states that ignoring contracting costs, performance contracts will result in more efficient production. Accounting for contracting costs, however, an employment contract can implement quality q at cost $W(q|EC)$, while the cost is $W(q|PC) + d(q,m)$ with a performance contract.

The cost of implementing q is therefore

$$C(q,m) = \min\{W(q|EC), W(q|PC) + d(q,m)\}.$$

The cost function $C(q,m)$ is the lower envelope of $W(q|EC)$ and $W(q|PC) + d(q,m)$. A useful observation is that because labor costs are linear, the latter cost function will cross the former at most once, from below, provided that $d_{qq} > 0$, i.e. that the costs are contracting are convex. This implies that if an employment contract is the most effective way to implement quality q, it will be most effective for all higher quality levels.

The optimal contract quality is the solution to the problem

$$\max_q \quad V(q,s) - C(q,m).$$

We are interested in how the optimal contract varies with the principal's sensitivity to quality s and the difficulty of specifying and enforcing performance standards m. Our next result provides a characterization.

Proposition 3 If contracting difficulty m increases, the principal will be more likely to use an employment contract, while the optimal quality may increase or decrease. If the importance of quality s increases, the principal will be more likely to use an employment contract, and optimal quality will increase.

Proof. Consider an increase from m to m'. The costs of implementing any quality q with an employment contract are unchanged, but the costs of implement any q with a performance contract are higher for m' than for m. Therefore an increase from m to m'

makes a performance contract less likely to be optimal. The optimal quality could move up or down however. To see this, suppose the optimal contract under m is a performance contract. If the same is true under m' and $d_{qm} > 0$ then it is optimal to reduce quality. On the other hand, if the optimal contract under m' is now an employment contract, it will involve an increase in quality.

Now consider an increase from s to s'. As $V_{qs} > 0$ and the principal's problem has a unique solution, the optimal quality must increase. The increase in quality could change the form of optimal contract from a performance contract to an employment contract, but not vice-versa. *Q.E.D.*

The first claim is straightforward: increased costs of specifying performance standards will reduce the use of specific performance contracts. The second claim, that increased sensitivity to quality will also reduce the use of performance contracts, is a bit more subtle. It relies on the assumption that it is increasingly hard to specify and enforce performance for higher quality levels, i.e. that $d(q, m)$ is convex in q.

4. Relating the Model to Data

Our baseline model points out the costs and benefits of two common modes of contracting. In this section, we describe the empirical implications of this baseline model. We also discuss how some simple extensions to the model can generate a richer set of predictions that we will consider in our empirical analysis.

Before turning to these predictions, we address one preliminary issue of interpretation. Our model focuses on the choice of contractual form, while we have data on the use of contracting versus inhouse provision. Matching our theory to the data therefore requires us to interpret employment, or inhouse provision, as a contract that specifies time on the job and private sector contracts as specifying detailed performance requirements. This seems to be an accurate description of local government practice. In principle, however, one could have "employees" who are paid solely on performance, or "contractors" who are paid solely on time. Lawyers, for instance, often fall into the latter category. We view this as a potentially

confounding problem if one were to apply our model to make or buy decisions in other settings, such as the private sector, but as relatively unproblematic for our current application. This being said, we now turn to discussing the empirical implications of the theory.

Our model yields two elementary predictions about how contracting practices will differ across services. First, the theory predicts that cities are less likely to privatize services for which it is harder to specify, enforce or adjust performance standards. Second, the theory predicts that cities are less likely to privatize services for which sensitivity to quality is high. As city residents are the final consumers of services, and city administrators are ultimately accountable to residents, this suggests that privatization should be less likely for those services where city residents are more likely to react to quality problems.

While not directly addressed in the model, our theory can easily accommodate the role of economies of scale. The theory suggests that cities may differ in how responsive they are to the trade-offs in the model, depending on their abilities to supply the service themselves, or on the availability of private sector. For instance, cities vary in size and location. Small or rural cities may have less flexibility in making contracting choices than do large cities. Furthermore, some services may have a relatively large efficient scale, making inhouse production quite inefficient for a small city. On the other hand, small or rural cities may face a thinner market of external providers.

This suggests a third prediction, that small and rural cities, being potentially more constrained, may be *less responsive* to contracting difficulties of the type highlighted by our model. In addition, to the extent that small cities may want to avoid private sector performance based contracting in accordance with our model, it may be more efficient to contract to another public agency rather than provide a service inhouse. A fourth prediction is, therefore, that small cities may use public contracting as an imperfect substitute for inhouse provision.

A further set of predictions that emerge from the theoretical framework involve differences in politics across cities, and a set of political economy predictions can be derived from the simple trade-offs we demonstrated in our model. Recall from the analysis in Proposition 3 that when city administrators place more weight on the benefits to service provision relative to the cost, i.e. have a higher value of s, they will be more likely to provide the service inhouse. A natural conjecture is that elected mayors may have motivations that are more

explicitly political than appointed managers. In light of our model, this suggests a fifth "level-effects" prediction: that cities run by mayors may be *less likely* to privatize services as compared to cities run by managers. Moreover, to the extent that political concerns might cause administrators to focus on issues other than the economic trade-offs emphasized in our model, a sixth "margins effect" prediction is that cities run by mayors will also be *less responsive* to differences in contracting difficulties as compared to cities run by managers.

The form of government we have just referred to is perhaps the most obvious political distinction across cities, but several others may be of interest as well, and these in turn will have similar levels and margins effects to those expressed by our fifth and sixth predictions. For instance, to the extent that cities that were formed relatively recently have less of a political infrastructure and perhaps less public union influence, it seems possible that they would do more privatization, implying another levels effects prediction. Moreover, if their decisions more closely reflect current economic efficiency trade-offs, they should be *more responsive* to contracting difficulties, implying another margins effects prediction.

An interesting conjecture that emerges from combining the political view of privatization with our transaction-cost view is that a city's financial condition may matter for its contracting decisions. In particular, the political view would suggest that if cities are very constrained — for instance because they have a great deal of outstanding debt — then they may be more likely to privatize to save costs (levels effects of large debt). Moreover, if financial constraints cause administrators to focus more on economic considerations, our model would then suggest that debt-constrained cities would be *more responsive* to contracting difficulties (margins effects of large debt). Finally, and outside of the scope of our analysis, it is possible that differences in political ideology (e.g. cities that are primarily democratic or republican) might affect contracting choices.

A final prediction can be obtained from extending our analysis to capture economies of scope in contracting. Our baseline model treats the contracting decision for each service a city provides in isolation. It seems plausible, however, that contracting choices within a given city may be related. In particular, city managers whom we interviewed emphasized that writing and administering contracts effectively takes practice. This suggests a seventh prediction: cities that privatize some services may be more likely to privatize others. Assessing whether this kind of spillover is present is a difficult empirical challenge; we will, however, provide

some indirect evidence along these lines.

5. Service Provision by U.S. Cities: Data

To study the procurement practices of U.S. cities, we compiled information from several sources. Our primary data are the International City/County Management Association's (ICMA's) 1997 and 2002 Service Delivery surveys. This data has been used in several other studies of local government (e.g. Hefetz and Warner (2004) and references therein).

The ICMA sends it survey to roughly 4000 U.S. cities, with a response rate of about 20%.[6] The survey presents city administrators with a list of 64 services. It asks them to identify the services they provide and the method of delivery. These include provision by city employees, contracting out to a private sector firm, contracting out to another public agency, a combination of the above, and other less frequent forms of procurement. After combining the survey responses from 1997 and 2002, and eliminating responses that are substantially incomplete, we have a data on a total of 1068 cities. For cities that responded in both years, we use the more complete or more recent response.

For each of these cities, we collected information from the U.S. Census on population, area, county median household income, the ratio of the city's long-term debt to its current revenue, and whether the city is part of a Metropolitan Statistical Area. We classify cities outside an MSA as rural, and those within an MSA as either suburban or urban, with the latter meaning that the city is the main city in the MSA. We also used Google searches to identify the date at which each city was incorporated.

From the ICMA, we obtained each city's form of government — Mayor-Council, Council-Manager, or the less common forms of Commission and Town Meeting. In addition, we gathered data on state laws that might constrain city decisions — such as limits on borrowing or restrictions on hiring processes.[7] Finally, as a rough measure of political ideology, we collected county-level voting data from the 2000 presidential election.

[6] The ICMA sends the survey to the Chief Administrative Officer in all municipalities with populations over 10,000 and a random sample of one in eight municipalities with populations between 2500 and 9999. Therefore smaller cities are under-represented in the sample. The response rate in 2002 was 23.7%. As can be seen in Table 1, cities in the Northeast are also somewhat under-represented.

[7] This data on state laws comes from the U.S. Advisory Commission on Intergovernmental Relations (USACIR, 1990, 1993). Lopez de Silanes et. al. (1997) argue that some good governance laws correlate significantly with *county-level* contracting decisions for a small set of services.

Table 1 presents a summary of city characteristics. The average city in our sample provides 37-38 of the 64 services in the ICMA data. Of these 64% are provided inhouse, or solely by city employees. Another 24% are provided either solely or in part by a private firm. An additional 10% are provided through contracts with another public governmental agency. The remaining 4% are provided in an alternative manner, such as by volunteers, or through the establishment of franchises.

While information on city characteristics is readily available, it is substantially more difficult to assemble useful measures of service characteristics. For instance, we are particularly interested in how difficult it is to specify and administer performance requirements for a given service. To assess this, we designed an additional survey of 23 city managers. For this survey we chose a representative sub-sample of 30 of the ICMA services.

We asked respondents to rank each service along four dimensions: (1) the difficulty of measuring and monitoring the provision of quality; (2) how routine or unpredictable the requirements of the service are; (3) the difficulty in replacing contractors due to specificity or lack of competition; and (4) the severity of conflict between incentives to minimize costs and the incentives to provide quality. For each question we standardized the answers of each respondent to have zero mean and unit variance. We then averaged the standardized responses to construct an average response to each question for each service.

Although our model does not clearly distinguish between these impediments to successful contracting, the existing theoretical literature suggests that each of these variables might have an important independent influence on contracting decisions. In practice, however, we found these characteristics to be so highly correlated across services as to be nearly collinear in regression analysis. Consequently, we decided to use a principal components approach to identify a single "contract difficulty" variable. We found that the first principal component explained 83% of the variation in the four survey variables. We therefore call this component, which is very nearly an equally weighted average of the four questions, *contracting difficulty*.

In addition to asking city managers about contracting difficulty, we included a survey question asking the city managers to assess the relative sensitivity of residents to the quality of the thirty different services. Again, we standardized the answers of each responses and averaged the standardized responses to obtain a measure of quality sensitivity that we refer to as *sensitivity*.

Finally, we used information on which cities provide which services to construct two additional service characteristics. A number of city managers suggested to us that services could usefully be distinguished by the degree to which they were (in the words of Palo Alto city manager Frank Benest) "core to mission" — and hence identified in an important way with city administration. To provide a measure of whether a given service is a "core" city service, we calculated for each service the fraction of cities in our sample that provide it. We then normalized this measure, denoted *core*, to have mean zero and standard deviation one across services.

Our *core* measures captures what fraction of cities provide a service. We constructed an additional measure to describe *which* cities provide a given service. To do this, we computed for each service the average population density of cities providing the service. Again, we normalize this measure, denoted *metropolitan* to have mean zero and standard deviation one across services. This measure seems to capture, in a rough way, the degree to which certain services have more or less of a public good nature. That is, the services that are provided only by the largest and most dense cities tend to be services with a strong private good nature, such as programs for the elderly, day care and drug and alcohol treatment programs.[8]

Table 2 reports provision patterns of each of the thirty services included in our contracting difficulty survey. Both the frequency of provision and the method of provision range dramatically across services. Some services, such as police and code enforcement are provided by city employees in nearly 90% of the cities in our sample. Other services, such as solid waste collection are privately contracted over 40% of the time, and vehicle towing is privately contracted over 80% of the time. The last part of the Table reports service characteristics. Reassuringly, these seem to square with common sense. For instance, the most difficult service to contract for is police services, while the easiest are utility meter reading and vehicle towing.

While our empirical analysis below focuses on the method of service provision, it is worth briefly discussing the question of whether a city provides a service at all. As discussed in Section 2, it seems reasonable to view *whether* a city is responsible for providing a given service as predetermined in investigating *how* the service is provided. This assumption seems

[8] Why exactly large cities provide these "private" goods while small or less densely populated cities do not is an interesting question, but one that is beyond the scope of this paper.

consistent with information gleaned from interviews with city managers, who generally have to concern themselves with how to provide a specified set of services.

Nevertheless, given variance in the number of cities providing each service, it may be helpful to convey a sense of which services are provided more frequently and which cities provide more services. To this end, Table 3 reports results from regressing a dummy variable for whether city i provided service k on a set of city and service characteristics. As the Table shows, there are a number of regularities. Larger and older cities provide more services, as do cities in the Northeast. Cities in the western U.S. tend to provide fewer services. Services for which contracting difficulties are greater are also provided somewhat less frequently — in particular, a one standard deviation increase in contract difficulty is associated with provision by 5% fewer of the cities.

6. Evidence on Contracting Practices

We now turn to addressing empirically the determinants of city contracting practices. We first describe our empirical approach, which is quite simple. We then examine how city and service characteristics correlate with the decision to contract to either the public or private sector. Finally, we investigate whether different types of cities are more or less sensitive to the kinds of transaction cost trade-offs identified in our theoretical model.

A. Empirical Approach

An observation in our data is a city-service pair. We focus on city-service pairs for which the city actually provides the given service, and for which the service is provided either inhouse or by contract with either a private firm or another public agency.

We describe the choice between these three alternatives using a linear probability model. Let y_{ik} denote the choice of city i regarding service k and X_{ik} denote a vector of city and service characteristics. We assume that:

$$\begin{aligned} \Pr\{y_{ik} &= \text{Private}\} = X_{ik}\beta_{pr}, \\ \Pr\{y_{ik} &= \text{Public}\} = X_{ik}\beta_{pu}. \end{aligned}$$

We estimate the coefficients β_{pr}, β_{pu} using a seemingly unrelated regression framework:

$$\begin{aligned} \mathbf{1}\{y_{ij} &= \text{Private}\} = X_{ij}\beta_{pr} + \varepsilon_{pr} \\ \mathbf{1}\{y_{ij} &= \text{Public}\} = X_{ij}\beta_{pb} + \varepsilon_{pb} \end{aligned}$$

As in a standard binary choice framework, the linear probability model has a well-known drawback — the predicted probabilities can be less than zero or greater than one. To address this and other concerns, we have also implemented a multinomial logit specification, which avoids these problems. That approach yields results that are qualitatively and quantitatively similar, but is computationally burdensome given that we want to include large numbers of fixed effects. For this reason, we focus on the linear model, and report multinomial logit estimates in a supplementary appendix.

B. Determinants of Privatization: Basic Results

We now consider the relationship between contracting decisions and the city and service characteristics described above. Table 4 reports results from our basic linear probability specification. The first column reports a specification with city and service characteristics. The second column reports fixed effect specifications, where service or city fixed effects are included in lieu of these characteristics.[9] The fixed effects estimates are very similar to the baseline estimates, implying that our baseline estimates are not driven by the fact that different cities may be providing different service.[10]

The results in Table 4 confirm the two elementary predictions of our theoretical model: both an increase in difficulty and in sensitivity will decrease the likelihood of a service being contracted to the private sector. Perhaps more importantly, an increase in our measure of contracting difficulty is associated with a shift away from private sector contracting toward both inhouse provision and public sector contracting. The shift is substantial. A one standard deviation increase in contracting difficulty is associated with more than a thirty percent

[9] The results under specification (2) include city fixed effects, while those under specification (3) include service fixed effects.

[10] As a preliminary comment, it is worth noting that both service and city characteristics appear to account for a substantial amount of the variation in contracting practices. For instance regressing a dummy variable for private contracting on service fixed effects leads to an R-squared statistic of 0.23, while the same regression on city fixed effects yields and R-squared of 0.15.

decrease in the likelihood of private contracting (recall that on average about 20% of services are contracted privately and the estimated probability change is -7.5%).

To provide a clearer illustration of the relationship between contracting difficulty and privatization, Figure 1 provides some graphical insight. To construct the figure, we regressed contracting difficulty on our other service characteristics and city fixed effects, and obtained the average residual by service. We then separately regressed a dummy variable for each contracting outcome (inhouse, public contract, private contract) on the same controls and obtained the average residual by service. Figures 1(a)-1(c) present residual against residual scatterplots.

Figure 1(a) depicts the negative relationship between contracting difficulty and privatization. It shows, for example, that after controlling for differences in the cities that provide different services, vehicle towing, waste collection and building maintenance are all relatively easy to contract and often privatized, while the reverse is true of police, fire, emergency medical services and code enforcement.

The figure also contains two notable, and interesting, outliers. One is legal services. The figure shows that it is relatively difficult to write a performance contract for legal services, yet these are frequently contracted out. A simple explanation is that while legal services are frequently contracted out, the contracts are the contracts are based on time rather than performance. The second outlier is parking lot operation, which is rarely contracted out, despite having low contracting difficulty. A natural explanation here is that outside of relatively large metropolitan areas, parking lot operation essentially doesn't involve any task that could be contracted. Once a parking lot is built, there is no need for an operator because parking is free.

Returning to our regression results, Table 4 also shows that in addition to finding a relationship between contracting difficulty and privatization, we estimate significant correlations between privatization and our other service characteristics. In particular, our measure of resident sensitivity to quality (proxying for the sensitivity s in the model) correlates with contracting practices in the manner predicted by the model, though an increase in our measure of sensitivity is associated with a shift away from private sector contracting toward only inhouse provision. This is consistent with the view that cities want control over the services that are more sensitive vis-a-vis resident responses. A one standard deviation increase in

sensitivity is associated with about a twenty-five percent decrease in the likelihood of private contracting (the estimated probability change is -5%).

In addition, services that are more "core", in the sense of being provided by a broader set of cities, are much more likely to be provided in house and much less likely to be provided by contracts with other public agencies. In particular, a one standard deviation increase in our "core" measure is associated with an increase in the probability of inhouse provision of 12% (an increase of about 20% in the likelihood of inhouse provision). Once again, this may be an indication of cities wanting to have control over core services that they provide.

Finally, "metropolitan" services — those that are provided primarily by large (densely populated) cities — are less likely to be provided inhouse and substantially more likely to be provided through private sector contracts. Note that this is not due to the characteristics of the cities providing these services — the effect is the same including city fixed effects. As discussed above, the services provided primarily by large cities tend to have more of a private good nature. So one explanation is that for many of these services, there is a private market in addition to public sector provision, which may make private sector contracts an attractive option.

C. Determinants of Privatization: Scale Economies

We argued that differences across cities in their ability to deliver services, and in the market conditions surrounding them, will affect their sensitivity to the basic predictions of our model. As indicated in the lower half of Table 4, larger and more urban cities are substantially more likely to privatize the provision of a given service. Cities that have more than fifty thousand residents are almost 20% more likely to contract privately (an increase of 4% in the probability of private) as compared with the omitted category of rural cities that have less than ten thousand residents. Similarly, cities in an MSA (Urban and Suburban cities) are about 15% more likely to contract privately (an increase of 2.7 and 3.4.% in the probability of private respectively) as compared with the omitted category. Conversely, smaller cities are more likely to contract for provision with another public agency, as are non-central cities within an MSA (Suburban cities), consistent with our fourth prediction that public services are a substitute to inhouse provision.

Recall that our third prediction was that economies of scale will have important marginal

effects on the mode of procurement. To get at this, we consider an alternative empirical specification where we regress the mode of provision (inhouse, public contract or private contract) on service characteristics and city fixed effects, letting the response to our three service characteristics vary with city characteristics. These results are reported in Table 5.

Our third prediction implied that larger cities are more likely to be sensitive to the trade-off between productive efficiency and contracting costs because they have sufficient size to make both private contracting and inhouse provision a viable option. The results in Table 5 are consistent with this conjecture. In particular, the smallest cities (with populations under 10,000) are slightly (and insignificantly) less likely to contract with the private sector or to provide inhouse when difficulties of contracting are higher, but more likely to provide the service with public contracting. Larger cities, however, are much less likely to contract with the private sector when contracting difficulties are higher and much more likely to provide inhouse. In particular, for a small rural city, a one standard deviation increase in contracting difficulty is associated with a 1.5% (insignificant) decrease in the probability of contracting privately. The change is more than twice as large (about 4%) for cities with a population between 25 and 50 thousand, and is over three times as large (about 6%) for a large city with a population over 50,000.

Moreover, strengthening the results from Table 4, these results are consistent with the idea that large cities substitute from private contracts toward inhouse provision, while very small cities that may lack the scale for inhouse provision, and substitute away from private to public contracting, consistent with our fourth prediction. It is also worth noting that Table 5 suggests that non-central cities within an MSA appear to respond strongly to differences in contracting difficulty, substituting from private sector to both public sector contracting and to inhouse provision.

D. Determinants of Privatization: Political Economy

As discussed earlier, our model of privatization decisions suggests a role for political forces in focusing attention on benefits of service quality and away from costs of provision. We have several variables capturing some aspect of political economy, including form of governance, city age, region of the country, city debt levels and resident voting patterns.

Recall our fifth prediction above was that cities run by mayors will be *less likely* to pri-

vatize services as compared to cities run by managers. As table 4 shows, this prediction is borne out in the data. Cities with an appointed manager are more likely to contract with both the public (by 1.3%) and the private (by 1.9%) sectors. Supporting our other political economy "level effects" predictions, younger cities (incorporated after 1950) privatize about 25% more than older cities (an increase of 5.4%), and cities with higher debt to revenue ratios privatize significantly more than those with lower levels of debt. The latter finding is consistent with a story that high debt levels constrain political opportunism by city administrators and force them to focus on costs (i.e. in the language of the model, act as if they had a lower value of s).

One striking finding in Table 5 is the amount of regional variation in city behavior. Cities in the west and northeast appear to behave quite differently from cities in the middle of the country. In particular, cities in the east are more likely to use private sector contracts and much less likely to rely on contracts with other public agencies. On the other hand, cities in the west are more likely to use contracts with both public and private sector providers. One alternative explanation offered to us by one western states city manager is that people in these states have a different political ideology, look less to government to provide jobs and services, and hence are more open to private sector contracting. An alternative explanations, closer to our theoretical model, is that these cities have a smaller public union presence, and hence politics plays a smaller role.

The above results also suggest an important role for political economy considerations in privatization decisions. One hypothesis we do not find support for, however, is that voter ideology plays a substantial role. In particular, there seems to be little correlation between voters' broader political preferences (as measured by voting patterns in the 2000 presidential election) and contracting practices. (We also obtained insignificant results using voting patterns from earlier presidential elections.)

In addition to making predictions about how political concerns would change the level of privatization, we argued above that greater political concerns would be likely to affect how *responsive* city administrators are to the economic trade-offs identified in the model. Thus, our sixth prediction was that cities with managers, younger cities, and cities with more debt would react more to differences in contracting difficulty across services. These interaction effects are reported in Table 5.

In general, our estimated coefficients are in line with our prediction, and the magnitudes are relatively large, but not every estimate is statistically significant. One effect that is highly significant is that the negative correlation between contracting difficulty and privatization is more than twice as large for newer cities as for older cities. The same is true if we compare cities with debt levels one standard deviation above the mean with those one standard deviation below the mean.

Finally, the negative correlation between contracting difficulty and privatization is also significantly larger for cities in the western states relative to the rest of the U.S. Interestingly, the substitution in these states appears to be more from private contracting to public contracting, rather than from private contracting to inhouse provision. This might be explained by a combination of two forces: first, that city administrators in these states face somewhat less binding political constraints and hence are more sensitive to economic trade-offs; and second, that there is more scope for cooperative agreements between public agencies in some of the western states.

E. Determinants of Privatization: Scope Economies

To conclude this section, a notable pattern in the data is that after accounting for city size and location, cities that provide a broader range of services are more likely to engage in private sector contracting for any given service. While this could be explained in a variety of ways, the effect seems particularly natural if contracting decisions for different services within a city are not made entirely in isolation and instead writing and administering contracts with private providers may become easier with experience. In that case, cities that provide more services are more likely to provide some services that are quite easy and appealing to contract for, making them more likely to acquire a level of experience with contracting that makes contracting for further services desirable. This was exactly our prediction seven above.

Our estimates in Table 4 show that the relationship between the number of services provided and the use of private contracting is reasonably strong. In particular, for every additional six services a city provides, its likelihood of privatizing any given service that it provides increases by 5%.

7. Conclusion

This paper has studied privatization of local government services. We develop a simple model that emphasizes what we believe to be a key trade-off between the productive efficiency induced by performance contracts and the low costs of contracting associated with employment. The model explains why contracting difficulties such as problems in monitoring performance, the need for flexibility, or a lack of a competitive market would lead to less use of the private sector. It also explains why greater sensitivity to service quality might push against privatization.

We use this model to interpret our empirical findings about the determinants of privatization for U.S. cities. Using data gathered from a variety of sources, we find that services that characterized by high "transactions costs" of contracting and services that are widely provided by cities in the U.S. are less likely to be privatized. Conversely, services associated with relatively high population density are more likely to be privatized. We also provide evidence that contracting to other public agencies appears to be largely a substitute for inhouse provision, rather than an analogue of privatization.

Perhaps most importantly, we find a substantial degree of heterogeneity across cities in terms of their contracting practices. In particular, large cities are more likely to privatize and appear more sensitive to the trade-offs identified in our model. We obtain similar results for cities that are government by an appointed city manager rather than an elected mayor, and for cities that were incorporated more recently. Finally, we provide indirect evidence that there may be spillovers in contracting practices within a given city, so that privatizing one service may make it more likely to do further privatization.

Our analysis leaves many questions open. For instance, our empirical analysis is purely cross-sectional; it would be interesting to study the dynamics of privatization decisions — for instance, to study whether economic shocks might drive privatization decisions. This could be done using our data. A more ambitious project would be to try to assess the direct costs and benefits of privatization decisions. This would probably require measures of service quality, which is one reason evidence on this front has to date largely been limited to case studies.

References

Bajari, Patrick and Tadelis, Steven, "Incentives Versus Transaction Costs: A Theory of Procurement Contracts." *RAND Journal of Economics,* Autumn 2001, 32(3), pp. 387-407.

Ballard, Michael J. and Mildred E. Warner, "Taking the high road: Local government restructuring and the quest for quality," in *Power tools for fighting privatization*, 6/1 –6/53. American Federation of State, County and Municipal Employees: Washington,DC, 2000.

Barzel, Yoram, "Measurement Costs and the Organization of Markets." *Journal of Law and Economics*, 1982, 20, pp.291-307.

Boycko, Maxim, Andrei Shleifer and Robert Vishny, "A Theory of Privatization," *Economic Journal*, 1996.

Brown, T. and M. Potoski, "Transaction Costs and Institutional Explanations for Government Service Production Decisions," *Journal of Public Administration Research and Theory*, 2003, 13(4), pp. 441-468

Brown, T. and M. Potoski, "Managing Contract Performance: A Transaction Costs Approach," *Journal of Policy Analysis and Management*, 2003, 22(2), pp. 275-297

Hart, Oliver, Andrei Shleifer and Robert Vishny, "The Proper Scope of Government: Theory and an Application to Prisons," *Quarterly Journal of Economics*, 1997.

Hefetz, Amir and Mildred Warner, "Privatization and Its Reverse: Explaining the Dynamics of the Government Contracting Process," *Journal of Public Administration Research and Theory*, 2004, 14(2), pp. 171–190

Holmstrom, Bengt and Paul Milgrom, "Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design." *Journal of Law, Economics, and Organization,* 1991, 7, pp. 24-52

Lazear,Edward, "Salaries and Piece Rates," *The Journal of Business*, 1986, 59(3), pp. 405-431.

Lopez-de-Silanes, Florencio, Andrei Shleifer and Robert W.Vishny, "Privatization in the United States," *Rand Journal of Economics*, 1997, 28(3), pp. 447–71.

Masten, Scott, "The Organization of Production: Evidence from the Aerospace Industry." *Journal of Law and Economics,* October 1984, 27(2), pp. 403-417.

Savas, E.S., *Privatization and Public-Private Partnerships,* Chatham, NY: Chatham House, 2000.

Sclar, E., *You Don't Always Get What You Pay For: The Economics of Privatization*, Ithaca NY: Cornell University Press, 2000.

Tadelis, Steven, "Complexity, Flexibility, and the Make-or-Buy Decision." *American Economic Review,* 2002 92(2), 433-37.

Warner, M. and R. Hebdon, "Local Government Restructuring: Privatization and its Alternatives," *Journal of Policy Analysis and Management*, 2001, 20(2), pp. 315-336.

Williamson, Oliver E., *Markets and Hierarchies*, 1975.

Williamson, Oliver E., *The Economic Institutions of Capitalism*, New York: Free Press, 1985.

Table 1: Summary Statistics for Cities (N=1068)

	Mean	Std. Dev.	Min	Max
City Characteristics				
Population (2000)	59,225	184,537	2,517	3,694,820
Area	24.3	46.9	0.5	607
Geographic Region				
East	0.05	0.22	0	1
Midwest	0.31	0.46	0	1
South	0.35	0.48	0	1
West	0.30	0.46	0	1
MSA Status				
Urban	0.21	0.41	0	1
Suburban	0.49	0.50	0	1
Rural	0.30	0.46	0	1
Form of Government				
Mayor	0.25	0.44	0	1
Manager	0.72	0.45	0	1
Other	0.02	0.14	0	1
Year Incorporated	1896	45.3	1699	1986
County Median Income (1997)	38,657	8,515	14,178	68,017
County % Republican (1988 election)	0.56	0.10	0.15	0.98
Debt Ratio (Long-term debt/Revenue)	0.91	0.78	0.00	5.75
Services Provided (all 64 services)				
Number of Services Provided	39.4	9.8	6	64
Method of Provision	37.6	9.8	6	63
Inhouse	0.64	0.22	0	1.00
Public	0.11	0.11	0	0.69
Private	0.20	0.15	0	1.00
Other	0.04	0.07	0	0.83
Service Provision (30 service subsample)				
Number of Services Provided	20.5	4.6	4	30
Method of Provision	19.4	4.7	4	30
Inhouse	0.63	0.23	0	1.00
Public	0.10	0.11	0	0.65
Private	0.22	0.16	0	1.00
Other	0.05	0.09	0	0.89

Sources: U.S Census, ICMA, U.S. Election Atlas, Google.

Table 2: Summary Statistics for Services

Service	# Cities Providing	Method of Provision			Service Characteristics			
		Inhouse	Public	Private	Difficulty	Sensitiv.	Core	Metro
Animal control	873	0.63	0.22	0.13	0.32	0.25	0.73	-0.44
Building security	740	0.77	0.02	0.21	-0.95	-0.74	0.28	0.27
Buildings and grounds maintenance	1028	0.66	0.01	0.31	-0.91	-0.38	1.26	0.12
Collection of delinquent taxes	594	0.41	0.41	0.18	-0.84	-0.61	-0.22	0.22
Commercial solid waste collection	569	0.34	0.01	0.44	-1.13	-0.22	-0.30	-0.10
Crime prevention/patrol	1042	0.89	0.07	0.00	2.11	0.93	1.31	-0.07
Drug and alcohol treatment programs	204	0.06	0.41	0.42	1.68	0.25	-1.54	1.89
Emergency Medical service	786	0.58	0.15	0.20	0.85	1.02	0.44	0.49
Fire prevention suppression	952	0.85	0.07	0.00	1.25	0.77	1.00	-0.09
Insect/rodent control	450	0.45	0.37	0.17	0.17	-0.18	-0.71	-0.22
Inspection/code enforcement	1036	0.87	0.04	0.08	1.52	0.24	1.29	0.03
Legal services	855	0.36	0.02	0.61	0.60	-0.85	0.67	0.09
Operation/maintenance of recreation facilities	996	0.75	0.06	0.10	0.20	0.30	1.15	0.07
Operation of daycare facilities	195	0.24	0.10	0.57	0.91	0.56	-1.58	2.24
Operation of libraries	645	0.58	0.30	0.03	0.37	0.42	-0.04	-0.07
Operation of museums	346	0.27	0.17	0.31	0.47	-0.10	-1.06	-0.57
Operation of parking lots and garages	418	0.73	0.04	0.20	-1.33	-0.74	-0.82	1.36
Parks landscaping and maintenance	1018	0.71	0.05	0.18	-0.89	0.08	1.23	-0.06
Programs for the elderly	589	0.33	0.23	0.23	1.19	0.36	-0.23	1.16
Residential solid waste collection	764	0.49	0.01	0.34	-1.17	0.77	0.36	-0.18
Sanitary inspection	503	0.53	0.42	0.05	0.41	-0.22	-0.53	0.02
Sewage collection and treatment	888	0.70	0.21	0.08	0.42	0.03	0.79	-1.30
Snow plowing/sanding	717	0.85	0.05	0.09	-0.37	-0.13	0.20	-1.32
Solid waste disposal	574	0.34	0.18	0.37	-0.58	-0.67	-0.28	-0.20
Street repair	1036	0.54	0.03	0.42	-0.23	0.31	1.29	-0.24
Street/parking lot cleaning	954	0.78	0.02	0.19	-1.08	-0.18	1.01	-0.29
Tree trimming/planting on public rights on way	957	0.48	0.02	0.44	-0.52	0.17	1.02	0.00
Utility meter reading	747	0.80	0.04	0.14	-1.41	-0.67	0.31	-1.21
Vehicle towing and storage	605	0.09	0.03	0.83	-1.41	-0.28	-0.18	0.85
Water treatment	797	0.79	0.14	0.06	0.33	0.38	0.48	-1.27

Sources: ICMA, Levin-Tadelis City Manager Survey.

Table 3: Provision of City Services

Linear Probability Model Provision of City-Services

	(1)		(2)	
	Coef.	**s.e.**	**Coef.**	**s.e.**
Service Characteristics				
Contracting difficulty	-0.055	(0.003)	-0.055	(0.003)
Resident sensitivity	0.154	(0.006)	0.154	(0.006)
Constant			0.678	(0.002)
			(3)	
			Coef.	**s.e.**
City Characteristics				
Population 10-25k	0.057	(0.009)	0.057	(0.008)
Population 25-50k	0.066	(0.010)	0.066	(0.009)
Population >50k	0.084	(0.011)	0.084	(0.010)
Manager	0.014	(0.006)	0.014	(0.005)
Other form of government	-0.001	(0.019)	-0.001	(0.016)
East	-0.030	(0.013)	-0.030	(0.011)
South	-0.023	(0.013)	-0.023	(0.012)
West	-0.064	(0.013)	-0.064	(0.011)
Urban	0.006	(0.010)	0.006	(0.008)
Suburban	-0.014	(0.007)	-0.014	(0.007)
Incorporated after 1950	-0.061	(0.007)	-0.061	(0.006)
County med. Income (10k)	0.000	(0.000)	0.000	(0.000)
City Debt/Revenue	0.003	(0.004)	0.003	(0.003)
Percent republican	-0.077	(0.028)	-0.077	(0.025)
Constant	0.739	(0.022)	0.743	(0.019)
			(2)	**(3)**
No. Observations	31770		32040	31770
R-Squared	0.029		0.128	0.253
F	54.0		327.7	29.8

Note: (2) includes city fixed effects; (3) includes service fixed effects.

Table 4: Effect of City/Service Characteristics on Contracting

Linear Probability Models for Frequency of Private and Public Contracting

	(1)			(2)		
	Inhouse	**Public**	**Private**	**Inhouse**	**Public**	**Private**
Service Characteristics						
Contracting difficulty	0.029	0.046	-0.075	0.028	0.045	-0.073
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Resident Sensitivity	0.044	0.007	-0.050	0.040	0.009	-0.049
	(0.008)	(0.005)	(0.007)	(0.008)	(0.005)	(0.007)
Core service	0.121	-0.115	-0.006	0.122	-0.115	-0.007
	(0.005)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)
Metropolitan service	-0.091	-0.039	0.130	-0.084	-0.041	0.125
	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.004)
Constant				0.573	0.170	0.257
				(0.004)	(0.003)	(0.004)
				(3)		
				Inhouse	**Public**	**Private**
City Characteristics						
Population 10-25k	0.018	-0.017	-0.002	0.014	-0.015	0.001
	(0.012)	(0.008)	(0.010)	(0.011)	(0.007)	(0.010)
Population 25-50k	0.013	-0.022	0.009	0.009	-0.021	0.012
	(0.013)	(0.009)	(0.012)	(0.012)	(0.008)	(0.011)
Population >50k	-0.017	-0.030	0.047	-0.019	-0.030	0.049
	(0.014)	(0.010)	(0.013)	(0.013)	(0.009)	(0.012)
Manager	-0.032	0.013	0.019	-0.035	0.014	0.021
	(0.008)	(0.005)	(0.007)	(0.007)	(0.005)	(0.006)
Other form of government	-0.023	0.003	0.020	-0.024	0.004	0.020
	(0.023)	(0.016)	(0.021)	(0.022)	(0.015)	(0.019)
East	0.012	-0.041	0.029	0.007	-0.049	0.042
	(0.015)	(0.010)	(0.014)	(0.014)	(0.010)	(0.013)
South	-0.003	0.012	-0.009	0.004	0.011	-0.015
	(0.009)	(0.006)	(0.008)	(0.009)	(0.006)	(0.008)
West	-0.065	0.041	0.024	-0.059	0.043	0.017
	(0.009)	(0.006)	(0.008)	(0.009)	(0.006)	(0.008)
Urban	-0.023	-0.003	0.027	-0.027	-0.001	0.028
	(0.012)	(0.008)	(0.010)	(0.011)	(0.007)	(0.010)
Suburban	-0.084	0.050	0.034	-0.078	0.048	0.030
	(0.009)	(0.006)	(0.008)	(0.009)	(0.006)	(0.008)
Incorporated after 1950	-0.110	0.056	0.054	-0.100	0.053	0.047
	(0.008)	(0.006)	(0.008)	(0.008)	(0.005)	(0.007)
Fraction of Services Provided	-0.320	0.210	0.110	-0.286	0.194	0.091
	(0.023)	(0.016)	(0.021)	(0.022)	(0.015)	(0.019)
County median income	-0.024	0.003	0.020	-0.024	0.004	0.020
	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.004)
Percent republican	0.002	0.003	-0.005	0.008	0.015	-0.023
	(0.035)	(0.024)	(0.032)	(0.033)	(0.023)	(0.029)
City Debt/Revenue	-0.014	-0.002	0.016	-0.015	-0.002	0.017
	(0.006)	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)
Constant	0.978	-0.009	0.031	1.032	-0.066	0.033
	(0.030)	(0.020)	(0.027)	(0.028)	(0.019)	(0.024)
No. Observations	19482	19482	19482	19482	19482	19482
R-Squared	0.126	0.097	0.104	0.221	0.173	0.245
Chi-Squared	140.30	104.99	113.00	54.57	36.98	26.05

Note: Specification (2) includes city fixed effects; specification (3) includes service fixed effects.

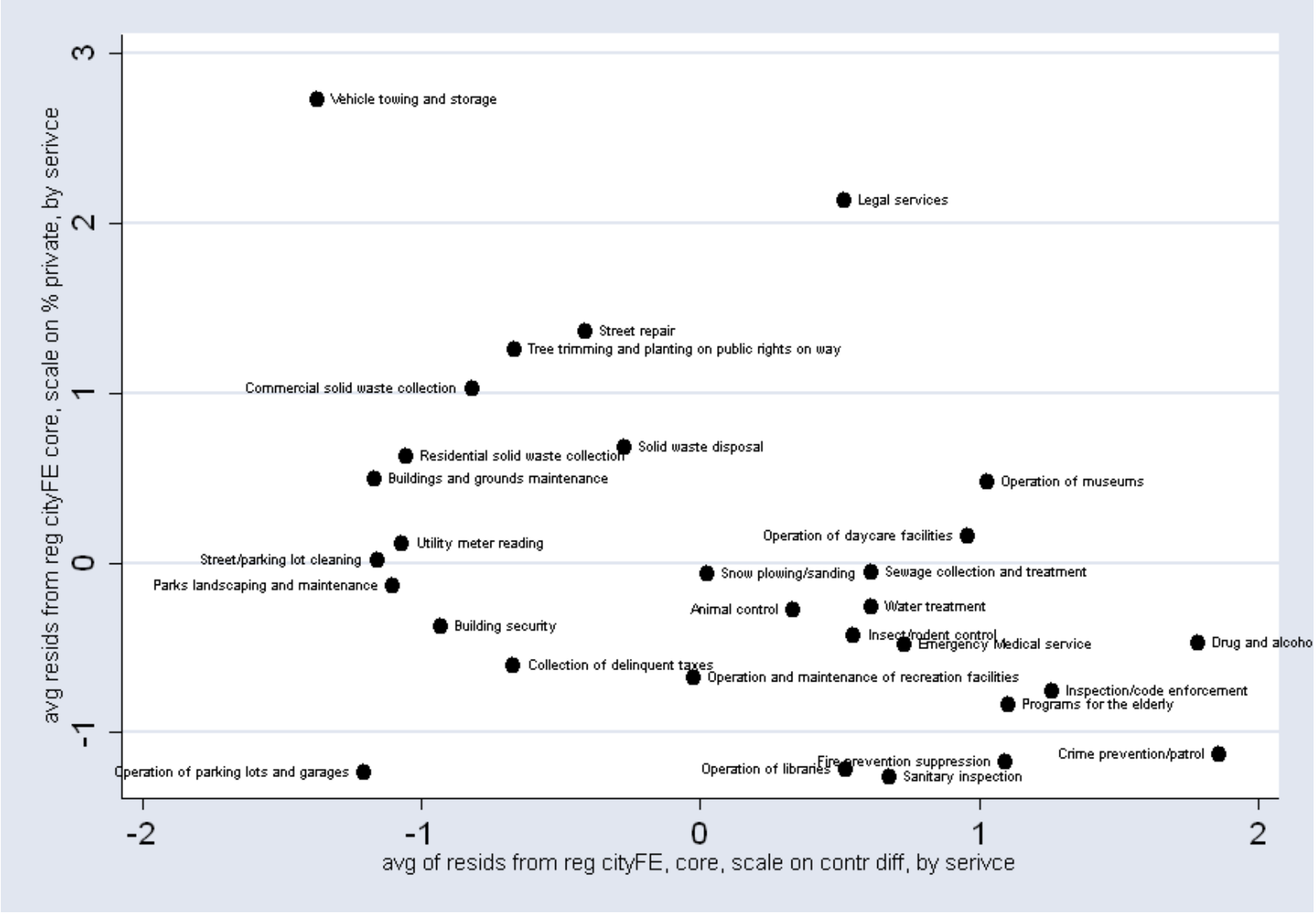
Table 5: Determinants of Contracting (Interaction Effects)

Linear Probability Models for Frequency of Private and Public Contracting

	Inhouse	Public	Private
Service Characteristics			
Contracting difficulty	-0.019	0.033	-0.015
	(0.012)	(0.009)	(0.011)
Resident sensitivity	0.040	0.009	-0.049
	(0.008)	(0.005)	(0.007)
Core service	0.123	-0.114	-0.009
	(0.005)	(0.003)	(0.004)
Metropolitan service	-0.084	-0.042	0.126
	(0.005)	(0.003)	(0.004)
City-Service Characteristics			
Difficulty * Population 10-25k	0.009	-0.009	0.000
	(0.011)	(0.008)	(0.010)
Difficulty * Population 25-50k	0.029	-0.004	-0.025
	(0.012)	(0.008)	(0.011)
Difficulty * Population >50k	0.054	-0.010	-0.043
	(0.013)	(0.009)	(0.012)
Difficulty * Manager	-0.005	0.011	-0.006
	(0.007)	(0.005)	(0.007)
Difficulty * Other FOG	-0.004	0.006	-0.002
	(0.022)	(0.015)	(0.020)
Difficulty * East	-0.003	0.001	0.002
	(0.015)	(0.010)	(0.013)
Difficulty * South	0.002	0.005	-0.007
	(0.008)	(0.005)	(0.007)
Difficulty * West	0.002	0.020	-0.021
	(0.008)	(0.006)	(0.008)
Difficulty * Urban	0.015	-0.014	0.000
	(0.011)	(0.008)	(0.010)
Difficulty * Suburban	0.023	0.010	-0.033
	(0.008)	(0.005)	(0.007)
Difficulty * Inc. after 1950	0.015	0.018	-0.033
	(0.008)	(0.005)	(0.007)
Difficulty * City Debt/Revenue	0.010	0.000	-0.010
	(0.006)	(0.004)	(0.005)
Constant	0.572	0.169	0.259
	(0.004)	(0.003)	(0.004)
No. observations	19639	19639	19639
R-Squared	0.285	0.204	0.238
F	108.46	86.37	117.99

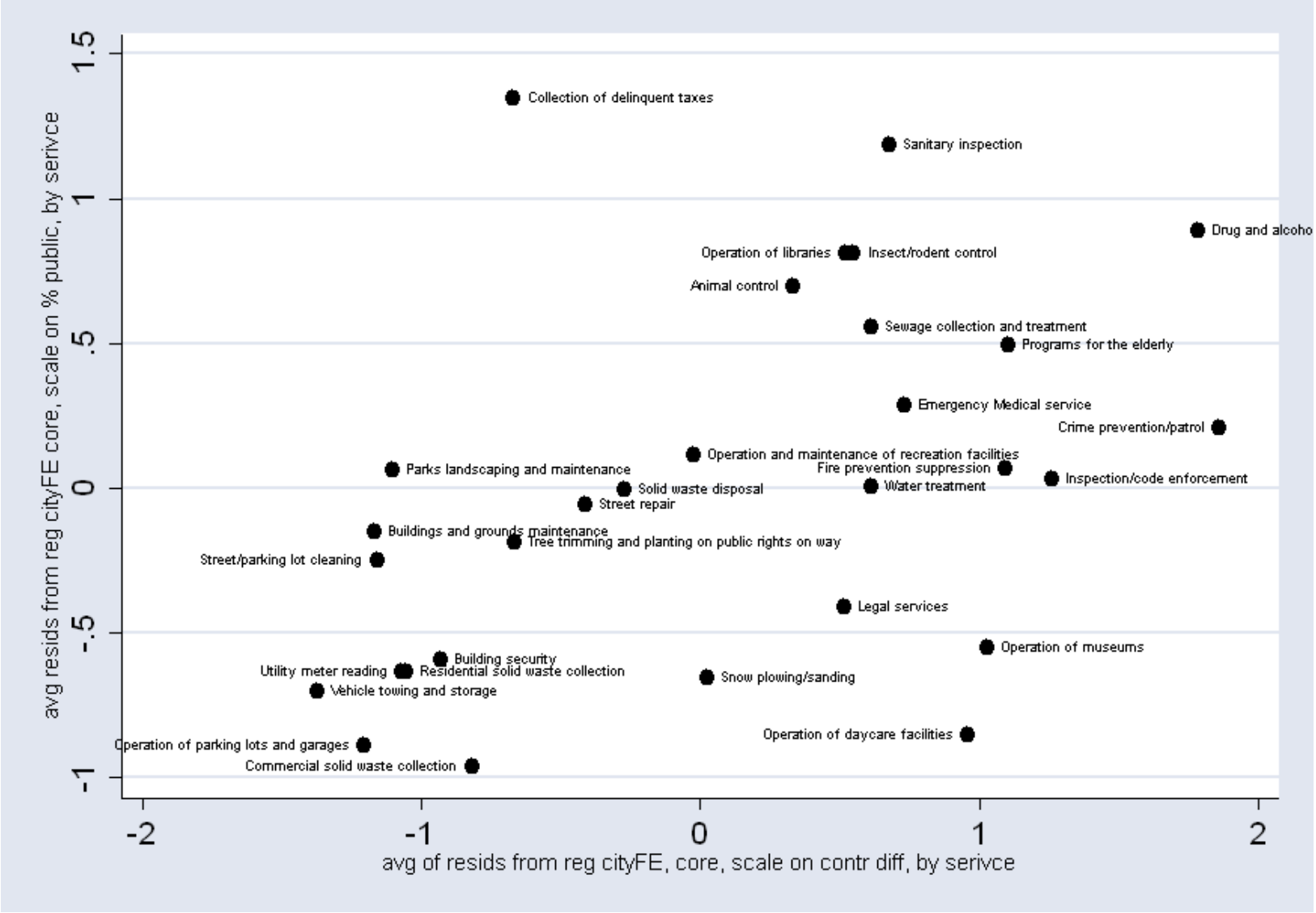
Note: Specification includes city fixed effects.

Figure 1(a): Contract Difficulty and Private Contracting



Explanation of Figure: The x-axis is the average for each service of the residuals obtained from regressing contract difficulty on service characteristics and city fixed effects. The y-axis is the average for each service of the residuals obtained from regressing a dummy for private contract on these same variables.

Figure 1(b): Contract Difficulty and Public Contracting



Explanation of Figure: The x-axis is the average for each service of the residuals obtained from regressing contract difficulty on service characteristics and city fixed effects. The y-axis is the average for each service of the residuals obtained from regressing a dummy for public contract on these same variables.

Figure 1(c): Contract Difficulty and Inhouse Provision

Explanation of Figure: The x-axis is the average for each service of the residuals obtained from regressing contract difficulty on service characteristics and city fixed effects. The y-axis is the average for each service of the residuals obtained from regressing a dummy for inhouse provision on these same variables.