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Picking up Savings:

The Benefits of Competition in Municipal Waste Services

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In this issue...

Municipalities that put waste service provision to competitive tender have substantially lower average costs per household than municipalities with few of their services provided through contracts.

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The Study in Brief

Municipal waste management has become the touchstone of the debate over the merits of public versus private provision of municipal services. Many major Canadian cities have contracted out some or all of their waste management services. This *Commentary* shows that where municipal employees provide the bulk of waste services, such as in the cities of Toronto (and many others in Ontario), Vancouver, and Calgary, municipalities could reduce the costs of their waste services through increased contracting. Contracting can also be used to attain other municipal policy goals, such as increased recycling rates, if municipalities are willing to provide incentive payments for contractors who meet specified goals.

Through a comprehensive analysis of the finances of all Ontario municipalities, this *Commentary* finds:

- Municipalities with fully contracted waste services have substantially lower average costs per household than municipalities with few of their services provided through contracts.
- Further, cost savings are particularly strong when collection services are provided by private contractors, but recycling and waste disposal contracting are equally cost-effective when contracted out to other nearby municipalities.

However, cost savings from contracting will be apparent only if municipalities follow certain guidelines. Contracts should be written in a manner that clearly defines municipally-monitored outcomes, and not specific processes, that contractors must meet. Municipalities might retain ownership of municipality-specific assets, such as landfills or waste-to-energy facilities, but contract out their operation, to prevent contractors from monopolizing local infrastructure that cannot be easily replaced. Municipalities can also retain a role for public employees in waste services by opening bidding for waste services to both private contractors and current public employees.

Municipal policymakers who contract out waste services through a well-designed contracting mechanism can reduce the costs of providing waste services and limit the consequences of municipal strikes.

The provision of waste management services by municipal employees is becoming much less common as modern Canadian cities increasingly contract out these traditionally government-run services to essentially private operators. But what benefits do municipalities derive by shifting this responsibility to the private sector? and how should this transition be managed?

This *Commentary* examines municipal waste services in Ontario to see if contracting out indeed reduces costs for municipalities. While municipalities that have fully contracted out their waste collection and recycling services tend to have the lowest average operating costs, they also expose themselves to the potential long-term costs of being held captive to contractors in later rounds of bidding, and a reduction in competition for contracts. Many of the issues on which individual municipalities must base their decisions are inherently local – for example, the terms of existing collective agreements with municipal employees, the amount of competition among private waste services providers, and the presence of nearby municipalities that can provide services through inter-municipal cooperation. The analysis shows, however, that Canadian municipalities would enjoy substantial cost savings by contracting out waste collection services to private hands, as long as the anti-competitive risks of doing so are addressed. Waste diversion and disposal services also could be provided at lower cost, through either private or inter-municipal contracting.

In contracting out, municipalities should ensure that there is a large number of bidders, that contracts do not entrench incumbent firms, and that important municipal goals, such as encouraging recycling or preserving public-sector jobs, are met. Municipalities also should design contracting procedures that allow for a tax-neutral comparison of public and private costs and provide for the monitoring and enforcement of contract terms.

The analysis in this *Commentary* relates almost exclusively to waste services provided to single-family residential houses or small-scale multi-residential apartments. The reason for this focus is that residents of these kinds of buildings usually do not have the option of making their own private arrangements for waste collection in lieu of paying for it through their taxes, and the services they receive are limited to those their municipal government provides. In contrast, many multi-residential, industrial, commercial, and institutional (ICI) waste collection services are provided on a private, fee-for-service basis. Multi-residential and commercial facilities that can choose to use municipal services often do so, but are also usually able to compare municipal fees to those for private pickup.

The Public and Private Provision of Waste Services

Waste management, perhaps the most visible of local government services, is a major component of local government spending: in 2007, Canadian municipalities spent more than $3 billion – about 5 percent of total municipal government expenses – on waste services, more than on public transit or housing (Statistics Canada 2008). Although waste management is the most common service that municipalities contract out to private providers, snow removal and the operation and maintenance of recreation facilities are also commonly provided by contract (Hebdon and Jalette 2008).

Waste services can be broken down into three stages: collection of solid waste from households and businesses; recycling (collection and processing) of plastics, papers, electronic waste, industrial and construction waste, organic materials, and so on; and disposal of non-recycled products at landfills or incinerators or their use in waste-to-energy facilities. Disposal covers a wide range of activities, from trucking waste to final sites to the operation of those sites.[1]

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1 See the appendix for a list of which waste services fall into each category.

In most of Canada, municipalities are responsible for waste services. In areas with two sub-provincial tiers of government – such as a regional, metropolitan, or county government – the responsibility often lies with the higher-level municipality, which usually collects the cost of the service as part of local taxes. Many municipalities also now employ user-pay systems, where the cost of waste services to users is based on the amount of waste they produce (see Kelleher, Robins, and Dixie 2005).

A 2004 survey found that 69 percent of Canadian cities and towns contracted out at least some disposal services, and 85 percent contracted out at least some residential and commercial waste collection; in still other cases, waste services are provided privately – that is, the municipality has no role in their provision. Surprisingly, perhaps, Canadian municipalities are more likely than their American counterparts to contract out for waste services (Hebdon and Jalette 2008).[2]

A Snapshot of Contracting Out in Canada

In all major cities in Canada except Calgary and Vancouver,[3] private contractors are responsible for at least a portion of the collection and recycling of waste from single-family residential areas (Table 1). That portion ranges from 20 percent in Toronto to approximately half in Edmonton, Hamilton, and Montreal, to full contracting in Peel Region[4] and Winnipeg. Municipalities often delineate geographic areas, such as neighborhoods, within their borders for which potential contractors bid to supply services. For example, Montreal contracts out waste services on a borough-by-borough basis, with about half the city now served by contractors; Winnipeg contracts out collection based on quadrants of the city. Often, economies of scale make it cost effective for a single contractor to provide multiple services. There is, however, a wide range of ownership and operation models for landfills and other final disposal sites. Many municipalities own and operate their own landfill facilities; in other cases, the municipality owns the site but contracts out its operation.[5] There is also a wide range of service levels that municipalities offer that may affect the waste costs per resident (shown in Table 1).

One of the reasons for the increasing popularity of contracting out could be the fractious state of labour relations in many Canadian cities. Since 1979, there have been 720 strikes by municipal workers – including at least seven major stoppages in Toronto and its amalgamated municipalities, five in Montreal, and three in Vancouver – and the average length of a strike was approximately two months. Not all involved waste services employees, but strikes by municipal employees halted garbage collection in Vancouver in 2007, in Windsor in 2009, and in Toronto twice during the past decade.

2 A survey of US local governments conducted in 2007 found that 29 percent of inner-city governments, 57 percent of suburban governments, and 39 percent of rural local governments privately contracted waste collection (Warner and Hefetz 2009). The level of service contracting exists on a continuum of nearly exclusive provision of services by municipal employees to municipalities that do not even have employees but contract out all services – examples at the latter end include Maywood, California, which has no direct employees ("Municipal Finances: There Goes Everybody," *The Economist*, July 8, 2010), and Sandy Springs, Georgia, where all services except for police and fire are provided through a private contractor (Stanek and Gilroy 2005). Walls, Macauley, and Anderson (2002) find that, in the United States, local governments that own and operate landfills or other disposal sites are more likely to have municipal staff provide waste and recycling collection services.

3 Calgary had private (not contracted) residential recycling collection until 2009, when it introduced municipal-wide single-family residential recycling collection exclusively by public employees. In Vancouver, solid waste collection in most multi-residential buildings is contracted out, and the city has contracted out multi-residential recycling collection in the downtown core.

4 Peel Region, a regional municipality west of Toronto, provides all waste services for residents of Mississauga, Brampton, and Caledon.

5 Examples of publicly owned, privately operated waste processing facilities are the Edmonton Waste Management Centre; the Glanbrook Landfill in Hamilton, Ontario; the Peel Integrated Waste Management Facility, Peel Region, Ontario; and Toronto's Green Lane Landfill. Private contractors also often own landfill facilities. Metro Vancouver uses a privately owned and operated landfill in the BC interior that was due to shut down in 2010, although recent expansion plans will lengthen its operating life by at least a decade (British Columbia 2010). The regional Metro Vancouver government, which is responsible for planning waste services in the area – although not direct waste service provision, which is a local municipal responsibility – is moving forward with plans for a new disposal site for area municipalities, and is considering various degrees of private involvement with respect to both landfills and the construction of a waste-to-energy facility at an estimated capital cost of nearly $500 million (Levelton 2010) and potentially a 20-year contract with the operator (Canadian Union of Public Employees 2010).

Table 1: Waste Service Contracting in the Nine Largest Canadian Municipalities

	City of Vancouver	City of Calgary	City of Edmonton	City of Winnipeg	City of Hamilton	Peel Region	City of Toronto	City of Ottawa	City of Montreal
Single-family solid waste collection	All public employees	All public employees	approx. 50% contracted, approx. 50% public employees	All contracted	approx. 50% contracted, approx. 50% public employees	All contracted	approx. 20% contracted, approx. 80% public employees	approx. 85% contracted, approx. 15% public employees	Approxi-mately half of boroughs contracted
Recycling	Single-family residential: all public employees. Multi-residential: contracted downtown, public employees elsewhere	Private until 2008, now all public employees	approx. 50% contracted, approx. 50% public employees for single-family residential	All contracted	All contracted	All contracted	approx. 20% contracted, approx. 80% public employees	approx. 85% contracted, approx. 15% public employees	Mostly contracted
Disposal	Publicly collected waste disposed at municipally owned and operated landfill, recycling to contracted facilities	Municipally owned and operated	Contracted operation, municipally owned fully integrated waste disposal site	Municipally owned and operated landfill, some waste to private landfill	Contracted operation, municipally owned	Contracted service to privately owned and operated disposal sites	Private contractors for haulage, landfill contracted operation, municipally owned	Two municipally owned landfills. One with contracted operation	Mix of private and municipal owned landfills
Total annual waste cost per resident ($ per person)	92	71	135	57	91	79	127	53	95

Note: Municipalities also offer different levels of service not controlled for in estimating costs per resident. Total costs (and prices) of waste services are authors' calculations from 2008 municipal gross total waste services (collection, diversion and disposal combined) operating and 2008 capital expenses on a non-amortized basis. Sources: British Columbia Ministry of Community and Rural Development Local Government Statistics, Alberta Municipal Affairs, City of Winnipeg 2009 Operating Budget, Ontario Ministry of Municipal Affairs and Housing Financial Information Return, Ville de Montreal 2009 budget (includes Montreal City Council and Urban Agglomeration Council expenses); Total population is from 2006 Census for all municipalities; contracting information from municipal waste service reports, Ontario Ministry of Municipal Affairs and Housing data for Ontario cities, and author's conversations with municipal staff.

The incidence of strikes has been declining, however, with an average of 29 per year between 1979 and 2000 but fewer than 10 per year since 2000. Nonetheless, 7.4 million municipal employee worker-days have been lost to work stoppages nationwide since 1979.[6]

Principles and Practices of Waste Services Contracting

Competition motivates firms to keep prices low or to improve service at a given price. Unlike normal market competition, however, government contracting in waste services entails competition for access to the market. Once a firm holds a contract, it is the only provider for the duration and coverage

6 These data are from Human Resources and Skills Development Canada (HRSDC), which has logged approximately 10,000 public and private strikes since 1978 where at least four worker-days were lost; see Dachis and Hebdon (2010) for a summary of the data on strikes.

area of the contract. In granting that exclusive right, a municipality therefore should define terms that encourage the contractor to provide high-quality service. The contract also should reflect the inherent limitations associated with the inability to foresee and cover every eventuality, provide for the enforcement of its terms, and spell out the cost savings, quality of service, and public employment goals the municipality seeks.

Contract Incompleteness

In theory, municipalities could negotiate contracts that specify the exact terms of the appropriate response to every possible contingency. In practice, however, all contracts are subject to some uncertainty (Williamson 2002). Again in theory, the contracted and the contractor could reach an ideal contract through renegotiation in later years so long as there was some degree of risk sharing, no contract-specific assets, and information on contract performance that was verifiable by outside observers such as citizens or the courts (Hart and Moore 1988). This renegotiation would occur throughout the life of the contract and it would be in the best interests of both parties to come to an agreement, as each would want to obtain future contracts, knowing that any given negotiation was just one of a series of negotiations. In the absence of such conditions, a municipality should hesitate to enter into a contract that involves assets that cannot be reused by other contractors or redeployed by the same contractor in another municipality. In contrast, services that use assets that can be used by multiple municipalities are good candidates for contracting out so long as service performance can be measured.

The terms of a contract that are not explicitly specified – where the right to decide on the meaning of undefined terms rests with one party to the agreement – are known as "residual powers" (for a discussion, see Hart 2003). Residual powers that leave penalties open ended or at the sole discretion of one party could drive out possible contractors or derail a municipality that fears potentially high liabilities for an outcome over which it might have no control.[7] In a well-designed contract, the allocation of residual powers might encourage better performance. A typical feature of recycling contracts, for example, is that service providers retain residual rights over recycled products – that is, they may bring to market the valuable recyclables that they collect – which gives them the incentive to bring in more recycled material than they otherwise might and thereby increasing the amount that is diverted from landfills and incinerators.[8]

At the same time, a contract that is too specific about how services must be provided – for example, by designating the use of particular trucks or types of technology – reduces opportunities for innovation by contractors. Instead, contract terms should specify standards of outcomes, such as the frequency of service, the number of customer complaints, and other clearly definable goals that municipal staff, not just the contractor, can measure (see Walls 2003). For example, the municipality could provide incentive payments for recyclable products that the contractor actually sells to the recycling market, rather than paying for recyclables simply to be collected, since they could be disposed of in landfills.

Finally, in requesting bids for a service contract, the municipality should be clear about the criteria it will use to choose among competing tenders and about the relative value it places on the quality of service as opposed to low cost, so that bidders can set out the appropriate service scenarios, for which they might offer separate prices.

7 For example, Calgary's request for proposals for city-wide recycling pickup had unclear conditions on how service complaints would affect the liability of contractors. This potentially large liability led large waste contractors not to bid for the work (letter from John Hooper, Calgary district manager, Waste Services, Inc., to the City of Calgary, November 21, 2006. Provided by the Canadian Federation of Independent Business).

8 Secondary market prices, however, are notoriously volatile, as demonstrated by the collapse of prices of recycled products in 2008. A greater reliance on secondary markets to generate revenue thus increases the potential risk for contractors, which could require municipalities to offer offsetting terms that reduce revenue volatility in the initial service delivery contract.

Monitoring and Enforcing Contract Performance

A principal difficulty with contracting is to ensure that the contractor complies with the terms of the contract. One benefit of having a private contractor provide a service, while government provides oversight, is that the provider and regulator are then separate bodies, which reduces the chances of an internal conflict of interest, such as when a municipality finds that it needs to discipline itself for poor service delivery. However, monitoring and negotiating the terms of a contract entail costs that municipalities would not incur if municipal staff provided the service.[9]

Contract compliance can be enforced through, for example, explicit penalties for failure to meet service obligations ranging from monetary loss for minor infractions to the revocation of the contract for repeated or significant service failures. At the same time, many factors that determine performance are beyond the direct control of contractors, which the contract's terms should take into account. For example, recycling rates are affected by municipal and provincial regulations on how to sort and clean recyclable products, by the mix of multi-residential and single-family housing, and by municipal recycling campaigns. In sum, contracts that specify outcomes that are unrelated to the effort the contractor provides are likely to fall short of targets that otherwise would be possible to attain.[10]

Contracting Out and Labour Relations

The key to better service is not necessarily private operation, but an environment that encourages both public and private providers to innovate by improving service quality relative to costs. Indeed, in managed competition, public employees bid alongside private contractors and often win out: in both the United Kingdom and the United States, public employee unions historically have won between 70 and 90 percent of contracts openly tendered (Segal, Ifelayo, and Pescheck 2004; Bel and Warner 2008). Efficient groups of public employees may expand their operations beyond their own municipality and offer their services region-wide.

A municipality that cannot step in if a provider fails to meet the terms of the contract risks leaving its residents without the service if another contractor is not immediately available. That possibility argues for a municipality's retaining a core group of public employees as a backstop in case of a contractor's failure to meet the contract, or if the contracting market becomes less competitive in later rounds of bidding, making municipal operation more cost effective.[11]

Many current municipal labour contracts make it difficult and expensive for municipal workers to be laid off. Workers who cannot be cost-effectively laid off or retrained for other municipal departments could form a public work crew that could compete alongside private contractors. Jalette and Warrian (2002) found that approximately half of municipal government collective agreements did allow for contracting of services in 1998, up from less than one-third in 1986. However, approximately half of collective agreements and employees covered by all types of collective agreements (in 2001, and for a broader range of collective agreements than just those in municipal governments) did not permit contracting out if this resulted in a loss of work hours or jobs.

In addition, Moore (1999) found that of over 2,200 employees in a number of local government services in the US in the 1980s that were contracted out, 7 percent of government workers were laid off, and a further 7 percent retired. Sixty percent of public employees affected by contracting went to work for the private contractor and one-quarter were placed in other government positions. Hebdon (2006) finds that among local government employees in the state of New York affected by contracting between 1990 and 2000, 4.5 percent were laid off, 36 percent were retrained for other jobs in the same government and 23 percent moved to the private firm. Overall, Hebdon (2006) finds

9 Such transaction costs represent, on average about 2 percent of the value of a contract (Wingerter 1991).

10 For an excellent overview of how US municipalities have structured performance measurement in waste contracts, see Walls (2003).

11 In fact, during the last decade American cities have been contracting work back in at a faster rate than they have contracted out (Hefetz and Warner 2007). This is not necessarily a failure of competitive contracting as the ability to bring work back in-house lets contractors know their jobs are always on the line. The return of services in-house may be a result of lobbying pressure (Hebdon and Jalette 2008).

that their wages and benefits did not appreciably change and that the results were not as bleak for workers as others he cites predicted, but that there were still some workers laid off or who received lower wages. Municipalities concerned with preserving jobs could create contracts that would permit municipal employees the right of first refusal on jobs offered by private contractors, or would provide other incentives for the contractors to hire displaced workers.

Contracted services are not strike free. Many private waste service providers employ unionized workers who have the full right to strike – as recently as mid-August, 2010, one of Ottawa's private waste services providers, Waste Management, Inc., was threatened by a stoppage.[12] A municipality also could require, as a contract term, that the private provider have a collective agreement in place with its employees that covers the duration of the service contract or that the contractor have a contingency plan to ensure services are provided as normal during a strike.

Municipal Operating Costs versus Contracting Costs

A municipality ought to be able to quantify how much might be saved by contracting out services instead of providing them itself. The calculation, however, is not a simple matter of comparing the gross cost per tonne or per household of waste services. Contracting out also could entail, depending on the labour contract in place, severance pay to workers who are transferred out of their jobs, as well as a change in pension costs. Contracting out also might lead to higher administrative costs.

Moreover, capital costs are accounted for differently in the private and public sectors. A municipality might have a lower cost of borrowing than private companies do, allowing it to invest in larger and newer vehicle fleets, for example. As well, unlike a corporation, a municipality often does not amortize capital costs over the useable lifetime of an asset, making the true lifetime cost unclear in annual budgets.[13] A municipality also does not pay the same taxes that a corporation does,[14] potentially disadvantaging private contractors in bidding – indeed, the exemption of municipalities from taxes levied by higher-order governments is an implicit subsidy of municipal services in place of private contractors. The solution to this is to have public departments, when bidding alongside private contractors, include in their bids the taxes that private contractors would have to pay. The inclusion of these other taxes might make the public sector bids more expensive from the standpoint of the municipality – as a Dutch study by Dijkgraaf and Gradus (2007) shows – but it would remove the implicit subsidy to municipal operation and make the overall contract costs neutral.[15]

Maintaining Competitive Services Provision Over Time

Waste management contracts raise the potential for anti-competitive behaviour by private operators, leading to higher costs for municipalities. For example, privatization in areas of Spain with little competition resulted in progressively declining savings from contracting (Bel and Costas 2006); in the Netherlands, the cost savings from contracting out were substantial at first, but collusion among, and entrenchment of, private contractors led to reduced cost savings over time (Dijkgraaf and Gradus 2007). With disposal contracts, in particular, a contractor's

12 However, the strike was averted. See "Possible strike won't affect garbage pickup," *Ottawa Citizen*, July 11, 2010; available online at: http://www.ottawacitizen.com/business/Possible+strike+affect+garbage+pickup/3263109/story.html

13 In 2009, municipalities in Canada switched to a full accrual accounting system for financial reports, which include amortization costs. Municipal budgets, however, are still not required to, and often do not, use full accrual accounting.

14 Ontario municipalities receive a rebate on the goods and services tax (GST) they pay, and an amount equal to 78 percent of the harmonized sales tax (HST) they pay. They also do not pay corporate income taxes. Moreover, a corporation that is willing to provide a contracted service also expects to earn a profit from doing so, and to have that profit taxed, whereas municipalities have no such expectations.

15 To implement this, municipalities would need to include GST and HST paid, less any rebate they would receive, in their bid amounts. To calculate the equivalent corporate taxes, municipalities could estimate the corporate taxes due on a given rate of return on the value of the bid that would approximate corporate profits. Municipalities would also have to compare contractors' costs with existing municipal costs by including interest on funds to purchase vehicles, rent for buildings, and the opportunity costs of assets to create a comparable public cost of waste services. This calculation, however, does not take into account different economic costs of taxes used by different levels of government that finance either the municipal sales tax rebates or the municipal expenses on waste services.

ownership of a local disposal site could increase the cost of service in later rounds when other disposal sites cannot be built easily. Conversely, contracting out the provision of services while maintaining ownership of facilities increases the risk that a contractor will reduce costs for the duration of the contract in a way that increases long-term costs – for example, by not properly maintaining the facility it operates under contract (Hart 2003). These risks can be partly ameliorated through contract terms that specify asset conditions at the start and end of the contract or that specify liabilities to a contractor for its actions that have long-term costs to the municipality, the environment, or subsequent contractors.

One way to encourage competition and a diversity of bidders is to split collection contracts into large areas on which major waste operators may bid, and into smaller districts where contractors of different sizes might be competitive with one another[16] – although the need for economies of scale means making a tradeoff between competition and the most cost-effective size of operation.[17] Similarly, the contract duration must strike a balance between being long enough to permit a contractor to recoup its investment in capital, but short enough that a contractor does not have a lengthy monopoly on the market.[18] One solution to providing city-specific assets is for municipalities to maintain ownership, but to contract out staff operations of immobile and specialized capital, such as disposal sites, and to have only basic bid criteria on the need for other assets, such as trucks, that allow capital assets to be used by multiple municipalities.

The Evidence on Contracting Out Waste Services

In a 1997 survey of 279 Canadian cities, 59 percent relied exclusively on collection contractors, 13 percent had a mixed public-private arrangement, and 25 percent had exclusive public provision (McDavid 2000, 2001). Private solid waste contractors were 20 percent less costly to municipalities than public workforces, due to the former's younger vehicle fleets, greater vehicle capacity, fewer workers per truck, and (on average) one-third more households serviced per collection crew, suggesting higher capital investment and productivity on the part of private contractors.

In a survey of Ontario waste providers, Dewees, et al. (1993) found that hourly wage and benefit costs for private contractors were 30 percent lower than those for public employees, total labour costs were 40 percent lower for private contractors,[19] and the number of waste pickups per route and the number of routes completed by private contractors were double those by public employees. Moreover, public employees took substantially more sick days per year (14) than did private contractor employees (2). Although capital costs per truck were slightly higher for private contractors than for public employees for trucks of the same capacity, capital costs per tonne were lower because of higher collection rates per worker and per route for private operators.

There are, however, relatively few savings from contracting out residential recycling pickup and landfill operation (McDavid and Laliberte 1998, 1999; McDavid and Mueller 2008). Factors that contractors cannot control, such as the share of a city's population that recycles and how much and what must be recycled, are more important determinants of cost than the choice of public versus private provider.

The international evidence on cost savings from waste contracting is slightly more mixed, but 12 of 18 studies from eight different countries surveyed by Bel and Warner (2008) find that costs were lower for contracted waste services than for services provided by public workers without a competitive tendering process. Privatization alone does not reduce costs, but much evidence shows that the

16 Bel and Fageda (2008) find that, in Spain, large national waste firms are especially prominent in large markets with waste contracting, but that smaller firms are more prevalent in smaller towns with contracts.

17 In Indianapolis, managed competition resulted in city staff submitting the lowest bid in four out of 11 waste districts, but, like all operators, they were limited by local rules to holding a maximum of three contracts (Savas 2005).

18 Ottawa, for example, tenders out waste and recycling collection contracts for six-year periods.

19 The more recent data I have collected on municipal waste services in Ontario municipalities, as discussed later in the paper, do not provide information on wage rates of municipal or contracted employees, unlike previous Canadian studies.

existence of a competitive tendering system results in cost savings provided by either public employees or private contractors. As well, in the case of private contractors, cost savings can occur because of better use of technology and higher worker productivity arising from more flexible work practices.

To update these past surveys, I conducted an empirical analysis of municipal waste services in Ontario using the most recent available data. I look first at the degree of competition in the Ontario municipal waste contract market, and then turn to the relationship between average municipal costs and the extent of contracting out.

Competition in the Ontario Waste Management Industry

A frequent concern about municipal waste contracts is that the market might not be competitive, resulting in possible collusion among market participants and higher prices for contracting municipalities.[20] Economic theory suggests, however, that the likelihood of collusion can be reduced by increasing the number of market participants and bidders on contracts. Backing this theory, McDavid (2000, 2001) found that contracts with at least five bidders had costs that were 29 percent lower per household than contracts with only one or two bidders, and that 79 percent of municipal waste contracts put out to tender received at least three bids.

To update these findings, I obtained the bid results of a number of recycling, waste, and organic collection contracts in Ontario, and used a standard objective metric called a Herfindahl Index to measure the extent to which the market is concentrated in a few firms.[21] Using the annual market value of waste contracts reveals that the Ontario waste collection industry has a Herfindahl Index of 1609, a value that represents a "moderately concentrated" sector. In the United States, for example, the Department of Justice considers a market to be "concentrated" if the Herfindahl Index is above 1800.[22]

The degree of competition also depends on the size and scope of the market. My analysis assumes that the market is Ontario-wide and that the scope of services provided includes all types of residential collection, a justifiable measure in that the province's municipalities use similar workforces and equipment and in that non-fixed equipment is likely mobile across the province. Indeed, many of the same companies bid on waste collection contracts all over the province.[23] One should caution, however, that such an arbitrary definition of the market obscures the possibility that local markets might have little competition. If price-fixing were to occur in local markets, economic theory would suggest that providing immunity policies for the first firm to disclose information on price fixing cartels would offer an incentive to break the cartel and inform the Competition Bureau, thus weakening competitors in the cartel. As the number of firms bidding for a contract increases, it would become harder to maintain an implicit or explicit agreement to keep prices high, as the gains to an individual member of remaining in the cartel would shrink. In sum, the market for waste collection services in Ontario does not appear to be heavily concentrated, although it does appear to be moderately concentrated. Competition in the sector could be increased,

20 In Winnipeg, for example, commercial solid waste collection businesses complied with a Competition Bureau request to change contract length and renewal terms that stymied competition (Competition Bureau 2008a, 2008b). Waste operators also operated under consent orders from the Competition Bureau to divest landfill assets and offer cost-based access to landfills following two separate mergers (Competition Bureau 1997, 1998).

21 The index is calculated as the sum of the squares of the market shares of each market participant. For example, if, among four firms, two each held 25 percent, one held 20 percent, and one 30 percent, the Herfindahl Index would be 2550 ($25^2 + 25^2 + 20^2 + 30^2$). In the analysis, I use bid results for 18 separate contracts for a range of cities in Ontario from a survey of private waste operators and 37 recycling contracts provided by Waste Diversion Ontario (REIC Perth 2005). Although this is just a sample of the contracts offered in Ontario cities, the information on these contracts comes from contract winners, losers, municipalities themselves, and from a province-wide waste division agency, suggesting that the sample is representative of waste service contracts in the province.

22 See United States, Department of Justice, "The Herfindahl-Hirschman Index;" available online at http://www.justice.gov/atr/public/testimony/hhi.htm

23 Bid results for municipalities in northern Ontario are unavailable.

however, if municipalities took steps such as limiting the amount of local market share that an individual contractor may obtain or splitting contracts into a mix of large and small that would open them to a wider range of potential bidders.

Waste Services Contracting and Municipal Government Costs

To assess how contracting out affects the costs to municipalities, I looked at data covering the period 2001 to 2008 from each municipality's Financial Information Return (FIR), a standardized form of the Ontario Ministry of Municipal Affairs and Housing (OMMAH) that all municipalities complete annually. The FIR provides operating costs, capital expenses, and other statistical information.[24] It also provides details on the amount spent on contracts by type of service, whether that be waste collection, diversion (recycling), or disposal,[25] so I omit municipalities that report only consolidated operating costs, rather than costs for each service. Some municipalities also report on cross-boundary service agreements, whereby they purchase, receive, give, sell, or provide waste services jointly with other municipalities. Further, most Ontario municipalities report – as part of the Municipal Performance Measurement Program (MPMP), also administered by the OMMAH – the number of tonnes of waste they collect, recycle, and dispose of; see the appendix for details on the classifications of services and data used.

In comparing private versus public costs, capital costs present a particular difficulty. Municipalities report their annual capital spending on waste services on a different basis than do private companies, whose costs are reflected in their bid price. Because the initial capital stocks of cities are not known and therefore cannot be amortized appropriately, I use unamortized annual capital expenses as the estimate of municipal capital costs. This is likely to be a fair approximation for cities that maintain constant levels of capital stock, as the annual expenditure amounts would represent the replacement investment per year. Other methods of amortization or estimates of capital costs, in fact, do not change the results. Thus, to approximate public capital and private costs, I use the reported annual capital expenses of municipalities in the empirical tests presented below.[26]

The Ontario municipalities that I analyze collectively spent nearly $1 billion on waste services in 2008, over $600 million of it on contracted services. It was not possible, however, to identify those municipalities whose staff won a contract to provide services, thus not necessitating any contracting out. Hence, in my dataset, expenditures on municipal staff who win tendered contracts are not recorded as contracted expenses. As McDavid (2001) shows, however, mixed private-public operations are much rarer forms of service provision in Canada than exclusively private or public operations, suggesting that this assumption does not result in substantially underestimating the percentage of budgets that are subject to a contracting process. If anything, this potential underestimation problem makes it more likely that I will not find benefits from the contracting process and, therefore, could underestimate the cost savings from contracting out.

24 Specifically, I looked at net operating expenses, which include revenues that municipalities earn on the sale of recyclable materials. Although the FIR has changed little since its introduction in 2000, there were many inconsistencies in the data reported that year, so I exclude it from the analysis. The most recent and most comprehensive survey of Canadian municipal waste services is that of McDavid (2000, 2001), but the single year of data available to him did not permit an analysis that controls for city-specific factors that are constant over time. However, because McDavid surveyed a number of municipalities, his work has a broader range of information for cities across Canada (not just Ontario), such as wages, the number of workers, types of trucks used, unionization, and the type of services offered.

25 Some Ontario municipalities allocate general city-wide administrative costs to each individual department. This is known as 'allocation of program support.' Municipalities allocate general government expenses to departments on a different basis; the analysis conducted in this paper excludes these general administrative expenses. There is little correlation between reported amounts of allocation of program support and the percentage of budgets that are contracted out, making this a reasonable approach.

26 In estimating capital amortization, I regarded 10 years as the useful asset life of waste facilities and vehicles, on the same basis as the US Internal Revenue Service in its depreciation tables, available online at http://www.irs.gov/publications/p946/ar02.html

COSTS AND CONTRACTING OUT IN ONTARIO MUNICIPALITIES: I measure municipal contracting by the percentage of each municipal waste division's operating costs that is spent on contracted services. For example, if a municipality reports that its only waste service expense is for contracted services, I report it as having 100 percent contracting; conversely, I assume that a municipality that reports no expenses on contracted services has zero contracting. The extent of contracting out changed little in Ontario for most services from 2001 through 2008, with the only noticeable increase coming in waste diversion: on average, 76 percent of waste diversion budgets were contracted out in 2001, rising to 83 percent in 2007.

Costs per tonne of all types of waste services are lower in cities in the top quartile of those that contract out than in cities in the bottom quartile (see Table 2). Except for waste diversion, the same is true for costs per household. Unlike waste diversion and collection services, more than 80 percent of which is contracted out in three-quarters of the cities in the sample, the contracting rate for disposal services exceeds 50 percent in fewer than half. A caveat: municipalities in the top quartile of diversion and collection contracting happen to be cities with low population densities, thus possibly resulting in different cost structures for these municipalities that could be the main determinant of cost savings.

ISOLATING THE COST SAVINGS FROM CONTRACTING OUT: Inter-municipal comparisons have a number of limitations. For example, the services municipalities offer differ: some might have an organic solid waste collection program such as the "Green Bin" in Toronto and Ottawa; others might have a more comprehensive recycling pickup program that result in higher costs per household or per tonne. Municipalities could also have higher costs owing to specific local factors, such as landfills or transfer stations in remote areas. Large, dense municipalities likely will have operating structures and costs that differ from those of small, less dense rural areas, making direct comparisons more difficult.[27] These characteristics also vary with the degree to which municipalities contract out. To control for these problems, I look at the data from a municipality over a seven-year period to see how costs per tonne or per household changed with changes in the share of the budget that is contracted out, and control for characteristics of municipalities that do not change much over time, such as average density or size.[28]

In the following analysis of how contracting relates to average costs, I apply a hypothetical test that compares one municipality that fully contracts out expenses and another that has no contracted expenses; in all other respects, the two are similar. In reality, most municipalities contract out an amount between these extremes; thus, the estimated costs savings presented below apply only to that portion of a municipality's waste budget yet to be contracted out. For example, a municipality that has already contracted out 50 percent of its waste services budget would realize savings only on the remaining 50 percent.

THE COST SAVINGS PER TONNE AND PER HOUSEHOLD FROM CONTRACTING OUT: Looking at costs per tonne, the results suggest contracting out leads to savings of 56, 49, and 33 percent for disposal, recycling, and collection services, respectively.[29] The accuracy of the estimates is hampered, however, by the fact that municipalities

27 In the regressions, I include yearly variables of population and number of households (both in unadjusted and logarithmic terms) to account for fast-growing cities. Including these variables does not appreciably change the results.

28 By starting the analysis with 2001, I did not have to worry about changes in the size of municipal governments, such as the amalgamations of Toronto (1998), Sudbury, Norfolk County, Kawartha Lakes, Haldimand County, Hamilton, or Ottawa (all on January 1, 2001). Efficiency gains these cities might have experienced immediately after amalgamation could be confused with possible gains from post-amalgamation changes in their approaches to contracting out. This issue, however, affects only a small number of municipalities in the analysis, which are excluded from the regression analysis. I present full regression results for both an ordinary least squares and fixed effects regression in the appendix.

29 Only one-third of Ontario municipalities report the number of tonnes of waste they collect, recycle, or dispose of. Although the effect of contracting out is empirically large in terms of collection operating costs per tonne, the result falls just short of statistical significance at the 10 percent level using robust standard errors. This may be because of the smaller sample size of the subset of cities that report the number of tonnes of waste collected.

Table 2: Average Costs per Tonne and Household of Waste Services in Ontario Municipalities, by Quartile Percentage of Budget Contracted (2001-2008)

		Contracting percentage quartile				
		0-25	*25-50*	*50-75*	*75-100*	*Provincial average*
Collection	Average percent of operating budget contracted	32	83	93	100	77
	Costs per tonne ($)	121	77	81	92	94
	Costs per household ($)	56	51	56	50	52
	Tonnes collected (000s)	55	39	17	12	32
	Households served (000s)	44	24	12	9	16
	Population density (people/sq km)	383	277	262	133	190
	Number of municipalities providing service					350
Recycling	Average percent of operating budget contracted	35	83	94	100	78
	Costs per tonne ($)	226	152	211	165	187
	Costs per household ($)	46	37	33	32	34
	Tonnes recycled (000s)	35	21	13	29	23
	Households served (000s)	34	23	13	19	16
	Population density (people/sq km)	216	345	214	122	190
	Number of municipalities providing service					322
Disposal	Average percent of operating budget contracted	7	29	57	91	46
	Costs per tonne ($)	133	154	83	78	110
	Costs per household ($)	103	100	84	62	86
	Tonnes disposed (000s)	47	48	95	38	53
	Households served (000s)	14	15	36	17	16
	Population density (people/sq km)	116	142	233	256	190
	Number of municipalities providing service					297

Note: Prices are in real 2002 dollars. Quartiles are created to form equally sized groups of municipalities.
Municipalities are grouped by the how much they contract their waste services relative to other municipalities, rather than creating arbitrary categories of comparison based on the percentage of budgets that are contracted out. Results are similar regardless of how the sample of municipalities is divided.
Source: Author's calculations from OMMAH.

are not required to report data on waste tonnage. Moreover, those municipalities that do report the tonnage of waste they collect are six to seven times larger than those that do not, which tends to bias the results. In addition, there are significant discrepancies in the tonnage amounts in some municipalities' reports, which also makes the data suspect.[30] A more reliable measure, therefore, is costs per household. Using this metric, a municipality's costs are estimated to be 31 percent less for both collection and disposal services and 34 percent less for recycling services that are fully contracted out compared with the costs for an otherwise similar municipality with no contracting out (Table 3). The implementation of household organic programs does not appear to have influenced costs.[31]

30 For example, the Ontario Municipal Chief Administrative Officer's Benchmarking Initiative reports that waste collection cost Toronto $71, $83, and $89 per tonne in 2006, 2007, and 2008. The FIR data, however, suggest costs of $76, $68 and $69 in those years. Some returns obviously have mistaken tonnes between collection and recycling. The FIR financial data and household counts are likely more reliable, as they are subject to numerous checks in the FIR submission process.

31 Tests were run that included data from Waste Diversion Ontario on the tonnes of organic material collected by each municipality in the province from 2002 through 2008. Details on these tests are available from the author.

Table 3: Difference in Per Household Costs for Municipalities with Full versus No Contracting

	Disposal operating costs	Recycling operating costs	Collection operating costs
Difference in average cost per household	-31%	-34%	-31%

Note: All results are statistically significant at least at the 5 percent level. Cost savings are regression coefficients (transformed from logarithms) that represent a comparison of costs between a municipality with no contracting to an otherwise similar municipality with full contracting.
Source: Author's calculations from OMMAH.

THE EXTENT OF CONTRACTING OUT: Are the cost savings constant as a municipality increases contracting out from zero to 100 percent? or do the lowest average costs come somewhere between these two extremes? Cost savings, in fact, vary in complex ways, with average costs per household falling as the percentage of the budget for waste diversion and collection that is contracted out increases from 50 percent to 100 percent, while costs per household for all waste services are lowest when 100 percent of the budget is contracted out. Predicted costs per household for diversion and collection services are highest when a municipality contracts out between 40 and 50 percent of services, rather than when they do not contract out any services.

For waste disposal, costs per household are highest when there is no contracting, and predicted costs fall continuously as contracting out increases as a share of the budget. However, the incremental reduction in costs from additional contracting out lessens as the share approaches 100 percent, so that the additional savings from fully contracting out, as opposed to partial contracting out, disposal are not as large as in the case of collection or diversion.[32] None of these estimates, however, includes cost savings that already might have occurred through managed competition. Municipalities might place a value on retaining a core public service, either because of labour contracts that would lead to high costs in other departments if waste service employees were transferred or laid off, or because of the potential insurance value of a public service backstop.

This finding that costs are minimized when services are fully contracted, and not partially contracted, might result from increased competition for a larger share of available services. There might be only limited competition when municipalities put just a portion of their waste services up for bid, or costly duplication of municipal and private contractor administrative, capital, or other costs among public and private waste crews.

One other potential explanation for this finding is that cities that contract out 100 percent of their waste budget have also driven down administrative and overhead costs. There is likely to be little difference in the extent of services contracted out between municipalities with, say, 95 percent of expenses contracted out and those with 100 percent contracted out. The difference in reported contracting percentage may be because of municipalities that retain some overhead and administrative costs in the waste services department, rather than under general municipal administration. Municipalities that have reduced their waste services' overhead costs have, by construction, increased the share of their waste services budget that is contracted out and likely have also reduced the total cost of providing services. For all municipalities, however, administrative costs average 7 to 8 percent of the total, which suggests that the fall in average costs as the share of contracting out rises above 50 percent of the budget is due to more than just the reduction of administration costs.

Indeed, whether services are contracted or whether services are provided by municipal staff, some administration costs will be inevitable, either

32 This conclusion stems from the statistically insignificant coefficients in Appendix Table A-3.

Table 4: Change in Cost per Household From Types of Contracting

	Disposal	Collection	Recycling
Contracting in general	-36%	7%*	-23%
Private Contracting	4%*	-24%	1%*

Note *Effect of private disposal and diversion contracting, and contracting in general in collection services are not statistically significant at even the 10 percent level of significance. Cost savings are regression coefficients (transformed from logarithms) that represent a comparison of costs between a municipality with no contracting to a municipality with full contracting.
Source: Author's calculations from OMMAH.

to administer contracts or to manage municipal workforces. In practice, these general administrative costs don't tend to differ much in varying degrees of contracting, as evidenced by the City of Windsor (2010) not including general administrative costs in its comparison of contracting versus municipal operation of waste services in its recently conducted waste service contract.

PRIVATE CONTRACTORS VERSUS INTER-MUNICIPAL COOPERATION: So far, I have not distinguished between contracts that municipalities enter into with private companies and those they sign with other municipalities. Approximately 20 percent of municipalities have contracts with other municipalities for the provision of diversion or disposal services, and 10 percent have contracts for collection services – most of them with an upper-tier municipality.[33] Many municipalities jointly use the same waste disposal site if the efficient scale of operation is above what a single municipality requires; similarly, one particular municipality's recycling or collection services might prove to be the most cost-efficient provider in an area, including private contractors, and economies of scale again might lead municipalities to combine operations.

Does it matter if municipalities contract out waste services to private providers as opposed to other municipalities?[34] For waste disposal and diversion services, the answer is no: it does not matter if these services are contracted out to either other municipalities or to private contractors. The costs savings emerge just from the contracting process, and cost savings are independent of which party earns the contract. Cost savings from the contracting process are 36 percent in disposal services and 23 percent in diversion services.

For collection, the story is different. When collection services are contracted out to private providers, municipalities derive cost savings of 24 percent. But they derive little cost savings from contracting out to other municipalities.[35] Thus, contracting in collection services only appears to save money in the Ontario context when private contractors are used. Identifying the definitive reasons behind this finding is beyond the scope of available evidence, but possible reasons based on past evidence cited in the previous section range from higher productivity of private workers, wage

33 A municipality is deemed to be in a contract with another municipality when it reports that it provides services jointly with, or purchases or receives services from, another municipality, either upper- or lower-tier. A municipality that reports that waste services are not its responsibility or not applicable to it, mainly small towns or municipalities where upper-tier municipalities are responsible for, and finance, waste services, is not considered to have a cross-border service agreement. When cities do not report any form of cross-border purchase, we assume that all contracted expenses are with private contractors. Likewise, we assume that cities with intergovernmental contracts only have intergovernmental contracting expenses. If cities with a cross-boundary agreement have at least some private contracting and private contractors are indeed lower-cost providers than other municipalities, this assumption will bias the estimates towards finding that private contracting does not result in cost savings. The estimates of the cost savings from private contracting are thus likely to be a lower-bound estimate

34 Specifically, I tested the interaction effect of the percentage of a municipality's budget that is contracted out with whether or not the municipality uses a private contractor. As mentioned above, the percentage of a budget that is contracted out is not representative if municipal staff members are permitted to bid on and win contracts, as this leads to an underestimation of the extent to which operations are competitively contracted out.

35 In fact, few municipalities have cross-border collection contracts, suggesting that the finding that only private contracting leads to lower costs may be due to only a few municipalities reporting higher costs with inter-municipal contracting.

Table 5: Estimated Annual Cost Savings From Contracting All Waste Services For Municipalities With Little Waste Contracting

Municipality	Cost Savings ($ millions)	Cost Savings as Percent of Waste Budget
Toronto	49	24
Hamilton	10	22
Windsor	6	34
London	4	23
Vancouver	14	32
Calgary	23	32
Total	**106**	**27**

Note: Prices are in 2008 dollars.

Source: Author's calculations from OMMAH and City of Calgary and City of Vancouver waste services budgets.

and benefits savings, or perhaps better use of technology by private contractors.

TOTAL MUNICIPAL COST SAVINGS FROM CONTRACTING OUT: How much would major Canadian municipalities that have contracted out only a small amount of their waste services save if they were to contract out fully? Taking the difference between the current level of contracting and fully contracting out and multiplying the estimated costs savings per household (from Ontario data in Table 3) of extending contracting out by the number of households not served by contractors reveals that Toronto has the most to gain, with potential savings of almost $50 million annually, representing about 24 percent of the current waste services budget;[36] other Ontario municipalities would see proportionally similar savings, although actual savings will differ from those predicted here (Table 5).[37] Using the same criteria, Vancouver and Calgary would save up to $14 million and $23 million per year, respectively. For just Vancouver, Calgary, Windsor, London, Hamilton and Toronto, annual savings from fully contracting out waste services would be more than $100 million. Ontario municipalities such as Oshawa, Whitby, Guelph, Thunder Bay, and Kingston, which contract out less than 20 percent of their collection or disposal budgets, could realize cumulative savings of another $5 million.

These forecasts do not take into account potential differences in savings among municipalities but assume that the average savings of 31 percent for collection and disposal services and 34 percent for recycling services apply generally.[38] Local factors such as the terms of existing collective agreements with employees, the amount of competition among waste services providers, and the opportunities for inter-municipal cooperation also could affect the estimates.

36 In 2008, 15 percent of Toronto's collection budget was contracted out; thus, the cost savings of 31 percent per household that were derived in the earlier analysis would apply only to the 85 percent of the budget that was not already contracted out. Most of the savings would come from contracting out collection and diversion, as the city's disposal services are already heavily contracted out. I repeat this for all municipalities and for each waste service using the relevant savings estimate for each from Table 3.

37 A City of Windsor (2010) staff report finds that fully contracting out waste collection and recycling would save the city approximately $2.1 million per year; I estimate that adding the full contracting out of waste disposal services, which the Windsor staff report does not consider, would result in a further $1 million in savings.

38 However, since the finding that savings appear to be robust to different regression specifications of the percentage of contracting out and the inclusion of service level indicators (such as the amount of household organic waste collected per household), the results likely apply generally.

Policy Recommendations

Most Canadian municipalities contract out the provision of at least some of their waste management services. Those that have not already fully contracted out these services – including Toronto, Calgary, Vancouver, and major cities in Ontario – could save their taxpayers substantial amounts of money by doing so. Previous analyses suggest that the cost savings come mainly from the higher productivity of private-sector contractors relative to that of municipal employees. If that is so, managed competition that increases the productivity of public-sector employees might reap many of the cost-saving benefits of private contracting. At the same time, however, cities that fully contract out waste collection and recycling services tend to have the lowest operating costs, although they expose themselves to being held captive to incumbent contractors' rising costs in later rounds of bidding if competition for local contracts is reduced. Given the savings they would gain, therefore, municipalities that do not now tender their waste management services should end their public service monopolies and design contracts for waste services that include the following:

- a quantitative standard by which to measure whether the contract's desired goal has been met;
- to increase diversion rates, incentive payments for the amount of recyclable waste that contractors sell to markets for recycled goods, not just the amount they collect;
- to improve the quality of collection services, penalties for the number of complaints the municipality receives or another clearly definable measure of the services contractors provide;
- ensuring that contracts encourage competition and do not entrench incumbents, by contracting out collection routes by sections of the city, with contracts of varying size, and by contracting out operations but maintaining facility ownership for waste services with specialized assets, such as landfills or more advanced disposal sites; and
- ensuring that contracts are politically and practically acceptable – for example, by providing incentives for public employees to continue employment with contractors or the municipality, perhaps by opening up bidding for waste services to both private contractors and current public employees.

Municipal policymakers who contract out waste services through a well-designed contracting mechanism can reduce the costs of providing waste services and limit the consequences on waste services of municipal worker strikes.

Appendix Data and Technical Appendix

In undertaking this analysis, data from the FIR and the MPMP were merged with 2006 Census data on household characteristics, such as income and average size of families, municipality size, and municipality housing characteristics.[39]

The OMMAH uses three waste services categories: disposal, diversion, and collection. Municipalities report their costs for a specific service under one of these categories. Disposal services include the administrative and direct overhead expenses related to the following services: depositing of garbage from all types of property at a transfer station, landfill sites, and incineration facilities; energy from waste facilities; hauling; the perpetual care of active and closed sites; solid waste landfill closure and post-closure; and transfer station and other waste disposal expenses. Waste diversion costs include the administrative and direct overhead expenses of backyard composting programs, a centralized facility, the collection and processing of recyclable material from all types of property – including blue box items, bulky items, Christmas trees, gardening waste, household hazardous waste, and source-separated household organics – as well as promotional expenses, the purchase and delivery of blue boxes and source-separated organic bins, and other recycling expenses. Collection expenses include the administrative and direct overhead expenses of garbage pickup except for diversion and recycling (Ontario Ministry of Municipal Affairs and Housing 2010).

The 450 Ontario municipalities for which data were obtained and analyzed are a complete range of types and sizes and contain 97 percent of the province's population and 40 percent of the population of Canada. Although all municipalities are required to fill out the FIR, not all have waste services expenses: 356 report expenses for collection services, 321 for recycling, and 297 for disposal. I exclude municipalities that do not report comprehensive cost data as they are also likely not to have any waste operations to report either because the service is handled by another municipality or because it is "not applicable" to them, usually because other levels of local government have taken on that service.

I use regression estimates of average operating costs per tonne of waste handled (Table A-1) and per household (Table A-2) in each of disposal, recycling, and collection. I use an ordinary least squares regression model and a fixed effects regression model. A fixed effects regression model will control for observed and unobserved municipality-specific factors.[40] For example, some cities' landfills might be particularly far from urban areas or have different spatial structures. For effects that vary from one year to another but are the same for all municipalities, such as fuel costs or weather, I include year-effects to control for cost changes that might have occurred in a given year.

I also use quadratic estimates of contracting out to establish the relationship between contracting out and average costs per household (Table A-3).[41] I find that average costs per household peak when contracting out of collection and recycling services is between 40 and 50 percent of total municipal waste expenses. A strongly negative and statistically significant coefficient in the fixed effects regression for recycling and collection suggests that costs are lowest at the highest percentage of contracting. Similar results were found using a cubic regression of contracting percentage.

39 I report all cost data in real terms in 2002 dollars using the consumer price index with the base year of 2002 using the 2005 basket of goods. All empirical work was conducted using Stata/IC 10.1. All data and code used in this paper are available from the author upon request.

40 Because of possible data reporting problems, we exclude cities at the top and bottom 1 percent of costs per tonne of waste and costs per household. I have found mistaken entries in the tonnage data in a handful of cases that I cannot correct. Excluding cities at the very top or high end of costs per tonne will exclude cities that severely misreport their waste data.

41 I also tested cubic relationships of contracting percentage and costs per household.

Table A1 Ordinary Least Squares and Fixed Effect Regression of Operating Cost per Tonne

Variables	Disposal	Recycling	Collection	Disposal	Recycling	Collection
			(operating costs per tonne)			
	Ordinary Least Squares			Municipality Fixed Effects		
Percentage of budget contracted	-0.331 (0.245)	-0.460** (0.177)	-0.543*** (0.173)	-0.831*** (0.221)	-0.656** (0.293)	-0.345 (0.251)
City is in Northern Ontario	-0.222 (0.225)	-0.0507 (0.215)	-0.260* (0.153)			
Population	4.66e-06*** (1.45e-06)	-2.39e-06 (1.51e-06)	-1.80e-06* (1.03e-06)			
Number of households	-1.16e-05*** (3.88e-06)	7.55e-06* (4.07e-06)	4.73e-06* (2.81e-06)			
Land area in square km (2006)	4.05e-05 (6.77e-05)	2.91e-05 (7.56e-05)	4.42e-05 (7.86e-05)			
Population density per square km	0.000125 (0.000167)	-0.000323** (0.000124)	-7.67e-06 (0.000116)			
Average household income (2005)	-5.67e-06 (1.34e-05)	-8.28e-06 (7.70e-06)	-4.40e-06 (5.80e-06)			
Share of homes that are single detached	0.956* (0.574)	0.364 (0.520)	0.651 (0.500)			
Average number of persons per family	-0.720 (0.733)	0.932* (0.475)	0.0759 (0.405)			
Municipality is upper tier	-0.158 (0.218)	-0.322* (0.166)	0.293* (0.149)			
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of municipalities			97	106	103	
Observations	440	509	505	440	509	505
R-squared	0.126	0.148	0.132	0.697	0.788	0.740

Robust standard errors in parentheses. Standard errors clustered by municipality. Costs per tonne are log transformations. Coefficients are thus percentage changes. Coefficients of percent of budget contracted are percentage changes in costs per household of a change in contracting percentage from 0 to 100 percent of operating budget.
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations from OMMAH.

Table A2 Ordinary Least Squares and Fixed Effect Regression of Operating Cost per Household

Variables	Disposal	Recycling	Collection	Disposal	Recycling	Collection
			(operating costs per household)			
	Ordinary Least Squares			Municipality Fixed Effects		
Percentage of budget contracted	-0.480***	-0.396***	-0.0272	-0.365**	-0.417***	-0.367**
	(0.113)	(0.112)	(0.0977)	(0.150)	(0.157)	(0.174)
City is in Northern Ontario	0.107	-0.278***	0.409***			
	(0.0859)	(0.0813)	(0.0842)			
Population	1.77e-06	-1.24e-06	-2.10e-06*			
	(1.68e-06)	(1.37e-06)	(1.27e-06)			
Number of households	-3.84e-06	3.22e-06	5.79e-06*			
	(4.38e-06)	(3.70e-06)	(3.26e-06)			
Land area in square kilometers (2006)	-0.000108	-1.79e-05	-0.000163**			
	(9.60e-05)	(7.20e-05)	(6.66e-05)			
Population density per square kilometers	-6.06e-05	-3.18e-05	-0.000110			
	(0.000165)	(0.000120)	(0.000103)			
Average household income (2005)	-6.64e-06	1.09e-05	1.21e-05**			
	(5.03e-06)	(6.62e-06)	(5.94e-06)			
Share of homes that are single detached	-0.0957	-1.449***	-0.478			
	(0.417)	(0.329)	(0.328)			
Average number of persons per family	-0.302	0.341	0.465*			
	(0.212)	(0.209)	(0.237)			
Municipality is upper tier	0.0376	0.177	-0.0309			
	(0.256)	(0.188)	(0.204)			
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of municipalities				352	317	296
Observations	1,869	1,759	1,694	1,869	1,759	1,694
R-squared	0.070	0.199	0.103	0.803	0.778	0.831

Robust standard errors in parentheses. Standard errors clustered by municipality.
Costs per household are log transformations. Coefficients of percent of budget contracted are percentage changes in costs per household of a change in contracting percentage from 0 to 100 percent of operating budget.
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations from OMMAH.

Table A3 Quadratic Relationship Between Contracting and Average Cost

Variables	Disposal	Recycling	Collection	Disposal	Recycling	Collection
	(operating costs per household)					
	Ordinary Least Squares			Municipality Fixed Effects		
Percentage of budget contracted	0.740**	0.766*	0.400	-0.256	1.154***	0.781*
	(0.373)	(0.448)	(0.411)	(0.324)	(0.397)	(0.472)
Percentage of budget contracted squared	-1.224***	-1.051***	-0.404	-0.116	-1.420***	-1.038***
	(0.352)	(0.385)	(0.396)	(0.325)	(0.297)	(0.362)
Number of municipalities				352	317	296
Observations	1,869	1,759	1,694	1,869	1,759	1,694
R-squared	0.085	0.209	0.105	0.803	0.785	0.835

Robust standard errors in parentheses. Standard errors clustered by municipality. Other control variables are the same as in Table A1 and A2. Costs per household and tonne are log transformations. Coefficients are percentage changes in costs of a change in contracting percentage from 0 to 100 percent of operating budget.
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations from OMMAH.

References

Bel, Germa, and Anton Costas. 2006. "Do Public Sector Reforms get Rusty? Local Privatization in Spain." *Journal of Policy Reform* 1 (9): 1-24.

Bel, Germa, and Xavier Fageda. 2008. "Privatization and Competition in the Delivery of Local Services: An Empirical Examination of the Dual Market Hypothesis." Xarxa de Referència en Economia Aplicada working paper 2008-4. Barcelona.

Bel, Germa, and Mildred Warner. 2008. "Does Privatization of Solid Waste and Water Services Reduce Costs? A Review of Empirical Studies." *Resources, Conservation and Recycling* 52 (12): 1337-48.

British Columbia. 2010. "Cache Creek Landfill Extension Project Approved." News release. January 6. Available online at: http://www2.news.gov.bc.ca/news_releases_2009-2013/2010ENV0001-000007.htm.

Canadian Union of Public Employees. 2010. "Submission to Metro Vancouver's Consultation on the Draft Integrated Solid Waste and Resource Management Plan 'How Should We Manage Our Waste?'" July 14. Available online at: http://cupe.ca/updir/July_16_sub_br_Solid_Waste_Submission_to_Metro_Vancouver_jul_14_102_(2).pdf.

City of Windsor. 2010. "Results of Waste and Recycling Tenders." News release. July 2.

Competition Bureau. 1997. "Consent Order Sought from Competition Tribunal in Solid Waste Collection Case." Ottawa. March 5.

——. 1998. "Competition Bureau Seeks Consent Order to Secure Competition in Non-Hazardous Solid Waste Sector." Ottawa. March 6.

——. 2008a. "Competition Bureau Cautions Winnipeg Businesses Signing Commercial Waste Removal Contracts." Ottawa. July 18.

——. 2008b. "Competition Bureau Concludes Winnipeg Commercial Waste Markets Investigation." Ottawa. October 1.

Dachis, Benjamin, and Robert Hebdon. 2010. "The Laws of Unintended Consequences: The Effect of Labour Legislation on Strikes and Wages." Commentary 304. Toronto: C.D. Howe Institute. June.

Dewees, Don, Michael Trebilcock, Ian Freedman, and Brent Snell. 1993. "The Regulation of Solid Waste Management in Ontario: A Policy Perspective." University of Toronto Law School and Department of Economics. April.

Dijkgraaf, Elbert, and Raymond Gradus. 2007. "Collusion in the Dutch Waste Collection Market." *Local Government Studies* 33 (4): 573-88.

Hart, Oliver. 2003. "Incomplete Contracts and Public Ownership: Remarks and an Application to Public-Private Partnerships." *Economic Journal* 113 (486): C69-C76.

Hart, Oliver, and John Moore. 1988. "Incomplete Contracts and Renegotiation." *Econometrica* 56 (4): 755-85.

Hebdon, Robert. 2006. "Contracting Public Services in New York State: Labour Effects." *Industrial Relations* 61 (3): 513-31.

Hebdon, Robert, and Patrice Jalette. 2008. "The Restructuring of Municipal Services: A Canada-United States Comparison." *Environment and Planning C: Government and Policy* 26: 144-58.

Hefetz, Amir, and Mildred Warner. 2007. "Beyond the Market vs. Planning Dichotomy: Understanding Privatisation and its Reverse in US Cities." *Local Government Studies* 33 (4): 555-571.

Jalette, Patrice, and Peter Warrian. 2002. "Contracting-out Provisions in Canadian Collective Agreements: A Moving Target." *Workplace Gazette* 5 (1): 64-76.

Kelleher, Maria, Janet Robins, and John Dixie. 2005. "Taking Out the Trash: How to Allocate the Costs Fairly." Commentary 213. Toronto: C.D. Howe Institute. July.

Levelton, Paul. 2010. "Metro Vancouver's Draft Solid Waste Management Plan." Report to Belkorp Environmental Services Inc. May 13. Available online at: http://www.belkorp.ca/KPMG_letter_report_MSW_IssuesandAnalysis_MAY13_2010.pdf.

McDavid, James. 2000. "Alternative Service Delivery in Canadian Local Governments: The Costs of Producing Solid Waste Management Services." *Canadian Journal of Regional Science* 23 (1): 157-74.

——. 2001. "Solid-waste Contracting-out, Competition, and Bidding Practices among Canadian Local Governments." *Canadian Public Administration* 44 (March): 1-25.

McDavid, James, and Verna Laliberte. 1998. "The Efficiency of Canadian Solid Waste Landfills: National Survey Report." Local Government Institute Working Paper, School of Public Administration, University of Victoria. December.

——. 1999. "The Efficiency of Residential Recycling Services in Canadian Local Governments: National Survey Report." Local Government Institute Working Paper, School of Public Administration, University of Victoria. June.

McDavid, James, and Annette E. Mueller. 2008. "A Cross-Canada Analysis of the Efficiency of Residential Recycling Services." *Canadian Public Administration* 51 (4): 589-615.

Moore, Stephen. 1999. "How Contracting out City Services Impacts Public Employees." In *Contracting Out Government Services*, edited by Paul Seidenstat. Westport, CT; London: Praeger.

Ontario Ministry of Municipal Affairs and Housing. 2010. "Schedule 91 Performance Measures: Efficiency." Municipal Finance Policy Branch.

REIC Perth. 2005. "A Study of Opportunities for Cost Savings in Municipal Blue Box Contracts." Toronto: Waste Diversion Ontario. April 28.

Savas, E.S. 2005. *Privatization in the City: Successes, Failures, Lessons.* Washington, DC: CQ Press.

Segal, Geoffrey, Ade Ifelayo, and Chandra Pesheck. 2004. "Exposing the Myths and Realities of Competitive Sourcing." Policy Brief 31. Los Angeles: Reason Foundation. August.

Stanek, Steve, and Leonard Gilroy. 2006. "Sandy Springs Incorporates, Inspires New Wave of 'Private' Cities in Georgia." Los Angeles: Reason Foundation. November 1.

Statistics Canada. 2008. "Public Sector Statistics 2007/2008." Cat. 68-213-X. Ottawa.

Walls, Margaret. 2003. "How Local Governments Contract with Private Firms: Economic Theory and Evidence on Solid Waste and Recycling Contracts." Discussion Paper 03-62. Washington, DC: Resources for the Future. November.

Walls, Margaret, Molly Macauley, and Soren Anderson. 2002. "The Organization of Local Waste and Recycling Markets: Public and Private Provision of Services." Discussion Paper 02-35REV. Washington, DC: Resources for the Future. May.

Warner, Mildred, and Amir Hefetz. 2009. "Trends in Public and Contracted Government Services From 2002 to 2007." Policy Brief 80. Los Angeles: Reason Foundation August.

Williamson, Oliver. 2002. " The Theory of the Firm as Governance Structure: From Choice to Contract." *Journal of Economic Perspectives* 16 (3): 171-95.

Wingerter, Eugene. 1991. "Refuse Collection." In Roger L. Kemp, ed. *Privatization: The Provision of Public Services by the Private Sector.* Jefferson, NC: McFarland and Company.

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