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Cheap Rubbish? Competitive Tendering and Contracting Out in Refuse Collection – 1981–88

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I. INTRODUCTION

The 1988 Local Government Act introduced compulsory competitive tendering (CCT) for a wide variety of services provided by local authorities in the UK. The Act covered services such as building cleaning, grounds maintenance, schools and welfare catering, sports and leisure management, street cleaning, vehicle maintenance and refuse collection. The legislation in part reflects an ideological belief in the benefits of competition and privatisation. However, the decision was also based on a perception that those local authorities which had introduced the policy of tendering-out services in the early 1980s had significantly reduced costs. One of the most widely cited pieces of evidence that tendering reduces costs is the study by Domberger, Meadowcroft and Thompson (1986) (hereafter referred to as DMT) of refuse collection services. Using data for 1984 and 1985, they found that authorities which had contracted out refuse collection services to private operators enjoyed costs about 22 per cent lower than those authorities which had not held a competitive tender. Those authorities which held a competitive tender and then awarded the contract to the existing in-house workforce (now known as the Direct Service Organisation (DSO)) also appeared to have lower costs, in their case 17 per cent lower than the non-tendering average. They therefore attributed the difference

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between these two groups and the remaining local authorities to the effects of competitive tendering. These results have been the subject of much controversy. This article re-examines some issues which remain unanswered from their original study and the subsequent literature, namely:

(1) Is there a significant difference in terms of cost savings under competitive tendering between
   (a) contracting out to the private sector?
   (b) awarding the service to the local authority's own labour force (Direct Service Organisation)?
(2) What factors cause the cost savings associated with contracting out?
(3) Have the apparent cost savings persisted over time, or has there been any tendency for the estimated cost advantages to disappear?
(4) Can the cost savings be directly attributed to the process of competitive tendering, or do they reflect factors (such as inherent efficiency) correlated with but not caused by competitive tendering?

To do this we have assembled data on refuse collection services over the five-year period 1984–88, i.e. up to the introduction of compulsory competitive tendering (CCT). Our data set comprises a wider range of authorities, a larger number of years, and a greater degree of detail than any other data set of which we are aware. It is for this reason that we believe that this is the most comprehensive study to date.

The article is set out as follows, in the next section we provide a short history of the sector and in Section III we review the literature. In Section IV we outline an estimable model of refuse collection costs and Section V describes the data. Section VI explains the estimation method and Section VII discusses the results including tentative answers to the four questions posed here. Section VIII contains our conclusions.

II. A BRIEF HISTORY

Refuse collection is one of a number of public services which are the statutory responsibility of the (elected) local authorities in England and Wales, of which there are 403. Other services include waste disposal, street cleaning, education, sports facilities and leisure management. Local authority responsibility for refuse collection grew out of the welfare legislation of the nineteenth and early twentieth century. At first, legislation in this area provided for local boards and commissions (e.g. the Public Health Act 1848), but in time a range of local sanitation services came to be under the control of local authorities. The statutory responsibility to ensure that rubbish is collected and disposed of was placed on local authorities by the Public Health Act 1936. The organisation, financing and control of local authorities has been the subject of central government reform on numerous occasions this century. Elected representatives are responsible for the efficient

running of the services which they are obliged to provide. However, they have limited powers to raise their own finances and their budget is the subject of close central government scrutiny. Professional managers are employed by each authority to run the day-to-day operations of the local services.

As the local authorities acquired new responsibilities, they grew in size and became significant employers in their own right. Whether by ideological predisposition or by default virtually all local authority tasks came to be the sole preserve of the authority's own Direct Service Organisation (DSO). Undoubtedly many people believed that local authority work was essentially a public service and therefore unsuited to the profit-oriented private sector (see, e.g., Perkins et al., 1986 p. 10). By the end of the 1970s this belief was starting to be challenged. Disaffection with poor labour relations in the public sector (see, e.g., Forsyth, 1983), growing evidence from other countries, mainly the US, that contracting out secured lower costs (e.g. Savas,1977), and a growing belief in the benefits of competition and privatization, primarily in Conservative-controlled authorities, all contributed to a change in the climate of opinion.[1] The newly-elected government of Margaret Thatcher played a significant part in the process of change. Contracting out of laundry and catering services in the National Health Service was vigorously implemented in the early 1980s (see DMT, 1987). The Local Government Planning and Land Act 1980 required local authorities to adopt competitive tendering for construction and maintenance work over £100,000 in value. This threshold was subsequently reduced in 1983 to £50,000, and at the same time a limit was set on the proportion of local authority work which could be carried out by their own DSO.

In 1980 Exclusive Cleansing, a subsidiary of the conglomerate BET won the contract for refuse collection services in Southend. Between 1980 and 1988, 34 local authorities contracted out refuse collection services to private contractors. In addition a number of authorities put services up for tender but ultimately awarded them to their own DSO. Contracting out also took place in some other local authority services (e.g. street cleaning, catering and cleaning in social services buildings and vehicle maintenance), but to a lesser extent. However, the majority of local authorities did not change the method of providing services. This was true not just of Labour-controlled authorities, many of which were ideologically opposed to privatisation, but also a majority of Conservative-controlled authorities. In part this may have reflected a belief in the high level of efficiency of the existing arrangements, or general support for the tradition of public services. However, elected representatives may also have perceived the process of tendering as a reduction in their own role and status, whilst professional managers inside

[1] Perkins et al. (1986) presents four case studies of authorities where contracting out took place. All of the factors played a role in one or other of the local authorities.

local authorities may have seen tendering and contracting out as a threat to their own jobs and the jobs of close colleagues. The 1988 Local Government Planning Act made competitive tendering compulsory for 'defined activities' of over £100,000 in value. These included refuse collection, street cleaning, building cleaning, social services cleaning and catering, maintenance of municipal sports and leisure facilities, and vehicle maintenance.

III. LITERATURE REVIEW

There has been considerable controversy over the benefits or otherwise of contracting out and competitive tendering in the 1980s. US studies from the late 1970s and early 1980s found that there were significant reductions in cost associated with the private operation of refuse collection service. Savas (1977, 1981) found that collection costs in the US were about 14 per cent higher for municipally-operated arrangements. McDavid (1985) found that 'exclusive public collection was 50.9% more expensive than private collection' in a sample of 205 Canadian cities. Stevens (1978) used Savas' data to show that local monopoly was cheaper than pure competition (since several firms collecting from the same street raises unit costs), but that private local monopolies (regulated or franchised) were also less expensive than public local monopolies. There have also been a number of studies of competitive tendering and franchising of services such as local cable TV networks (see, e.g., Prager, 1990).

In the UK there have been a number of studies of contracting out. In 1984 the Audit Commission published a Report suggesting that contracting out authorities enjoyed costs around 5 per cent below the ROSS standard, a measure of standard efficiency developed by the Local Authorities Management Services Advisory Committee. However, the report also argued that the best performing authorities in the non-tendering group performed as well as the tendering group, and that the most important problems were associated with a minority of underperforming authorities.

The most thorough analysis to date is the DMT study cited in the introduction. Their study, like ours, is based on an annual survey carried out for local authorities by the Chartered Institute of Public Finance and Accountancy (CIPFA). This survey asked 91 questions about the provision of waste collection services in local authorities, including data on the type, quality and volume of services, financial data on costs and data relating to contracting out of services. The data are discussed in more detail in Section V. DMT used 16 variables from this data set for the years 1984 and 1985[2] to estimate the cost of services. In their data set around 20 authorities had contracted out services by 1985, whilst about 10 had put services

[2] i.e. the financial years 1983–4 and 1984–5. The financial year end is April.

up for tender but had then decided to retain them in-house. After controlling for factors such as the quality and type of services, economies of scale and regional wage variation they found that:

(1) contracting out authorities enjoyed costs around 22 per cent lower than the norm;
(2) authorities which tendered services but ultimately kept them in-house enjoyed costs around 17 per cent lower, but this estimate was not significantly different from (1);
(3) tendering services was associated with larger falls in costs in years after the initial year;
(4) extending competitive tendering to all local authorities could reduce costs by as much as £80m in 1984–85.

The DMT results were striking for their clarity. Their cross section regressions were able to account for over 90 per cent of the cross section variation and the significance level of the variables was impressive. Contracting Out and Tendering variables were significant at the 1 per cent level and appeared robust to a variety of specifications. Despite this their paper gave rise to controversy. A paper by Ganley and Grahl (1988) argued:

(1) the findings were distorted by a number of outliers in the data;
(2) the distribution of costs was affected by a small number of high-cost local authorities which made the public service average much worse. Comparing best practice public services with private services revealed only small differences, a point made by the 1984 Audit Commission report;
(3) there was no time series evidence that contracting out reduced costs, comparing data on unit costs for 1978–79 and 1984–85;
(4) 'improvements in local costs have been realised through pressures in labour markets rather than through competition'; in many cases this meant large-scale redundancies and a deterioration in working conditions;
(5) private contracts had been won only through loss leading behaviour;
(6) quality of service had been reduced by contracting out, demonstrated by high levels of complaints and the payment of significant penalties for underperformance.

In fact DMT (1988) re-estimated their regressions omitting the outliers identified by Ganley and Grahl and found that their results were not significantly different. However, the comments about loss leading, falling quality and poorer working conditions have been backed up by a number of other studies largely sympathetic to the in-house provision of public services,for example SCAT (1988, 1989) and Blunkett (1991), suggesting that service quality and working conditions had deteriorated. Most of the other research in this area has been case-study based.

For example Meadows (1986) provides case studies of seven local authorities, whilst Walsh (1991) looked at the effect of CCT after 1988 on a sample of 40 authorities. The pattern of lower costs and employment levels in refuse collection is largely confirmed. Walsh identifies a number of factors which can account for these changes, including both organisational change and changes in the monitoring of work, but draws no firm conclusions on the benefits of CCT. Whilst these studies can provide considerable institutional detail, they inevitably rely on specific experiences which make more general inference hazardous.

A follow-up study to DMT by Cubbin, Domberger and Meadowcroft (1987) used Farrell measures of technical efficiency to identify the extent to which contracting out brought about productivity gains.[3] The principle behind this method is that the input combinations of the most efficient authorities define a concave isoquant. Using these as a reference group, the relative efficiency of local authorities can be estimated. Using data on the number of vehicles (capital), the number of employees and an index of output volume for 1984 and 1985, they estimated that productivity in contracted out authorities was 17 per cent higher than for authorities which did not tender. This suggested that a large part of the cost savings identified by DMT could be accounted for by productivity gains. Being based on the same data set as DMT, this paper is also subject to the criticisms raised by Ganley and Grahl. In particular, since the method of analysis relies on outliers, it may be particularly suspect if there are only a small number of these whose performance can be accounted for by idiosyncratic characteristics. In addition, the estimation procedure imposed the assumption of constant returns to scale, an assumption they believed had been justified by the regression results of the DMT study.

IV. AN ESTIMABLE MODEL OF REFUSE COLLECTION COSTS

Stevens (1978) proposed a simple model of refuse collection costs. This model was used by DMT and we propose to use a modified version here. Suppose the production function for refuse collection combines drivers and loaders (L) with trucks (K) in a Cobb-Douglas technology such that

$$Q = A\, L^{\alpha}\, K^{\beta} \qquad (1)$$

where A is a vector of characteristics specific to each local authority and Q is the volume of waste collected. The characteristics in A may reflect either the collection format laid down by the authority (e.g. backdoor or kerbside, once a week or more than once a week), factors relating to the geographical characteristics of the

[3] The method was suggested by Farrell (1957). Cubbin has developed a computer package which can calculate Farrell measures for multivariate problems.

authority (e.g. metropolitan or rural) or to factors associated with political control (Labour or Conservative). In the last case these may relate to political commitments (e.g. support for unions) or explicit preferences (e.g Labour authorities might offer terms and conditions higher than the going rate).

Given these characteristics, authorities are assumed to minimise a cost function

$$C = wL + rK \quad (2)$$

where w is the wage rate and r is the interest rate facing authorities. Minimising (2) subject to (1), substituting, rearranging terms and taking logs yields an estimable equation

$$ln\,(C) = \Sigma\gamma\ \ A + g_0 + g_1\ ln\,(w) + g_2\,(Q) \quad (3)$$

Note that $g_2 = 1/(\alpha+\beta)$ is an indicator of returns to scale. We assume in what follows (as did DMT and Stevens) that all authorities face a common interest rate which does not vary over time. Whilst this is not wholly satisfactory given that the basis on which local authorities have had access to capital over the period 1984–88 has been subject to continual political interference, attempting to proxy the cost of capital facing each authority over this five year period would be unlikely to improve the precision of the econometric estimates. Finally, a natural decomposition of (3) is to divide through by Q, to get cost per unit, and then to estimate cost per employee (a proxy for total labour costs to the authority) and employees per unit (a proxy for labour productivity), since

$$C/Q = C/L \times L/Q \quad (4)$$

Thus the three specifications to be estimated are:

$$\begin{aligned} ln(C) - ln(Q) &= \Sigma\lambda\, A + a_0 + a_1\, ln\,(w) + a_2\,(Q) \\ ln(C) - ln(L) &= \Sigma\mu\, A + b_0 + b_1\, ln\,(w) + b_2\,(Q) \\ ln(L) - ln(Q) &= \Sigma\pi\, A + c_0 + c_1\, ln\,(w) + c_2\,(Q) \end{aligned} \quad (5)$$

V. DATA

The data used in the DMT study were based on a survey carried out by CIPFA on behalf of local authorities. Local authorities used this data as a basis for evaluating their own performance. This accounts for the very high response rates, generally in the region of 80 per cent. Whilst these data were available only for 1984 and 1985 for the original DMT study (as well as Ganley and Grahl, and Cubbin, Domberger and Meadowcroft (CDM)), we have obtained the same survey from CIPFA for the additional years 1986, 1987 and 1988. Since the introduction of CCT local authorities have been much less willing to release what is now

commercially sensitive data. In fact, even by 1988 many authorities were unwilling to complete important sections of the questionnaire and in this year the sample falls to 165.

Full definitions of all the variables are contained in the data appendix. The data from the CIPFA survey used by DMT and ourselves relate to:

(1) total cost of refuse collection, including all capital costs, overheads and related expenditure;
(2) frequency of collection (once a week, less than or more than once a week); method of collection (kerbside, backdoor, wheely bins, special or other); reclamation of waste (paper, bottles or vehicles);
(3) number of collection units (pick-up points: domestic, commercial or industrial), population density and percentage of household units in total, and the number of employees.

In addition to the CIPFA data, DMT collected information on the average earnings for adult male workers by (80) geographic regions from the New Earnings Survey to proxy local labour costs. Since the bulk of employees are male manual workers, we chose average male manual earnings by region as our proxy. We also collected data on the political control of each local authority – Conservative, Labour, hung (no single party with an absolute majority) or other), and type (metropolitan, London and rural).

Finally, the key variables of interest in DMT and here are CONT and TEND. CONT refers to the case where the local authority held a competitive tender and the service was contracted out to a private sector firm. The CIPFA data report the percentage of services contracted out, and following DMT we focus only on those cases where more than 10 per cent of the service was contracted out. It is worth noting that in all cases contracting out was associated with competitive tendering, i.e. there was no privatisation without competition (unlike other parts of the government's privatisation programme). However, in around 50 per cent of cases where contract renewal came up before the introduction of CCT, contract renewal took place on the basis of a single negotiation between the local authority and the existing contractor *(NAWDC* News, April 1992, p. 14).

TEND, which signifies that an authority had put refuse collection services up to competitive tender but had subsequently awarded the contract to its own DSO,

[4] In some cases it may be genuinely unclear what putting out to tender but retaining them in-house means. Meadows (p. 9) cites the farcical story of the metropolitan borough of Bury. When the issue of contracting arose in the early 1980s, Bury deemed their refuse collection services to be efficient and so rejected the idea. Then a survey published by CIPFA suggested that Bury was in fact one of the least efficient sampled. Aghast, the council almost immediately put services up for competitive tender and received eight firm bids. Then it emerged that the CIPFA results were caused by the erroneous inclusion of street cleaning costs in the refuse collection data. Then in-house DLO won the contract, but it is unlikely the exercise would ever have taken place had it not been for a statistical error.

was a more difficult variable to collect. It is not reported in the CIPFA data and DMT bought this information from BFI Wastecare, one of the early private contractors who had held three contracts over the period 1984–88. According to them '10 local authorities had tendered and retained services in house by the end of the year 1983–84 and 10 by the end of the year 1984–85' (DMT, p. 76). It is not clear from this that these were the same 10 authorities in each year. Unfortunately BFI Wastecare were unable to supply us with the same data for 1984-88 and DMT themselves were no longer in possession of the original datafiles. Our data were assembled from the Annual Privatization Survey published in the *Local Government Chronicle*, the Privatisation Survey in NAWDC News and Surveys published in the *Municipal Journal*. In all, these sources provide only 13 cases over the whole period 1984–88 where services had been tendered but kept in-house. Collecting data on this phenomenon is obviously difficult and it is clear that some caution must be exercised in analysing the results.[4]

VI. ESTIMATION

The three regressions defined by (5) were estimated by calculating the cost of refuse collection per unit (pick-up point, domestic, commercial or industrial), henceforth cost per unit, the cost per employee and the number of employees per collection unit. We have used three approaches to the estimation.

(1) Cross sections by year. We estimated individual cross sections for each year in the data set. As mentioned above, it was clear that the response rate in 1988 was significantly lower than in other years because of the introduction of CCT. Furthermore, we believed that some authorities had a greater incentive to report than others. For example, an authority that had performed a successful competitive tender, and supported the government's CCT programme will almost certainly wish to report, whereas an inefficient Labour-controlled authority, in which the refuse is collected by the DSO, is likely not to report. For these reasons we believed that there could be a systematic bias in the data caused by certain authorities selecting themselves out of the sample.

To correct for this, we adopted Heckman's (1979) two-stage approach to controlling for sample selection bias. The inverse Mill's ratio derived from the first stage of this procedure is then used as an explanatory variable in the second stage regression. Failure to report is likely to be a function of either the perceived benefits of the exercise or the attitude of the authority to disclosure of information. We have proxied these factors by authority type (metropolitan authorities who are in the minority may see themselves as sufficiently different from rural authorities to make comparison useless), political control (Labour authorities may have been more suspicious of global cost comparisons, particularly in a period when central government was under Conservative control) and the competitive tendering decision itself.

(2) Pooling. We pooled the entire data set, deflating nominal variables by the average rate of central and local government inflation and including time dummies.

Whilst the cross sections reveal the relative level of costs for local authorities, we are also interested in the evolution of cost savings over time. The reason for looking at the time series profile of collection costs in tendering authorities relates to the third and fourth questions raised in the introduction. If cost savings do not persist then we would expect the coefficients on a sequence of dummies representing each year since the first competitive tender was held to trend downwards over time. If tendering authorities were different from other authorities, regardless of the fact that they held a competitive tender, then we would expect a dummy variable representing the last year *before* a tender was held also to show a significant cost saving. To test these hypotheses we defined 10 dummy variables for the pooled and panel regressions starting from the last year before a competitive tender was held, up to the eighth year after the first competitive tender was held (the earliest competitive tender for an authority in the data set was in 1980). Dummy zero represented the first ever year in which a competitive tender took place for an individual authority. Dummies 1 to 8 represented the number of years since the first ever competitive tender was held. A further (–1) dummy represented the last year prior to the first ever competitive tender being held. The coefficients on these dummies can then be interpreted as representing the relative cost savings for each year subsequent to competitive tendering.

(3) Panel estimation. Estimating the model as a panel with separate intercepts for all 403 authorities and time dummies for each year effectively controls for unobserved differences between each local authority but, given only 1460 observations in total, most of the interesting variation between authorities is removed by this process. Nor does this approach substantially improve our understanding of the economic forces at play since the intercepts themselves have no obvious economic interpretation. Nonetheless, this approach implicitly tests the hypothesis that there was some underlying difference between tendering and non-tendering authorities, other than the simple fact of holding a competitive tender, which might account for differences in the total cost of refuse collection.

VII. RESULTS

Table 1 presents some summary statistics of the data. The table clearly shows that even in authorities which did not hold a competitive tender, total costs on average remained stable in nominal terms, implying significant falls in real costs. In authorities which held a competitive tender (either contracted out or awarded in-house) total costs were on average about 20 per cent lower in each year in the sample. The table also shows that these authorities tended to need about 20 per cent fewer employees, even though on average these authorities were larger than those which did not hold a competitive tender.

However, the number of authorities which held a competitive tender prior to CCT was small, and this must be borne in mind when interpreting the results. In total there are 57 authorities in the whole sample who ever held a competitive tender, 34 of which contracted out the service, 13 of which awarded the contract in-house. In fact, it appears that relatively few authorities introduced competitive tendering after 1985, so that most of the authorities included in this study are the same as those covered by DMT.

A number of factors may account for the downward trend in collection costs for the sample over the period. Following the Audit Commission report (1984) a number of authorities looked for ways to improve the efficiency of the collection service. Table 2 gives the pooled regression results and these show that kerbside collection (meth1) significantly reduces costs. Between 1984 and 1988 the percentage of authorities in the sample using this method rose from 18.9 per cent

TABLE 1
Cross Section Summary Statistics

	1984	*1985*	*1986*	*1987*	*1988*
(i) Non-tendering authorities					
Expenditure (£000)	1149	1138	1189	1184	1199
Units (000)	54.1	52.7	53.0	50.5	47.8
Cost per unit (£)	20.4	20.9	28.8	22.8	24.9
Employees	83	78	78	72	66
Authorities in sample	318	300	296	272	149
(ii) Competitive tender and contracted out					
Expenditure (£000)	1070	1048	1020	1152	909
Units (000)	60.9	61.0	57.6	52.0	48.9
Cost per unit (£)	16.5	16.0	16.5	19.7	18.4
Employees	69	69	61	59	47
Authorities in sample	11	18	20	25	14
(iii) Competitive tender and awarded in-house					
Expenditure (£ 000)	717	956	906	1070	554
Units (000)	44.6	57.1	53.7	58.2	29.8
Cost per unit (£)	15.7	15.6	16.2	16.7	18.8
Employees	46	51	48	66	29
Authorities in sample	7	6	7	8	2

All values in actual prices. The number of authorities refers to the number of observations in the sample for that year and many of the same authorities appear in each of the years in the sample.

TABLE 2
Pooled Regression Estimates

Dependent variable (in logs)	*CPU*	*CPE*	*EPU*
Constant	5.71	7.49	–1.77
	(0.54)	(1.07)	(1.21)
Tend	–0.18	0.035	–0.21
	(0.03)	(0.051)	(0.046)
Cont	–0.24	0.043	–0.28
	(0.03)	(0.046)	(0.047)
Log units	–0.04	0.034	–0.076
	(0.016)	(0.022)	(0.026)
freq1	0.0037	0.0017	0.002
	(0.00059)	(0.0018)	(0.021)
freq2	–0.004	0.0009	–0.0049
	(0.0012)	(0.0013)	(0.0012)
meth1	–0.0033	0.00094	–0.0043
	(0.00038)	(0.00046)	(0.00055)
meth2	–0.0019	0.0008	–0.0027
	(0.0005)	(0.00049)	(0.00067)
meth3	–0.0012	0.0015	0.0003
	(0.00067)	(0.00078)	(0.00097)
meth4	–0.0014	–0.0044	0.003
	(0.0015)	(0.0017)	(0.0021)
meth5	–0.00058	–0.00048	–0.0001
	(0.00035)	(0.00037)	(0.00047)
rec1	0.000082	–0.0000053	0.000087
	(0.0000086)	(0.0000099)	(0.000013)
rec2	0.00021	0.000015	0.00019
	(0.000037)	(0.000033)	(0.000045)
rec3	–0.0008	0.00025	–0.0011
	(0.00099)	(0.00066)	(0.001)
Tandf	–0.0081	0.013	–0.021
	(0.014)	(0.017)	(0.018)
Contin	0.044	0.06	–0.016
	(0.023)	(0.043)	(0.049)
log Hous	–1.04	0.044	–1.00
	(0.051)	(0.15)	(0.16)
log wage	0.52	0.38	0.14
	(0.084)	(0.09)	(0.11)

log Dens	–0.019	–0.0016	0.017
	(0.0055)	(0.0078)	(0.0088)
Met	0.12	–0.028	0.15
	(0.025)	(0.037)	(0.035)
London	0.11	0.079	0.035
	(0.031)	(0.040)	(0.043)
Con	–0.02	0.035	–0.055
	(0.012)	(0.014)	(0.017)
Lab	0.12	–0.013	0.13
	(0.014)	(0.014)	(0.019)
Oth	–0.02	0.012	–0.033
	(0.018)	(0.037)	(0.042)
$\bar{R}^2$	0.57	0.12	0.43

White standard error in parentheses.

Note: all monetary variables are deflated by the inflation index for central and local government services.

to 22.7 per cent. It is widely believed that backdoor collection raises costs and the proportion of authorities using this method (meth5) has fallen from 54.7 per cent to 45.2 per cent (surprisingly from the pooled unit cost regression the coefficient is the wrong sign and insignificant at the 5 per cent level). It is possible that the introduction of competitive tendering had knock-on effects as other authorities looked for ways to improve the service without having to hold a competitive tender. General financial pressures on local authorities may have intensified the search for cost savings, whilst the knowledge that CCT was going to be introduced may also have forced authorities to reorganise their services in anticipation of the reform.

In the regression analysis, the pooled specification was preferred over the cross section regressions corrected for sample selection bias and the panel regression estimates. Many of the coefficients in the sample selection bias regressions were not significant, in general the standard errors were much larger than the pooled estimates and the coefficients were not stable between regressions. In the panel regressions, although the panel specification was preferred in likelihood ratio tests, almost all of the coefficients on the remaining explanatory variables were insignificant at the 5 per cent level, limiting any economic interpretation of the regressions. The full pooled estimates are reported in Table 2 but only the cross section and panel estimates for TEND and CONT are reported in Table 3. Full details of the cross section and panel regressions are available from the authors on request.

Most of the coefficients in the cost per unit regression in Table 2 are similar in sign, size and significance to those of DMT. Of the political variables only the

TABLE 3

Reductions in Costs per Unit, Costs per Employee and Units per Employee Implied by the Cross Section, Pooled and Panel Regression Coefficients

		1984	*1985*	*1986*	*1987*	*1988*	*Pool*	*Panel*
CPU	T	–0.10	–0.13	–0.18	–0.03	–0.15	–0.17	– 0.25
		(0.12)	(0.11)	(0.11)	(0.22)	(0.21)	(0.03)	(0.02)
	C	–0.19	–0.26	–0.30	0.06	–0.17	–0.24	– 0.12
		(0.10)	(0.08)	(0.08)	(0.17)	(0.16)	(0.03)	(0.05)
$\bar{R}^2$		0.56	0.61	0.61	0.50	0.58	0.58	0.89
Wald		0.97	2.63	2.28	0.26	0.02		
							2.81*	7.8**
CPE	T	0.05	–0.08	–0.27	–0.13	0.00	0.04	–0.35
		(0.11)	(0.29)	(0.41)	(0.12)	(0.18)	(0.05)	(0.04)
	C	0.04	–0.22	–0.34	–0.04	0.03	0.04	0.07
		(0.09)	(0.21)	(0.30)	(0.10)	(0.14)	(0.05)	(0.04)
$\bar{R}^2$		0.13	0.13	0.15	0.16	0.06	0.12	0.63
Wald		0.0030	0.42	0.06	0.91	0.04		
							0.00*	31.0**
EPU	T	–0.15	–0.05	0.09	0.10	–0.15	–0.21	0.09
	(0.15)	(0.31)	(0.38)	(0.35)	(0.24)	(0.05)	(0.08)	
	C	–0.23	–0.04	0.04	0.10	–0.20	–0.29	–0.19
		(0.12)	(0.22)	(0.28)	(0.22)	(0.18)	(0.05)	(0.04)
$\bar{R}^2$		0.46	0.52	0.49	0.47	0.51	0.43	0.84
Wald		0.58	0.00085	0.04	0.00019	0.07		
							1.34*	15.6**
Obervations		335	323	323	305	165	1460	1460

CPU = cost per unit, CPE = cost per employee, EPU = employees per unit.

T = Tendered but kept in-house, C = Contracted out.

Wald is a test statistic for equality of the coefficients on T and C. The statistic is distributed $X^2(1)$ with critical value 0.0039 at the 95 per cent confidence level.

* is an F-test statistic for equality of the coefficients on T and C.

** is a likelihood ratio test statistic for equality of the coefficients on T and C. The critical value at the 5% level is 3.8.

Standard errors in parentheses.

TABLE 4
Time Series Coefficients on Competitive Tendering from the Pooled Regression

	CPU	*CPE*	*EPU*	*Number of cases*
T – 1	0.05	0.04	0.01	26
	(0.03)	(0.04)	(0.04)	
T 0	–0.10	0.10	–0.20	22
	(0.04)	(0.06)	(0.05)	
T + 1	–0.23	0.08	–0.31	20
	(0.05)	(0.05)	(0.04)	
T + 2	–0.27	0.12	–0.39	23
	(0.05)	0.17)	(0.18)	
T + 3	–0.30	–0.07	–0.23	20
	(0.05)	(0.07)	(0.06)	
T + 4	–0.19	0.06	–0.25	18
	(0.09)	(0.11)	(0.08)	
TR	–0.13	0.09	–0.22	14
	(0.09)	(0.05)	(0.08)	

CPU = cost per unit, CPE = cost per employee, EPU = employees per unit.
T0 is the year in which the first competitive tender for refuse collection services was held. T1–4 are years 1–4 respectively after T0. T–1 is the last full year before the first competitive tender was held. TR refers to all periods more than four full years after the initial competitive tender, by which date all the original contracts had expired.
Robust standard errors in parentheses

coefficient on Labour is significant, implying that Labour-controlled authorities have unit costs around 10 per cent higher than the average. It may be that Labour-controlled authorities face particular problems not experienced by other authorities, such as inner-city deprivation and so on. It is also possible that their higher costs are associated with particular political choices, e.g. the attitude toward union power, the importance of working conditions or service standards. They might also be less efficient than other authorities. London and metropolitan authorities also appear to have higher than average unit costs. Conventionally it is argued that optimal authority size from the point of view of collection cost is in the middle

range, since small authorities tend to be sparsely populated and have high collection costs (the coefficient on Density reflects this), whilst large metropolitan authorities also have higher costs, perhaps because the distance travelled to disposal sites tends to be greater. This pattern is confirmed by the data, but the coefficient on Units in the cost per unit regression also implies that there are economies of scale (unlike DMT). This raises a question as to whether large authorities have intrinsically higher costs, or whether these higher costs are simply a consequence of poor organisation or some other factor common to large authorities. This question is of interest since the introduction of CCT may affect the ability of some authorities to maintain peculiar practices (such as highly favourable working conditions or inefficient management operations). Post-CCT data will be able to shed some light on this issue.

The variables Tandf and Contin, which refer to types of work organisation employed are also variables not included by DMT. Tandf stands for 'Task and finish' the standard form of work organisation used before competitive tendering and widely blamed for low productivity in refuse collection. Under this method employees are set a fixed task, say a certain number of streets, and once the task is completed they can go home. The problem has been that these tasks may have been fixed a long time ago and the unions have been unwilling to renegotiate them, even though the workload may have diminished substantially (because, say, of new technology). The 'continuous' method has been introduced by most private contractors, and under this system employees work a fixed number of hours (other systems exist and this third possibility is allowed for in the CIPFA survey). In the data set 81 per cent of observations are 'Task and finish', but surprisingly the coefficient is insignificant.

We now turn to the four questions posed in the introduction.

(1) Is there a significant difference under competitive tendering between
   (a) contracting out to the private sector?
   (b) awarding the service to the local authority's own labour force (Direct Service Organisation)?

Table 3 reports the regression estimates for the coefficients on competitive tendering for those cases awarded in-house (T) and those awarded to outside contractors (C). The first five columns refer to the cross section estimates controlling for sample selection bias. The sixth column presents the pooled estimates and the last column the panel estimates including fixed effects and time dummies.

The cost per unit estimates indicate that authorities which held a competitive tender and contracted out the service had costs around 20 per cent lower than those that did not hold a competitive tender, significant at the 5 per cent level, from 1984-86. This is essentially the same finding as DMT. However, in 1987 and 1988 the difference is insignificant. For those authorities which held a competitive tender

and awarded the service in-house, the difference from the non-tendering group is only significant in the pooled and panel regressions. The coefficient on authorities which awarded contracts in-house is smaller than the coefficient on contracted out authorities in every year apart from 1987, but is also significantly larger in the panel estimates. It is clear that these results need to be interpreted cautiously. The estimates are unstable between models and in general poorly defined. The fact that the quality of the data is declining over time may mean that the results for 1987 and 1988 are not reliable. It is also likely that the poor definition on the in-house coefficients reflect the small number of observations.

The first question posed in the introduction about the relative efficiency of in-house and contracted out services cannot therefore be answered conclusively. A study of post-CCT data (Szymanski, 1993) suggests that in-house DSOs are more expensive than outside contractors, but this may relate to the unwillingness of many authorities to contract out, or indeed to participate at all in compulsory competitive tendering since 1988. The pre-CCT period was one of voluntary competitive tendering, so this factor may not have been important.

(2) What factors cause the cost savings associated with contracting out? Table 3 breaks down the cost advantage of tendering local authorities between cost per employee and the number of employees per collection unit. The pooled estimates imply that cost per employee is not significantly different, but that the number of employees per unit is significantly lower in authorities which held competitive tenders, and once again the coefficient on in-house authorities is smaller but the difference is not significant at the 5 per cent level. This result is consistent with the CDM paper which attributed a significant part of the cost savings from competitive tendering to efficiency gains. The cross section estimates are much less clear, the coefficients are not significant and change signs. The panel regression estimates imply that authorities which awarded the tender in-house had much lower costs per employee, but employees per unit insignificantly different from the non-tendering authorities. This might be taken as evidence of a significant difference between the in-house and contracting out group, but given the lack of stability between models this is at best a tentative conclusion.

Even the pooled estimates need to be interpreted carefully. Although the total cost of refuse collection per employee may have been unchanged by competitive tendering, it may still be the case that wages and conditions were reduced, given that part of the cost per employee must include an allowance for profits. Similarly reductions in employment per collection unit may reflect longer hours and thus a lower wage rate. In fact evidence from Perkins et al. (1986) and Walsh (1991) suggests that typically private contractors offer roughly the same weekly take-home pay, require longer hours, a shorter holiday, and withdraw sickness benefits and pension rights.

(3) Have cost savings persisted or were the original savings due to unsustainable underbidding? Table 4 reports the estimates from a pooled regression where,

instead of the dummy variables CONT and TEND, dummies for each year since competitive tendering was introduced are included in order to try and identify a time series pattern for competitive tendering. Thus T0 refers to the year in which the first competitive tender was held (possibly before 1984) and T+4 to the fourth full year after the first competitive tender. TR refers to any year after the fourth full year. In fact the dummies go up to T+8 but for these dates there are very few observations. TR also coincides with the second competitive tender, since almost all the pre-CCT contracts were for five years. T–1 is a dummy for the last full year before competitive tendering. Given the small number of observations, it was not feasible to distinguish between in-house and contracted out authorities. Note that in the pooled data all monetary values are deflated by the price index for central and local government services. Time dummies were included in some specifications but made no significant difference to the time profile of the coefficients.

The time profile of the coefficients on cost per unit follow a definite pattern, rising from T0 up to year T+3 and then falling. F-tests for coefficient equality were performed. In the cost per unit regression, equality of all six coefficients was easily rejected at the 5 per cent level ($F(6,1431) = 9.40$), and also for equality of T0 to TR ($F(5,1431) = 3.79$). For equality of T+1 to TR the F-test statistic ($F(4,1431)$) was 2.29, just accepted at the 5 per cent level, but for T+2 to TR and T+3 to TR the restriction was rejected ($F(3,1431) = 3.04$ and $F(2,1431) = 3.92$). Finally the restriction of coefficient equality for T+4 and TR could not be rejected at the 5 per cent level ($F(1,1431) = 0.88$). These tests suggest that although there is clearly a pattern in the time profile of the effects of competitive tendering it is not precisely defined, as one might expect given the limited number of observations.

The increase in the size of the coefficients from T0 to T+1 was noted by DMT and probably reflects reorganisation costs incurred in the first year. In general the time series pattern may reflect either changes in the non-tendering group, or in the tendering group, or in both. As far as the non-tendering group is concerned, we have already seen that real costs appeared to be falling over time and it may be that these authorities were catching up with the tendering group. But the pattern may also indicate that cost levels were changing in the tendering group. Changes before the end of the contract period may be associated with the way in which the initial contracts were indexed. In some cases they simply allowed increases in line with the RPI, in others they involve RPI–X formulas and in others costs are tied to input price indices. In addition, where problems arose which were not envisaged in the original contract there may have been contract renegotiation. For example, if new environmental standards are laid down contractors may demand additional payments in order to meet them.

Contractors may also have incentives to 'game' the system by underbidding initially with a view to raising contract prices later. If incumbents are more likely to win contracts than outsiders, then it may make sense for contractors to bid low

the first time in the expectation of renewing the contract with higher bid when the initial contract expires. This possibility is a matter of some controversy and all contractors deny that any form of underbidding takes place. Nonetheless, the evidence that 50 per cent of contract renewals pre-CCT were by single negotiation (see above), and the fact that 70 per cent of contracts in refuse collection since CCT have been won by the incumbent DSO, lends some support to the view that incumbency does convey an advantage in bidding for this service.

The data are consistent with underbidding, but there are only a small number of observations in the data set and it will only be possible to arrive at a firm view when large numbers of CCT contracts are renewed (around 1995–96).

(4) Can the cost savings be directly attributed to the process of competitive tendering, or do they reflect the inherent efficiency of various local authorities? DMT were unable effectively to distinguish between the hypotheses (a) that competitive tendering authorities are inherently cheaper; and (b) that they are cheaper because they have held a competitive tender, because of the absence of a significant time series dimension to their data. Using this data set we can generate two tests of this hypothesis.

The first follows from the panel estimation of the data allowing for authority specific intercepts. These should pick up differences between authorities present throughout the sample period. The significance of the CONT and TEND variables in the panel regression with authority specific intercepts therefore supports the idea that the introduction of competitive tendering coincided with a change in the performance of the authority.

The second test relies on the fact that in some cases we know the cost of refuse collection in the last full year prior to competitive tendering. If tendering authorities are intrinsically different from the non-tendering authorities, then this difference should be observable even before the first competitive tender was held. Specifically, a dummy for the last full year prior to the competitive tender in the pooled regression should indicate insignificantly lower costs than the non-tendering group.

In this data set we have 26 instances where the cost of collection is known in the last full year prior to holding a competitive tender. The estimates shown as T–1 in Table 4 show that there is no significant difference between tendering and non-tendering authorities in year T–1. This supports the view that there was no intrinsic difference between authorities aside from the decision to hold a competitive tender.

VIII. CONCLUSIONS

The main contribution of this article has been to provide an analysis of competitive tendering in refuse collection in the period 1984–88, prior to the introduction of CCT in 1988. This extends the earlier work of DMT and others which related only

to the years 1984 and 1985. Using data for the years 1984–88 we found:

(1) Competitive tendering and contracting out reduced unit costs by around 20 per cent, a figure broadly in line with earlier findings of DMT.

(2) In some specifications competitive tendering and retaining the service in-house appears to have a smaller impact on the level of costs than contracting out, but the difference is not statistically significant at the 5 per cent level, again in line with DMT. The absolute size and significance (though generally not the sign) on these coefficients was not robust to changes in the method of estimation.

(3) Whilst the savings from contracting initially appear to rise, we found evidence that the trend is reversed four years after the award of the initial contract. Since this is about the time that most of the initial contracts were renegotiated, we believe this is evidence that underbidding – deliberate or accidental – was taking place. However the data are limited for this pre-CCT period and a clearer picture will emerge only when a full post-CCT study is carried out.

(4) Most of the cost savings associated with contracting out can be identified with productivity improvements. This means that fewer people were doing the same job at the same employment cost per person. Whilst this appears to confirm that direct pay reductions were not the source of the cost savings, it may be that the productivity increase involved a fall in the effective hourly wage rate.

(5) The existence of lower than average costs in tendering authorities does not predate the beginning of the first contract, supporting (though not proving) the hypothesis that the lower costs observed in the tendering authorities are associated with the act of competitive tendering itself. Panel regressions revealed that tendering made a significant difference to the level of refuse collection costs not accounted for by authority specific factors.

This article draws a line under the era of pre-CCT competitive tendering. Whilst the results here have several important implications, more robust findings will come only from analysis of the post-CCT era to which the focus of research will now shift.

DATA APPENDIX: DEFINITION OF VARIABLES

Cost	total gross expenditure on refuse collection services, including employees, premises and depots, supply of sacks and dustbins, transport, support services and agency services including payments to contracts
Employees	total number of employees involved in refuse collection services, full-time and part-time measured in full-time equivalents
Units	total number of pick-up points from which refuse is collected, domestic, commercial or industrial
Wage	regional average male weekly earnings
Freq1	per cent of waste collected more than once a week
Freq2	per cent of waste collected less than once a week

Meth1	per cent of waste collected from kerbside
Meth2	per cent of waste collected but not from backdoor or kerbside
Meth3	per cent of waste collected from skeps*
Meth4	per cent of special collections of household waste
Meth5	per cent of household waste collected from backdoor**
Den	units per hectare
Hous	percentage of household units out of the total number of collection units
Rec1	tonnes of paper reclaimed
Rec2	number of abandoned vehicles collected
Rec3	number of bottle banks
Tandf	a dummy variable:=1 if waste collected by the 'Task and finish' method, = 0 otherwise
Contin	a dummy variable:=1 if waste collected by the 'continuous' method, = 0 otherwise
Contract	a dummy variable:=1 if privately contracted more than 10 per cent of total expenditure, = 0 otherwise
Tend	a dummy variable:=1 if a formal tender had been issued but the service retained in-house, = 0 otherwise
Met	a dummy variable:=1 for metropolitan authorities, = 0 otherwise
London	a dummy variable:=1 if a Greater London borough, = 0 otherwise
Con	a dummy variable:=1 if a Conservative-controlled authority, = 0 otherwise
Lab	a dummy variable:=1 if a Labour-controlled authority, = 0 otherwise
Hung	a dummy variable:=1 if no single party has a majority, = 0 otherwise***

* A skep is a dustbin sized container carried by the operative. The contents of the dustbin are first emptied into the skep and then carried to the collection vehicle.

** there is an 'other' category of collection method which accounts for the remaining 10–20 per cent of waste not collected by meth1–5.

*** the fourth possibility is that another party (such as the Liberals) holds an overall majority.

Note: DMT included a variable DISP, the distance to be travelled to the disposal site. We have been unable to recover any information at all on this variable.

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