

# Privatization of Refuse Removal and Labor Costs\*

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*We examine the labor-cost savings associated with privatization by comparing earnings and employment trends of public and private sector refuse workers. Findings suggest that high union earnings for workers in the public sector are a source of labor-cost savings in the refuse industry. Evidence on job changers does not indicate that earnings for this group of workers are a compensating differential. Metropolitan area employment findings suggest that municipalities are less likely to use union refuse workers in the public sector when a relatively small percentage of area residents belong to a union.*

## *I. Introduction*

The privatization of government services is a recent major policy shift largely driven by expected cost savings.<sup>1</sup> Despite the potential savings from privatization, most public services are still provided by government employees (Lopez-de-Silanes et al., 1997). Strong resistance from beneficiaries of the public system, such as municipal unions, might slow the privatization movement in part because government-sanctioned monopolization of municipal services allows unions to obtain rent for their members. Theory suggests that municipal unions can successfully oppose privatization by supporting candidates financially and deploying members to promote candidates who oppose privatization (Peltzman, 1976).

We contribute to the understanding of privatization and labor-cost savings by examining the earnings and employment patterns of union and nonunion, public and private refuse workers. Limiting our analysis to refuse allows us to examine a ubiquitous service that can be easily provided by private firms (Lopez-de-Silanes et al., 1997). The industry's highly elastic labor demand reduces the effectiveness of labor strikes and operation slowdowns as methods of union coercion.<sup>2</sup> Rather, unions are more likely to use political pressure to resist privatization. Hence, we use Peltzman's theory on political determinants of policy change as a framework for examining privatization and labor costs.<sup>3</sup>

The hypotheses derived from Peltzman's model are tested by initially estimating separate public-private earnings differentials for union and nonunion refuse workers employed in the public and private sectors to determine if unions benefit from the public system. Following that analysis, we explore whether union refuse workers in the public sector possess unmeasured attributes that command higher earnings than their counterparts in private firms. Such an analysis indicates whether union earnings premiums are a potential source of labor-cost savings. Last, we estimate a public sector-union status equation that includes the population of metropolitan areas and the percentage of the employed population that belongs to a union as determinants of refuse worker status to identify the type of municipalities that are more likely to use low-wage refuse workers.

## II. *Municipal Unions and Privatization in the Refuse Industry*

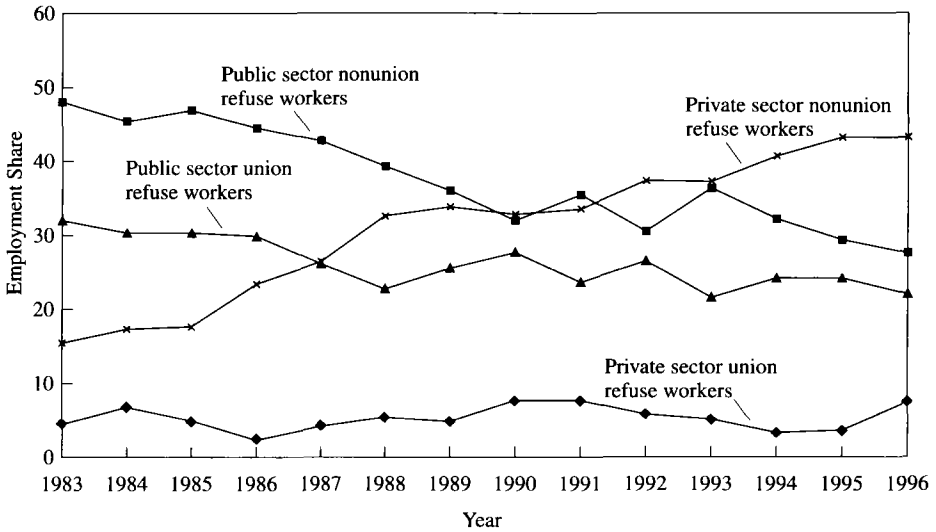
Past findings report substantial cost savings from privatization of refuse collection. For instance, Bennett and Johnson (1979) show that at the mean, consumers receiving refuse service from government paid nearly 50 percent higher fees.<sup>4</sup> Moreover, there has been a substantial increase in nonunion workers employed by private refuse companies. The employment share of nonunion private sector workers increased from 15.5 to 43 percent between 1983 and 1996 (Figure 1). The large gain in nonunion private sector employment reflects the relative ease of using alternative providers. The share of public sector employees fell from 80.11 to 49.5 percent over the same period. A 21 percentage point employment share decline in nonunion public sector workers explains most of the erosion in this sector. In comparison, the share of union workers in the public sector fell 10 percentage points during the same period. The relatively smaller employment share erosion of union workers suggests that unions are better able to protect their members from job displacement associated with privatization.

Avoiding member displacement is most likely linked to municipal unions successfully supporting the election of officials who oppose privatization, especially given the ineffectiveness of strikes in a labor market with a large pool of replacement workers. A framework that identifies how unions promote the election of their preferred officials is found in Peltzman's (1976) model, which emphasizes factors influencing the election of policymakers as key determinants of government decisions.

In Peltzman's model, supporters of public refuse are highly likely to vote if the gains from using public workers to provide refuse collection are greater than the campaign and organizing costs required to elect their candidate. Nonsupporters are less likely to vote if the union campaign can show that the benefits of using public workers justify the associated high cost.

Labor unions are the ideal pressure group to increase the probability of a majority vote for its candidate. For example, a union's monopoly control over the public sector labor supply strengthens its ability to negotiate higher wages, and higher wages raise the probability that unionized public workers will vote to oppose privatization. Union funds support advertising campaigns promoting candidates who favor public

Figure 1  
*Refuse-Removal Employment Share Trends*



refuse systems.<sup>5</sup> In addition, unions can also distribute information favoring public provision. Last, unions have low campaign-organization costs, due to the ease of mobilizing their membership.

In Peltzman's framework, unionized public workers should also avoid significant erosion of their share of jobs during a period of increasing privatization. Municipal unions do not want more nonunion workers in the public sector, since a small number of workers in this sector allows the payment of high union wages without requiring a large fee increase to residents. Passing on high union wages presents residents with greater incentive to oppose the use of union workers in the public sector. Despite the decreasing share of nonunion workers in the public sector, the increasing use of private firms places downward pressure on union wages. Nonetheless, the ability of unions to avoid a large declining share of the refuse industry work force possibly provides enough control over the labor supply to avoid complete erosion of the union earnings premium. The possibility of a union employment advantage reveals the significance of distinguishing the effect of privatization on the earnings and employment of union and nonunion workers in the public sector.

### III. *Data and Empirical Specification of Earnings Equations*

Information on individual workers is used to compare earnings of union and nonunion, public and private refuse workers. The same information is also used to examine the earnings pattern differences of these four worker groups. Current Population Survey

(CPS) outgoing rotation groups for each monthly file from 1983 to 1996 are used to compile data on refuse workers.<sup>6</sup> The 1982 surveys are excluded because the union membership question was omitted for that year. The sample selected from these data consists of full-time refuse workers age 16 to 64 who provided information on usual weekly earnings, usual hours worked per week, and union status.

Comparison of labor earnings is achieved by estimating the following log-linear earnings equation:

$$\ln \text{earnings}_j = \alpha + \beta_1 \text{wc}_j + \beta_2 \text{occ}_j + \beta_3 \text{region}_j + \beta_4 T + \beta_5 \text{Union}_j + \beta_6 \text{Private}_j + \beta_7 \text{Union}_j \cdot \text{Private}_j + \varepsilon_j, \quad (1)$$

where  $j$  indexes individual refuse removal workers, and  $\text{earnings}_j$  measures weekly earnings in 1983 dollars. The vector  $\text{wc}_j$  is the set of worker characteristics indicating the individual's marital status, standard metropolitan statistical area (SMSA) residency status, race, years of schooling completed, potential years of work experience and the square of this variable, and the natural log of usual hours worked per week. The vector  $\text{occ}_j$  is a set of occupational dummies as classified by one-digit census coding, and the vector  $\text{region}_j$  is a set of regional variables. The vector  $T$  is a set of year dummies that are included to account for possible changes in the earnings determination process over time.

Dummy variables  $\text{Union}_j$ ,  $\text{Private}_j$ , and the interaction term for these variables are of primary interest. The estimated coefficient on  $\text{Union}_j$  depicts the union log earnings differential of public refuse workers.<sup>7</sup> The difference of the estimated coefficients on  $\text{Union}_j$  and  $\text{Private}_j$  depicts the log earnings differential between public sector union workers and nonunion workers in the private sector. The sum of the estimated coefficient on the interaction term and the  $\text{Private}_j$  dummy depicts the public sector log earnings differential for union workers. Following the estimation of equation (1), a difference-in-differences approach is used to examine annual changes in the log earnings differentials.<sup>8</sup>

#### IV. Earnings Results

The key findings from estimating earnings equation (1) are presented in Table 1.<sup>9</sup> These findings support the notion that public refuse workers benefit from union representation. For instance, the estimated coefficient on the  $\text{Union}$  dummy suggests that union workers in the public sector received earnings that were 14.91 percent higher than those received by their nonunion counterparts in the same sector. The difference between the estimated coefficients on the  $\text{Union}$  and  $\text{Private}$  dummies suggests that union workers in the public sector enjoyed a 9.24 percent earnings advantage over nonunion workers employed in private establishments. The sum of the estimated coefficients on the  $\text{Private}$  and  $\text{Union} \cdot \text{Private}$  interaction terms suggests that earnings of union workers in the public sector are 11.07 percent higher than those of union workers in the private sector. These large earnings premiums reveal the potential labor-cost savings from privatization and from the employment of nonunion workers in the public sector. The

magnitude of such savings can be illustrated by calculating the labor cost differential for a work force of 100. Using the results from Table 1 we find that, at the mean, replacing 100 union workers in the public sector with nonunion workers from either the public or private sector would lower labor costs by \$8,312, or \$5,921 a week, respectively, in 1996 dollars. The cost savings would equal \$6,494 a week if union workers in the private sector were the replacement group.<sup>10</sup> Even though the results in Table 1 depict nonunion workers in the public sector receiving the lowest earnings, findings in Table 2 indicate that the largest overall labor savings is likely to arise from using nonunion workers in the private sector. The percentage of workers receiving employer-financed pension plans is appreciably smaller for nonunion workers in the private sec-

Table 1  
*Partial Results from Estimating Equation (1) for Refuse Workers\**

Earnings Determinants	Estimated Coefficients (1)	t-Statistics (2)
Constant	1.692	10.146
<i>Union</i>	0.139	10.500
<i>Private</i>	0.042	3.351
<i>Union • Private</i>	-0.147	-1.121
Number of observations	5,438	
Adjusted R-squared	0.4540	
F-Statistic	162.458	

\*Note: Complete results that include control variables are available from the authors.

Table 2  
*The Percentage of Refuse Workers Receiving Fringe Benefits\**

Refuse Worker Category	Employer-Financed Pension Plan	Employer-Financed Health Care Plan
Union Worker in the Public Sector	97.40% (96)	93.50% (96)
Union Worker in the Private Sector	94.11 (21)	88.23 (21)
Nonunion Worker in the Public Sector	83.18 (141)	88.78 (137)
Nonunion Worker in the Private Sector	62.50 (90)	84.88 (94)

\*Note: Sample population sizes are in parentheses. Data for this table were compiled from 1983-1996 March CPS files.

tor compared to the three other groups of refuse workers. To a lesser extent nonunion workers in the private sector are also less likely to receive employer-financed health care plans.

Table 3 indicates that for the 1983 to 1996 observation period union workers in the public sector were able to avoid an erosion of their earnings advantage over nonunion workers in this sector and union workers in the private sector. The estimated coefficient on the time trend variable for the sample of union workers in the public sector shows that their earnings declined at a statistically significant annual rate of 0.51 percent over the 14-year observation period. The earnings of nonunion workers in this sector and union workers in the private sector fell at annual rates of 1.22 and 0.53 percent, respectively. In contrast, the earnings of nonunion workers in the public sector fell at a much slower annual rate compared to union workers in the public sector. For instance, the earnings of nonunion workers in the private sector declined at only a 0.298 percent annual rate. The difference between this trend and that of union workers in the public sector depicts an earnings differential erosion of 3.36 percentage points for the 14-year observation period. Compared to the nine percent earnings premium for union workers found when estimating equation (1), this earnings compression represents slightly more than one-third of the earnings premium received by this group of workers above that of nonunion workers in the private sector. This evidence on refuse worker earnings patterns, though, still indicates that union workers in the public sector remain the highest paid workers in this industry.

### V. Earnings Change Results Following Change of Jobs

While the maintenance of an earnings advantage for union workers in the public sector might depict rent sharing, these workers could possess unobserved attributes that command high earnings. The absence of data depicting worker characteristics such as

Table 3  
*Partial Results on Log Earnings Trend for Refuse Removal Workers\**

	Public Sector Refuse Workers		Private Sector Refuse Workers	
	Union	Nonunion	Union	Nonunion
Time Trend Variable (1983-1996)	-0.0051 (-1.940)	-0.01228 (-5.494)	-0.00532 (-0.8109)	-0.0029 (-1.016)
Adjusted R-squared	0.2151	0.4629	0.3564	0.5231
F-statistic	15.982	68.364	7.269	72.689
Number of obs.	1,421	2,032	283	1,699

\*Note: *t*-statistics presented in parentheses. Complete estimation results are available from the authors.

reliability, carefulness, promptness, and diligence precludes the use of conventional estimation to test whether high-quality workers receive high earnings. Inter-industry comparison of earnings changes following change of jobs offers an approach for identifying the relative market value of workers (Krueger and Summers, 1988; Gibbons and Katz, 1992). Individuals with highly valued attributes will experience larger earnings gains on re-employment. Information on job changers is taken from the 1983–1996 CPS Out-Going Rotation Group (ORG) files. This data set of individual worker characteristics allows us to examine the extent to which earnings change patterns differ by refuse removal worker group. Using the selection procedure developed by Hirsch and Macpherson (2000), we construct a longitudinal data sample consisting of 251 and 36,807 refuse and service sector job changers reporting their original and new industry of employment, gender, race, marital status, educational attainment, the year of job change, and weekly earnings before and after changing jobs.<sup>11</sup>

The specification of the earnings change equation is:

$$\ln w_{k,t+1} - \ln w_{k,t} = \Delta w_k = \alpha + \beta_1 \Delta wc_k + \beta_2 T + \beta_3 \Delta refuse_k + \epsilon_k, \quad (2)$$

where  $k$  indexes individuals.<sup>12</sup> The dependent variable is the post-displacement log earnings change in 1983 dollars. Vector  $\Delta wc_k$  includes a set of earnings change determinants depicting changes in individual worker characteristics and worker location following job changes.<sup>13</sup> Vector  $T$  consists of time dummies indicating the year prior to job change. Vector  $\Delta refuse_k$  includes a series of dummies identifying whether refuse workers who changed jobs were originally employed as union or nonunion workers in the public or private sector.<sup>14</sup> The baseline occupation used for earnings change comparisons is nonunion service sector workers employed in industries other than refuse collection.<sup>15</sup> Thus, the estimated coefficient on the pre-job-change variables measures the difference of the earnings change of refuse removal job changers compared to the earnings change experienced by service sector workers leaving other industries.

The results from estimating equation (2) are presented in Table 4. These findings do not suggest a relatively high market value for union and nonunion public sector workers leaving their refuse jobs. Both public sector worker groups received low refuse removal earnings gains following a change of job. The sum of all five of the estimated coefficients on the pre-job-change dummies measures the relative log earnings change for union refuse workers in the public sector. This summation suggests that the weekly earnings gain following a job change for union refuse workers in the public sector is 8.85 percent smaller than gains experienced by the baseline comparison group of nonunion workers in other service sectors. The sum of the estimated coefficient on the *refuse* and *public sector refuse* dummies depicts the earnings change of nonunion refuse workers in the public sector compared to the baseline worker group. This summation suggests that the weekly earnings gain following a job change for refuse nonunion workers in the public sector is 15.40 percent smaller than gains experienced by the baseline comparison group. Consequently, while nonunion workers in the public sector are a source of labor-cost savings, their market value does not command wage gains that match those of nonunion service worker.

Table 4  
*Results on Log Earnings Change Following Job Change  
 (Estimation of Equation (2))*

	Estimated Coefficient	t-Statistic
Earnings Change Determinants (1983/84 dollars)		
Constant	0.4538	6.561
<i>Δrefuse</i>		
<u>pre-job-change worker group</u>		
<i>union</i> (1 if union member)	-0.0788	-7.479
<i>refuse</i> (1 if refuse industry)	-0.0119	-0.295
<i>union public sector refuse</i> (1 if union refuse worker in Public sector)	-0.0065	-0.500
<i>Public sector refuse</i> (1 if nonunion public sector worker in refuse industry)	-0.1555	-2.419
<i>union refuse</i> (1 if union refuse worker in private sector)	0.1599	1.673
<u>post-job-change employment</u>		
<i>union</i> (1 if employed as union worker)	0.0684	6.730
<i>private</i> (1 if employed in private sector)	-0.0774	-6.796
<i>Δwc</i>		
black	-0.022	-2.780
other minorities	-0.004	-0.344
female	0.0086	1.779
age	-0.0072	-5.795
age-squared (× 10000)	0.074	4.293
SMSA resident	0.0002	0.036
changed marital status	-0.124	-1.147
change in weekly hours worked	0.0183	53.400
changed regions	-0.5189	-3.982
change of educational status (original education attainment)		
attended high school	0.008	0.601
attended college	-0.0114	-0.841
received undergraduate degree	0.0288	2.188
received graduate degree	0.0148	1.661
<i>T</i>	-0.002	-2.665
<i>F</i> -Statistic	151.364	
Number of observations	32,976	



The estimated coefficient on the *refuse* pre-job-change dummy depicts the log earnings gain of private nonunion refuse workers compared to the baseline group. Adding its value to the estimated coefficients on the *union* and *union refuse sector* pre-job-change dummies depicts the log earnings gains of private sector union refuse workers compared to the baseline group. The results for these estimated coefficients suggest that nonunion and union workers in the private refuse sector received earnings gains that were 1.18 percent below and 7.17 percent above the comparison group, respectively. Consequently, using nonunion workers from the private sector allows municipalities the opportunity to lower labor costs while employing refuse workers whose market value commands wage gains that are comparable to those of nonunion service sector workers.

## VI. *Municipal Determinants of Public Refuse Removal Employment*

The use of private sector workers to provide public services differs significantly by municipality (Lopez-de-Salines et al., 1997; Kodrycki, 1994). In Peltzman's theoretical framework, characteristics such as union members' work force share and metropolitan population size influence municipalities using private sector workers. Officials in metropolitan areas populated with a large share of union members should receive greater support for the public employment of union workers, because residents in these localities are likely to be sympathetic to the demands of union workers. Less opposition to the use of public workers could arise in large metropolitan areas because compared to smaller localities, the per customer tax for the same coverage of public services is smaller, all else equal.<sup>16</sup>

The same CPS files used to examine refuse removal worker earnings are also used to analyze employment patterns for these workers. The sample selection for the employment analysis follows that used for the earnings analysis except for the additional criterion that individuals report their SMSA residence. Satisfying this additional condition substantially lowers the sample population.<sup>17</sup> Nonetheless, the number of observations is still large enough to allow examination of employment patterns of the four groups of refuse workers.

Comparisons of employment patterns are accomplished by using a multinomial-logit procedure to estimate employment probabilities of the four worker groups. Individual workers' years of schooling, age, marital status, race, sex, and geographic region of employment comprise the set of demographic control variables. Metropolitan population size and a unionization variable are included to capture the effects of metropolitan area characteristics on employment probabilities of the worker groups. The variable *SMSA-size* indicates whether the worker resides in a small SMSA. This dummy variable equals one if the SMSA population exceeds 500,000. Lastly, *City-union density* indicates the percentage of union members residing in an SMSA.<sup>18</sup>

Employment probabilities converted from estimating the multinomial-logit equation are presented in Table 5, where the findings suggest that metropolitan population size is not associated with the employment probabilities of union workers in the refuse

**Table 5**  
*Predicted Refuse Industry Employment Probabilities\**  
 (Probabilities are derived from multinomial-logit estimation results)

SMSA Type	Private Sector Workers		Public Sector Workers	
	Union (1)	Nonunion (2)	Union (3)	Nonunion (4)
(1) Large SMSA	$2.31877 \times 10^{-5}$	0.6841	0.0771	0.2387
(2) Small SMSA	$9.10841 \times 10^{-6}$	0.6175	0.0672	0.3152
(3) Employment	$-1.40789 \times 10^{-5}$	-0.0666	-0.0099	0.0765
Probability Change				
(4) $\frac{\partial \text{employment probability}}{\partial \text{union residency rate}}$	$-0.00001 \times 10^{-5}$	0.024	0.6914	-0.715

\*Note: Complete estimation results are available from the authors.

industry.<sup>19</sup> For instance, the results in row (3) of columns (1) and (3) show negligible differences in the employment probabilities of union refuse workers in large and small metropolitan areas. In contrast, the findings in row (3) of columns (2) and (4) show that metropolitan population size is associated with employment probabilities of nonunion refuse workers. Compared to smaller metropolitan areas, large metropolitan areas are more likely to use nonunion private sector refuse workers. The probability of nonunion employment in the private sector is 6.6 percentage points higher in large metropolitan areas. This depicts a 10.78 percent difference in the probability of nonunion refuse workers in this sector.

The findings on metropolitan size and refuse employment do not support the notion that privatization is less likely in small localities. Rather the results in row (3) of column (4) show that compared to large metropolitan areas, small localities are more likely to employ nonunion refuse workers in the public sector. For instance, the expected employment probability of this group of workers is 7.65 percentage points larger than that found for large metropolitan areas. Hence, municipalities with small populations are less likely to take advantage of the low labor cost that arises from employing nonunion workers in the private sector. Even though small metropolitan areas are less likely to employ these workers, the greater employment probability of nonunion public sector refuse workers in these localities does not suggest that these municipalities face high labor costs. Especially since the low earnings paid to nonunion public workers indicates that their total labor cost more closely resembles that of nonunion workers in the private sector than that of union workers in the public sector.

Findings on the marginal employment effect of union residency rates are presented in row (4). These findings support the view that highly organized metropolitan areas are more likely to resist privatization. For instance, the results in column (3) of row

(4) indicate that the employment probability of public sector union workers in the refuse industry increases by 0.69 percent for each percentage increase in the union worker share of metropolitan area residents. The greater probability of employment of union workers in these localities is apparently associated with a lower employment probability of nonunion refuse workers in the public sector. Column (4) of row (4) indicates that a one percent increase in the union residency rate is associated with a 0.71 percent decline of the employment probability of nonunion public sector refuse workers. This low employment share is unique to nonunion refuse workers in the public sector, as the results in columns (1) and (2) suggest that the union residency rate has a negligible effect on the employment probability of refuse workers in the private sector.

## VII. *Conclusion*

Recent economic policy has shifted toward the use of private firms to promote greater use of low-cost providers of public services. Refuse removal presents the opportunity to examine municipal administrators' ability to lower service cost through privatization when there is a large source of competent workers in the private sector. In this study we examined the extent to which municipalities have taken advantage of the potential cost savings by analyzing union and nonunion earnings and employment patterns.

Findings reveal that labor-cost savings arise in two ways. The percentage of high-wage union workers in the public sector declined over the 1983 to 1996 observation period. However, the rate of decline is much smaller than that of nonunion workers in this sector. Labor-cost savings have also been achieved through the payment of earnings to union workers in the public sector that more closely resemble those of low-wage nonunion refuse workers in the private sector. Union workers in the public sector, though, still receive a premium above other refuse workers. A test for compensating differentials does not suggest that public sector union workers possess unobserved traits that justify these higher earnings. Hence, the potential for labor-cost savings apparently still exists in this service industry. Employment findings show that the potential for experiencing further savings is most prevalent in metropolitan areas with high union residency rates, since these localities are more likely to employ union workers in the public sector.

In sum, privatization is less likely when metropolitan residency characteristics indicate that it is not politically advantageous for municipal administrators to endorse this policy, as in highly unionized metropolitan areas. Nonetheless, declining employment shares of union refuse workers in the public sector and the erosion of their earnings advantage over their nonunion counterparts in the private sector do suggest nontrivial labor-cost savings as a result of the move toward greater privatization of the refuse industry.

## NOTES

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<sup>1</sup>Past research on privatization of municipal services indicates nontrivial cost reductions following this policy change (Stevens, 1984, p. 401). Such cost savings arise whether the private system relies on contracting, franchising, or open/restricted entry (Kemper and Quigley, 1976; Dubin and Navarro, 1988; Edwards and Stevens, 1978).

<sup>2</sup>The unlikely event of labor strikes by municipal refuse unions is further enhanced by legislation prohibiting strikes. Despite the threat of job loss, strikes by public workers still occur. The ease of replacement in the refuse removal industry suggests that union workers in this industry are less likely than other public employees to strike.

<sup>3</sup>Peltzman (1976) focuses on the political determinants of regulation. However, his model is general enough to apply to the political determinants of other policies, such as privatization.

<sup>4</sup>Bennett and Johnson observe the advantages of using refuse-removal fees rather than service cost to municipalities when examining consumer gains from privatization. In particular, they argue that it is difficult for most municipalities to accurately measure the true cost of their agency providing public services. Nonetheless, Stevens (1984) finds 40 percent cost savings when municipalities switch from public to private refuse service. These cost savings nearly match the fee reduction found by Bennett and Johnson.

<sup>5</sup>Provisions of the 1947 Taft-Hartley Act prohibit unions directly financing political campaigns.

<sup>6</sup>1983 is chosen as the initial observation year, because the ORG files do not report workers' union status prior to this year. The 14-year sample observation period, though, is large enough to allow examination of earnings and employment of the four sets of worker groups.

<sup>7</sup>Log earnings differentials are converted into percentage differentials by taking the exponential of the estimated coefficient, subtracting one, and then multiplying this difference by 100.

<sup>8</sup>Even though the sample population is large enough to allow for separate estimations of earnings trends of the four worker groups, it is too small to allow separate yearly estimations for each worker group.

<sup>9</sup>Though not shown in Table 1, the estimated coefficients on the control variables have standard signs and statistical significance.

<sup>10</sup>These calculations were taken for the 1996 observation period.

<sup>11</sup>A shortcoming faced when using ORG files to examine job changes is the inability to distinguish voluntary and involuntary job changers. Nonetheless, the market value of workers' unobserved characteristics should not differ appreciably even when the reason individuals change jobs differs.

<sup>12</sup>On average, workers in this observation sample receive earnings gains following their change of jobs.

<sup>13</sup>A dummy for SMSA residency status instead of a dummy depicting a change in residency is used, because the CPS does not report information on individuals who change SMSA residences. Other worker characteristics that do not change or change by the same amount across individuals are race, gender, and age.

<sup>14</sup>A variable depicting whether individuals changed industries is excluded as a determinant, because the sample only consists of job changers who change industries.

<sup>15</sup>Nonunion service sector workers are chosen as the baseline comparison group in part because they are employed in the same sector as refuse workers.

<sup>16</sup>The analysis of city size and privatization assumes economies of scale in the refuse removal industry. Stevens (1978) presents evidence supporting this as an appropriate assumption.

<sup>17</sup>CPS sampling techniques only provide for a small number of individuals reporting their SMSA residency location. In addition, prior to the 1987 sample period, CPS files do not report SMSA residence location of individuals for the entire 252 census localities.

<sup>18</sup>CPS files are used to compute the percentage of full-time employed SMSA residents who are union members. These metropolitan unionization rates are derived for the 252 SMSA locations reported by the 1980 census.

<sup>19</sup>Though not reported in Table 5, results on the control variables suggest that workers residing in the south, workers who are single, male, employed as professionals, technicians, clerical workers, or who receive more years of schooling are more likely to be employed as nonunion workers in the private sector or as nonunion workers in the public sector.

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