ILR Review

Volume 63 | Number 2 Article 6

January 2010

Does Outsourcing Reduce Wages in the Low-Wage Service Occupations? Evidence from Janitors and Guards

Arindrajit Dube
University of California, Berkeley, adube@berkeley.edu

Ethan Kaplan
Columbia University, ethan.kaplan@gmail.com

Does Outsourcing Reduce Wages in the Low-Wage Service Occupations? Evidence from Janitors and Guards

Abstract
Outsourcing of labor services grew substantially during the 1980s and 1990s and was associated with lower wages, fewer benefits, and lower rates of unionization. The authors focus on two occupations for which they can identify outsourcing in those two decades using industry and occupation codes: janitors and guards. Across a wide array of specifications, they find that the outsourcing wage penalty ranged from 4% to 7% for janitors and from 8% to 24% for guards. Their findings on health benefits mirror those on wages. Evidence suggests that the outsourcing penalty was not due to compensating differentials for higher benefits or lower hours, skill differences, or the types of industries that outsourced. Rather, outsourcing seems to have reduced labor market rents for workers, especially for those in the upper half of the occupational wage distribution. Industries with higher historical wage premia were more likely to outsource service work.

Keywords
Outsourcing, Subcontracting, Industry Wage Premium

DOES OUTSOURCING REDUCE WAGES IN THE LOW-WAGE SERVICE OCCUPATIONS? EVIDENCE FROM JANITORS AND GUARDS

ARINDRAJIT DUBE and ETHAN KAPLAN*

Outsourcing of labor services grew substantially during the 1980s and 1990s and was associated with lower wages, fewer benefits, and lower rates of unionization. The authors focus on two occupations for which they can identify outsourcing in those two decades using industry and occupation codes: janitors and guards. Across a wide array of specifications, they find that the outsourcing wage penalty ranged from 4% to 7% for janitors and from 8% to 24% for guards. Their findings on health benefits mirror those on wages. Evidence suggests that the outsourcing penalty was not due to compensating differentials for higher benefits or lower hours, skill differences, or the types of industries that outsourced. Rather, outsourcing seems to have reduced labor market rents for workers, especially for those in the upper half of the occupational wage distribution. Industries with higher historical wage premia were more likely to outsource service work.

Over the past several decades, there has been a marked increase of service contractors in low-wage service occupations. At the same time, there has been a sharp increase in wage inequality in the United States and, in particular, a decline in real wages at the low end of the labor market. One set of explanations for this rising inequality is that changes in the contracting environment have led to a rise in so-called contingent work or nonstandard work relations, with an attendant impact on wages. As common as this reasoning is in popular discussion, only limited empirical research on whether contracting out has reduced wages has been conducted. To remedy this, we assess a number of different explanations behind the outsourcing wage differential, including unobserved heterogeneity in skills, compensating differentials in benefits, and the nature of the underlying industry engaged in outsourcing. We also provide inter-temporal evidence on what types of industries were more likely to outsource over this period. Finally, we provide evidence on how increased outsourcing altered the distribution of wages in these occupations during this period. The evidence we present in this paper allows us to draw a much stronger conclusion regarding the impact of outsourcing on labor market rents of low wage service occupations.

Relation to Existing Research

We consider the contracting out of janitors and security guards over the 1980s and 1990s, two low-wage service occupations with substantial numbers of outsourced workers. Additionally, the skill requirements for these occupations are relatively homogeneous, and the status of these workers as being

*Arindrajit Dube is Assistant Professor of Economics at the University of Massachusetts-Amherst and Ethan Kaplan is Assistant Professor of Economics at the Institute for International Economic Studies at Stockholm University.

Industrial and Labor Relations Review, Vol. 63, No. 2 (January 2010).
0019-7939/00/6302 $01.00

outsourced or in-house is easily identifiable using industrial and occupational codes.

To date, formal empirical work on outsourcing has been limited. Using the Current Population Survey (CPS), Abraham (1990) demonstrated that wages as well as non-wage benefits tend to be lower for outsourced workers than for those employed in-house. However, she did not address whether these gaps reflected rent differentials due to outsourcing or were simply a product of differences in the skill mix. In subsequent work, Abraham (1996) used an establishment survey (the 1986/87 Industry Wage Surveys conducted by the BLS) to argue that the use of business support services is correlated with lower compensation, volatility of demand output, and availability of specialized skill of contractors. In his study of outsourcing, Berlinski (2008) used the contingent workers supplement, which includes information on underlying industry for employment for outsourced workers, to show that outsourcing wage differentials are not explained by underlying industry characteristics. His sample size was small (the sample contained less than 60 outsourced workers), however, and his cross-sectional analysis did not reveal whether or not the reduced wage associated with outsourcing reflected lower labor market rents.

In addition to the work mentioned above, some related research exists on the temporary help industry. For instance, Segal and Sullivan (1997) noted that workers in the temporary help industry are outsourced because they could potentially be hired for the short term by the firms using their services. They documented, using the CPS, that, conditional on covariates, workers employed in the temporary help industry earn lower wages, receive fewer benefits, and unionize at lower rates. This mirrors our findings for permanent outsourcing. Autor (2003), for example, showed that the temporary help service industry increased most after states made firing workers more difficult in states with high union density, consistent with the existence of rent differentials between outsourced and directly employed temporary workers.

Methodologically, our study draws from the literature on inter-industry wage differentials. Krueger and Summers (1988) and Gibbons and Katz (1992) documented that significant industry wage premia exist within occupations, racial groups, educational groups, and gender—even controlling for work environment, firm size, and some forms of unobserved skills. We are attempting to establish that there is an inter-industry wage premium for service contractors, but one that is *different* in that the industry differences merely reflect variation in the legal labels of the employer of record. For example, if two janitors are earning different wages at a manufacturing versus a retail establishment, this can be considered a classic case of inter-industry wage differential. However, a janitor earning different wages when employed by a manufacturer as opposed to a service contractor who contracts with the same manufacturer is qualitatively a different issue, since she can in principle do the same job with a nominally different employer.

The existence of inter-industry wage differentials also provides a *competing* explanation of the outsourcing wage differential. If industries that outsource tend to have lower industry wage premia, lower wages (and rents) for outsourced workers may simply reflect the characteristics of the "underlying" industry outsourcing the work. We assess this possibility empirically by studying what types of industries actually outsource service work. In addition to estimating the *mean* impact on wages from being outsourced, we provide evidence on where in the distribution of wages for guards and janitors outsourcing is likely to have had its largest impact. We do this by reweighting the 1983 wage distribution with year 2000 probabilities of being outsourced conditional on observable data, using a semi-parametric estimator devised by DiNardo, Fortin, and Lemieux (1996).

We also investigate whether outsourcing allows firms to lower inter-industry wage premiums. In other words, firms unable to reduce rents that go to direct employees may be able to shift rents by contracting out these services. Borjas and Ramey (2001) found that over the past few decades, industries with high wage premia have experienced reduced employment growth that is not accounted for by

differential productivity growth. Similarly, we found that industries with high wage premia were more likely to outsource work, suggesting that some of the employment reduction that Borjas and Ramey documented reflects outsourcing of labor services, as opposed to a reduction in actual employment.

Theoretical Predictions on Outsourcing and Wages

Two broad types of theories may explain why outsourced workers earn less than directly employed workers. Wages may differ because of competitive reasons or because of differences in rents. Explanations based on competitive labor markets fall into two categories: compensating differentials or skill differentials. Different wages for outsourced workers may reflect compensating differentials in hours of work or non-wage benefits. Lower wages in the outsourced sector may also reflect lower skill levels of the outsourced workforce. Outsourcing technology may be less skill intensive, or the types of firms contracting out their service workers may inherently require lower skills.

Alternatively, wage differentials may reflect differences in labor market rents. Rent differentials may be causally due to outsourcing, or they may reflect characteristics of underlying firms that are contracting out. If service contractors have better monitoring technologies, they may pay lower efficiency wages. Corporate culture may also explain outsourcing wage differentials. If there is low tolerance for wage inequality within a firm, it may outsource its low-wage workers. Outsourced workers may also experience greater difficulties in unionizing and are likely to have a weaker bargaining position. The National Labor Relations Act provides a greater amount of protection to workers during a strike and provides more avenues to pressure a company through boycotts and pickets when they are in-house.[1] As a consequence, the union wage gap for outsourced workers may be smaller. Additionally, as a result of the threat effect of unionization, outsourcing firms may also reduce wages of non-unionized contract workers. Several questions follow from these assumptions. First, are there wage and benefit differentials associated with outsourcing? Second, if so, do they reflect rent or competitive differentials? And third, are differences in rents merely due to characteristics of the underlying industries that are contracting out?

Data

Our primary data source is the Current Population Survey (CPS); we use the outgoing rotation groups (ORG) between the years of 1983 and 2000. Given the focus on two of the only low-wage occupations where we can measure outsourcing, the CPS allows for much larger sample sizes than other household datasets such as the National Longitudinal Survey of Youth (NLSY) or the Survey of Income and Program Participation (SIPP).[2] We also match the CPS across years to get two wage observations per individual exactly 12 months apart. We match individuals across years by household ID and line number, as well as race, Hispanic origin, sex, age, and education level.

Because the monthly CPS does not contain information on health benefits, we use data

[1]Dube and Kaplan (2003) discussed the legal issues of permanent replacement, secondary boycotts, and requirements of "good faith bargaining" and how they differentially apply to in-house versus outsourced workers. They concluded that unionized workers have less power when they are contracted out because they can be permanently replaced through a switch in the employer of record (a switch in the contractor). This tends to lower an outsourced union's wage demands and thus the willingness of a union to attempt to organize outsourced workers. Consequently, the union threat effect may be lower in an environment consisting of outsourced as opposed to directly employed workers, which can explain the outsourcing wage differential for non-union workers.

[2]One alternative to the monthly CPS would have been the Contingent Worker Supplement (CWS) to the CPS conducted in the odd years between 1995 and 2001. The advantage of the CWS is that it identifies the underlying industry of work for outsourced workers. However, the total CWS sample size is roughly 2% of the sample size of the monthly CPS between 1983 and 2000. Moreover, unlike the monthly CPS, individuals are only interviewed once on the CWS questions, which means that we cannot control for individual fixed effects.

from the March Supplement to the CPS for non-wage benefits. Specifically, the March Supplement reports the following information: (1) whether the individual has any health insurance; (2) whether health insurance is purchased through the employer or the union; and (3) whether the employer pays all, some, or none of the insurance premium. The Census Bureau also estimates the value of the employer premium contribution for each respondent, which we use to construct a monetary measure of total compensation.

We use all the Benchmark Input/Output Use Tables collected by the Bureau of Economic Analysis between 1982 and 1997 in order to construct measures of industry usage of contracting services.

Measurement of Outsourcing

We focus on janitors and security guards—two low-wage occupations where outsourcing has been prevalent and where it is possible to determine unambiguously when a worker is outsourced using our primary data source, the Current Population Survey.[3] We define an individual to be outsourced if she works for an employer that provides labor services mainly as an intermediate input to a primary firm, when that individual could in principle provide the same labor services as a direct employee of the primary firm. Janitors and Cleaners (occupation code 453 in the CPS) provide intermediate services to other firms either as direct employees or as outsourced workers.[4] When these janitors are employed in the Services to Buildings and Dwellings Industry (722), then they are working for a firm that primarily[5] provides intermediate labor services to other firms. Therefore, we classify them as outsourced. Similarly, security guards (occupation code 426) employed in the Protective Services Industry (industry code 740) are also classified as being outsourced.[6]

Essentially, janitors in industry 722 and guards in industry 740 supply services only to other businesses. In contrast, other occupation/industry groupings exist in which workers provide both intermediate services to other firms and final services to consumers. The Kitchen Workers/Food Preparation occupation (439) is an example of this situation. University dining halls often provide meals through contractors such as Sodexho. Workers at such dining halls are outsourced, because they are providing intermediate services to the university. At the 3-digit SIC level, these workers are employed in Eating and Drinking Places (641). However, this industry code also includes restaurants which provide final services to consumers, making it impossible to use this industry/occupation combination to discern outsourcing status. Similar problems arise, for example, with Washers in Laundry Services or Gardeners in Landscaping Services. We do not use occupations in the Personnel Supply Services Industry (731) because of the prevalence of temporary workers in the industry. A clerical worker in Personnel Supply Services who is at a job for a short period of time is both an outsourced and a temporary worker. We are interested in estimating the wage differentials that are due to outsourcing itself, and not due to the temporary status of the work (which we do not observe).[7]

Descriptive Statistics

For both janitors and security guards, outsourcing has grown substantially over the past two decades. Table 1 illustrates that the

[3]We do not consider a janitor or a security guard working for a temporary firm to be "outsourced" in this schema.

[4]Providers of cleaning services to consumers have another occupational code (449 which includes maids and housemen).

[5]We use the word primarily here because it is possible that a janitor working in the Services to Buildings and Dwellings industry may clean the building of his employer, that is, the janitorial contractor, in which case he is not outsourced. This would, of course, represent a trivial fraction of total employment in the industry.

[6]Katharine Abraham (1988) also used this method for identifying outsourced workers in the CPS.

[7]There is most likely measurement error in the outsourced variable. Some outsourced workers may report being directly employed and some directly employed workers may report being outsourced. This will cause attenuation bias, meaning the magnitude of the outsourcing wage differential may be larger than what we find.

share of janitors employed by service contractors rose from 16% to 22% over this period. Similarly, the outsourced share of security guards rose from 40% to 50%. The growth over this time was statistically significant for both groups at the 1% level.

Table 2 documents the raw wage gap between janitors (guards) working for building service contractors (protective service contractors) and those who are directly employed. This wage penalty is around $1.33 or 14% for janitors, and $2.34 or 21% for guards. We also find some differences in the demographic and educational composition for outsourced and in-house workers. Although there is no significant difference in education levels in the case of janitors, outsourced security guards tend to be less educated. They are 8 percentage points less likely to have completed college, 5 percentage points more likely to have only completed high school, and 3 percentage points more likely to have attended but not completed high school. In-house janitors are also less likely to be Latino (a 9.3 percentage point difference), and less likely to be female (a 21.1 percentage point gap). Similarly, in-house security guards are less likely to be Latino (a 1.6 percentage point difference) and less likely to be black (8.0 percentage point difference). Where differences in workforce composition are statistically significant and substantial, they are consistent with a skill-based explanation of the wage gap between in-house and outsourced workers.

Table 2 also shows that 9.3% fewer in-house janitors are part-time workers as compared to their outsourced counterparts. However, for guards, the story is reversed, as 2.2% more in-house guards are in part-time positions—defined as usually working less than 30 hours per week.[8] Outsourcing is also associated with a lower union density for both janitors and guards—a gap of 6.6 percentage points for janitors and 7.7 percentage points for security guards.

[8] The CPS asks a question about "usual hours" at the job separately from the actual hours worked that week.

Table 1. Incidence of Outsourcing over Time

Years	*Janitors*	*Guards*
1983–1985	0.164	0.401
	(0.003)	(0.008)
1986–1988	0.182	0.411
	(0.004)	(0.008)
1989–1991	0.210	0.424
	(0.004)	(0.008)
1992–1994	0.227	0.462
	(0.004)	(0.009)
1995–1997	0.231	0.497
	(0.005)	(0.010)
1998–2000	0.216	0.497
	(0.005)	(0.010)
Change	0.051	0.096
	(0.006)***	(0.013)***

Notes: Data from the merged outgoing rotation group of the CPS for each month between 1983 and 2000; standard errors in parentheses; a janitor (Occupation Code 453) is coded as outsourced if working in the Services to Buildings and Dwellings Industry (Industry Code 722); a guard (Occupation Code 426) is coded as outsourced if working in the Protective Services Industry (Industry Code 740).

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level (two-tailed tests).

Results on Wages

Baseline Results

In this section, we provide cross-sectional evidence of outsourcing wage differentials, controlling for measurable skill, demographic, and geographic factors. In later sections, we address whether these differentials reflect unmeasured heterogeneity in skills, or unobserved characteristics of underlying industries that are outsourcing. Our econometric approach is to control for or to difference out confounding variables. We argue that given the covariates, wages are unlikely to be correlated with unobservable factors that are correlated with workers' outsourcing status. Therefore, our estimates here reflect the penalty resulting from a worker being assigned to an outsourced job as opposed to an in-house one. To be clear, this estimated effect is *not necessarily* the same as the marginal effect on the wages of a group of workers when their firm contracts out their work. Likewise, the effect we identify does not necessarily reflect the impact of

Table 2. Characteristics of Directly Employed and Outsourced Workers

	Janitors			*Guards*		
	In-House	*Outsourced*	*Difference*	*In-House*	*Outsourced*	*Difference*
Real Wage	$9.22	$7.89	–$1.33	$10.84	$8.50	–$2.34
	(0.024)	(0.042)	(0.049)***	(0.062)	(0.052)	(0.081)***
Employer-Sponsored Health Insurance	0.494	0.236	–0.258	0.598	0.380	–0.218
	(0.004)	(0.008)	(0.009)***	(0.009)	(0.012)	(0.014)***
Part Time	0.237	0.360	0.122	0.154	0.132	–0.022
	(0.002)	(0.005)	(0.006)***	(0.004)	(0.004)	(0.006)***
Unionized	0.159	0.093	–0.066	0.141	0.064	(0.077)
	(0.002)	(0.003)	(0.004)***	(0.004)	(0.003)	(0.005)***
No Schooling	0.008	0.008	0.000	0.001	0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
Primary School Attendance	0.142	0.141	0.001	0.056	0.052	–0.004
	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
High School Attendance	0.245	0.243	0.001	0.109	0.133	0.025
	(0.002)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)***
High School Completion	0.422	0.422	0.000	0.382	0.434	0.052
	(0.002)	(0.004)	(0.005)	(0.005)	(0.005)	(0.007)***
Some College	0.092	0.092	0.000	0.175	0.178	–0.003
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.007)
College Completion or More	0.091	0.094	0.003	0.277	0.202	–0.075
	(0.001)	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)***
Black	0.226	0.236	0.010	0.198	0.278	0.080
	(0.002)	(0.004)	(0.004)**	(0.004)	(0.005)	(0.006)***
Latino	0.134	0.227	0.093	0.077	0.093	0.016
	(0.002)	(0.004)	(0.004)***	(0.003)	(0.003)	(0.004)***
Female	0.494	0.704	0.211	0.171	0.164	–0.006
	(0.004)	(0.002)	(0.005)***	(0.004)	(0.005)	(0.005)
Age	40.581	37.142	–3.439	41.676	40.110	–1.566
	(0.072)	(0.124)	(0.143)***	(0.156)	(0.179)	(0.247)***

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level (two-tailed tests).

outsourcing on the distribution of wages. Below, we provide evidence on where in the wage distribution outsourcing likely had the greatest impact.

Our baseline estimate of the conditional wage penalty comes from the following wage regression:

$$(1) \qquad \ln(w_{ist}) = \gamma_1 O_{ist} + \gamma_2 U_{ist} + \gamma_3 PT_{ist} + X_{ist}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \varepsilon_{ist}$$

Each individual, *i*, is observed in a given state, *s*, and date, *t*. The primary variable of interest is *O*, which is a dummy for outsourcing status. Additionally, *U* is a dummy for union membership (or coverage), while *PT* is a dummy for part-time status. *X* is a vector of demographic variables—age, age squared, race, sex, and educational attainment categories representing no schooling, primary schooling only, high school attendance, high school completion, some college, and college completion.[9] This specification also includes state-specific year effects (α_{st}), as well as two dummies representing the extent of urbanization: MSA (ν_{MSA}) and central city status (δ_{CC}). We cluster our standard errors at the cross-sectional level (that is, the level of individual months). In Tables 3a and 3b, we report coefficients for outsourcing status

[9]College completion is the omitted educational dummy variable in regressions.

(employment by a service contractor), union membership (or coverage), part-time employment, and outsourcing interaction terms with part-time and with union.

For both occupations, we find that employment by a service contractor is associated with a wage penalty that is statistically significant at the 1% level and substantial. Tables 3A and 3B illustrate that in our baseline specification 1, the wage penalty for janitors is -0.045 while for guards it is -0.202.[10] For security guards, adding covariates does not meaningfully change the wage gap while for janitors the conditional penalty is quite a bit smaller than the raw wage gap. For both janitors and guards, the outsourcing wage penalty remains significant at the 1% level when estimated separately by gender (rows 2 and 3). Overall, the magnitudes of the penalty are similar for men and women. For janitors, the outsourcing penalty for *women* (–0.049) is slightly greater than that for men (–0.041). In contrast, for guards, the penalty among men (–0.213) is somewhat larger than it is among women (–0.165).

The specification in row 4 of Tables 3A and 3B also includes interaction terms between outsourcing, union and part-time status. We find that the outsourcing penalty is 57% larger for unionized janitors and 67% larger for unionized security guards as compared to their non-unionized counterparts. The smaller union wage premium for outsourced workers is consistent with unions having greater bargaining power in-house, and with a lower level of unionization among outsourced workers (Table 2).

While at least for janitors outsourced workers are more likely to be part-time workers, compensating differentials for part-time work cannot explain the outsourcing wage penalty. Estimates from row 4 in Tables 3A and 3B demonstrate that the outsourcing penalty occurs primarily for full-time workers. The interaction term between outsourcing and part time status is positive. For part-time janitors, there is no outsourcing penalty (adding the coefficient on outsourcing and the coefficient on the interaction term); however, for part-time guards the outsourcing penalty is much smaller than for guards working full time. Overall, this evidence rules out the possibility that the outsourcing penalty is simply capturing the differences in hours of work between in-house and part-time workers.

Low-Rent Pass-Through

Although outsourcing seems to be associated with lower worker rents, it is possible that industries that outsource are low-rent industries. If that is the case, outsourcing may not reduce rents: the industries that do so would have had low-rent jobs whether or not they chose to outsource. In this scenario, low-rent industries "pass through" low wages to outsourced workers but there is no causal effect of outsourcing on wages.[11] We address this issue empirically in several ways. First, since janitors are the only workers employed by building service contractors who are outsourced, other occupations should not incur a wage penalty by working for such contractors. The same holds for security guards in the protective service industry. We employ a difference-in-differences strategy using clerical workers as a control group, which we use because they comprise the largest of the non-managerial occupations working for contractors besides the security guards and janitors themselves.[12] We estimate the following wage regression:

$$(2)\qquad \ln(w_{it}) = \gamma_1 O_{it} + \gamma_2 U_{it} + \gamma_3 PT_{it} + \gamma_4 Occup_{it} + \gamma_5 Occup_{it} * O_{it} + X_{it}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \varepsilon_{it}$$

Here *Occup* is a dummy indicating that the person's occupation is janitor (guard) as

[10] Immigration status is available in the CPS beginning in 1994. We ran regressions with our benchmark specification with and without immigration status on the post-1993 sample. In both janitor and guard regressions, the difference between the outsourcing coefficient with and without the immigration variable was less than 0.001.

[11] "Pass through" reflects the low wages of the outsourced industry. For example, underlying industry wages are considered to "pass through" if firms that previously used outsourced workers subsequently hired them to work in-house. The workers would still receive low wages—they would not be due to outsourcing.

[12] Clerical workers are defined as workers with SOC code 313.

Table 3a. Effect of Outsourcing on Log Wages – Janitors

	Outsourced	*Union*	*PT*	*Union*Out*	*PT*Out*	*N*	R^2
Repeated Cross Section							
(1) Baseline	–0.045 (0.005)***	0.298 (0.007)***	–0.173 (0.005)***			33222	0.44
(2) Baseline (Female)	–0.049 (0.006)***	0.298 (0.008)***	–0.21 (0.007)***			22760	0.46
(3) Baseline (Male)	–0.041 (0.007)***	0.286 (0.011)***	–0.117 (0.007)***			10462	0.46
(4) Baseline with Interactions	–0.065 (0.006)***	0.301 (0.007)***	–0.19 (0.005)***	–0.037 (0.018)**	0.073 (0.009)***	33222	0.45
(5) Underlying Industry Controls	–0.052 (0.006)***	0.272 (0.009)***	–0.16 (0.006)***			33222	0.46
(6) Inter Occupational Differencing	–0.04 (0.020)**	0.253 (0.003)***	–0.186 (0.002)***			268083	0.45
Panel with Individual Fixed Effects							
(7) Within Occupation Switchers	–0.068 (0.031)**	0.09 (0.020)***	–0.125 (0.025)***			3551	0.27
(8) Within Occupation Switchers with Demog Controls	–0.065 (0.031)**	0.09 (0.019)***	–0.123 (0.025)***			3549	0.28
(9) All Switchers with Demog Controls	–0.04 (0.019)**	0.104 (0.018)***	–0.108 (0.016)***			5808	0.20

Notes: Data come from the 1983–2000 Current Population Survey merged outgoing rotation groups except for the underlying industry vector which, for outsourced workers, come from the 1987, 1992 and 1997 Use Tables published by the Bureau of Economic Analysis; all cross-sectional regressions include dummies for no education, primary school, some high school, high school completion, some college (completed college is the excluded dummy), race and ethnicity dummies, a quadratic polynomial in age, a union dummy, a part-time dummy, state X year dummies, and dummies for central city and MSA status; specification 4 also includes interactions of outsourcing status with union and part-time status; industry controls regressions control for underlying 1-digit industry of outsourced janitors by using the distribution of purchases of outsourced protective services by 1-digit industries; inter-occupational differencing is a difference-in-differences estimator, comparing the differential premium of secretaries working for building service contractors to the premium of janitors working for such contractors; the within-occupational switcher specification (7) regresses change in log wages on change in outsourcing status for individuals who change outsourcing status but are janitors in both periods, and include state X year dummies and dummies for central city and MSA status; specification 8 adds all the demographic controls in levels as added controls; specification 9 includes all employees who were janitors at least during one period, and regresses the change in log wages on the change in outsourcing status and includes occupational fixed effects along with demographic controls and state X year dummies and dummies for central city and MSA status; standard errors are clustered at the cross-sectional level (survey month) for all specifications except specification 5, where they are clustered at the year level. *Statistically significant at the .10 level; **at the .05 level; ***at the .01 level (two-tailed tests).

opposed to clerical. This "inter-occupational differencing" formulation allows janitors and guards working for service contractors to have wage penalties different from those of clerical workers. The coefficient γ_5 is the outsourcing penalty for janitors (or guards) beyond the penalty for clerical workers (γ_1).

The coefficients from this regression are reported in row 6 in Tables 3A and 3B. The outsourcing penalty for janitors in the inter-occupational differencing specification is slightly smaller than in the baseline specification (-0.040 versus -0.045) and is significant at the 5% level. For guards, the coefficient is also somewhat smaller in magnitude (-0.151 versus -0.202). The actual service contractor coefficients γ_1 (not reported) are small and statistically insignificant. In other words, clerical workers employed by building or protective service contractors do not suffer from the kind of wage penalties that janitors and guards confront in their respective

Table 3b. Effect of Outsourcing on Log Wages – Security Guards

	Outsourced	*Union*	*PT*	*Union*Out*	*PT*Out*	*N*	R^2
Repeated Cross Section							
(1) Baseline	–0.202 (0.007)***	0.206 (0.011)***	–0.181 (0.010)***			11116	0.45
(2) Baseline (Female)	–0.165 (0.018)***	0.217 (0.033)***	–0.184 (0.026)***			1809	0.61
(3) Baseline (Male)	–0.210 (0.008)***	0.204 (0.013)***	–0.177 (0.011)***			9307	0.46
(4) Baseline with Interactions	–0.213 (0.008)***	0.247 (0.013)***	–0.24 (0.012)***	–0.142 (0.022)***	0.142 (0.017)***	11116	0.46
(5) Underlying Industry Controls	–0.244 (0.017)***	0.175 (0.013)***	–0.17 (0.012)***			11094	0.46
(6) Inter Occupational Differencing	–0.151 (0.016)***	0.256 (0.003)***	–0.192 (0.002)***			268083	0.44
Panel with Individual Fixed Effects							
(7) Within Occupation Switchers	–0.115 (0.052)**	0.030 (0.043)	–0.147 (0.045)***			1372	0.39
(8) Within- Occupation Switchers with Demog. Controls	–0.083	0.027	–0.145			1371	0.40
(9) All Switchers with Demog. Controls	–0.090 (0.034)***	0.074 (0.036)**	–0.089 (0.032)***			1818	0.34

Notes: Data come from the 1983–2000 Current Population Survey merged outgoing rotation groups except for the underlying industry vector which, for outsourced workers, comes from the 1987, 1992 and 1997 Use Tables published by the Bureau of Economic Analysis; all cross-sectional regressions include dummies for no education, primary school, some high school, high school completion, some college (completed college is the excluded dummy), race and ethnicity dummies, a quadratic polynomial in age, a union dummy, a part-time dummy, state X year dummies, and dummies for central city and MSA status; specification 4 also includes interactions of outsourcing status with union and part-time status; industry controls regressions control for underlying 1-digit industry of outsourced guards by using the distribution of purchases of outsourced protective services by 1-digit industries; inter-occupational differencing is a difference-in-differences estimator, comparing the differential premium of secretaries working for protective service contractors to the premium of guards working for such contractors; the within occupational switcher specification 7 regresses change in log wages on change in outsourcing status for individuals who change outsourcing status but are guards in both periods, and include state X year dummies and dummies for central city and MSA status; specification 8 adds all the demographic controls in levels as added controls; specification 9 includes all employees who were guards at least during one period, and regresses the change in log wages on the change in outsourcing status and includes occupational fixed effects along with demographic controls and state X year dummies and dummies for central city and MSA status; standard errors are clustered at the cross-sectional level (survey month) for all specifications except specification 5, where they are clustered at the year level. *Statistically significant at the .10 level; **at the .05 level; ***at the .01 level (two-tailed tests).

industries. Thus, the outsourcing penalty is unlikely to be explained by low-wage industries outsourcing.

We may also ascertain whether low outsourcing wages are "passed through" from low-rent industries by using Input/Output (IO) data on which industries make purchases from the building and protective services sectors. The Bureau of Economic Analysis (BEA) surveys and estimates inter-industry purchases every five years. We use the 1982, 1987, 1992 and 1997.[13] BEA Benchmark Input/Output Use Tables to construct a distribution of one–digit SIC industry purchases of janitorial and protective services.

[13] The 1997 Benchmark Tables are reported in an industry classification created by the BEA and used just in 1997. We use bridge matrices from this industry definition to NAICS and then from NAICS to SIC in order to construct our 1-digit distribution of SIC industry usage of janitorial and guard contracting services.

This is constructed as the proportion each one–digit industry's purchases of janitorial and protective services respectively:

$$I_j = \frac{Purchases_j}{\sum_{k=1}^{n} Purchases_k}.$$

We chose not to use more disaggregated industry categories because of sample size issues for two-digit industries and because of the imperfect correspondence between BEA and CPS industry definitions at more disaggregated levels. For intermediate years (years other than the four benchmark years), we linearly interpolate our one-digit distribution from the two nearest Benchmark Table distributions.

We then estimate the baseline regression with added industry fixed effects.

$$(3) \qquad \ln(w_{it}) = \gamma_1 O_{it} + \gamma_2 U_{it} + \gamma_3 PT_{it} + X_{it}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \eta_{IND} + \varepsilon_{it}$$

Here, η_{IND} represents the industry fixed effect. For in-house workers we use their actual one-digit level industry of work, while for every outsourced worker, instead of coding their industry as janitorial or protective services, we enter the IO table distribution of the industries using janitorial or protective services.

The industrial compositions are generated regressors, which are constant across all outsourced individuals for a given year. For this reason, we cluster our standard errors at the year level. Our results are reported in row 5 of Tables 3A and 3B. For janitors, the outsourcing penalty increases from –0.045 to –0.052. For security guards, the penalty increases from –0.202 to –0.244. The coefficients for both groups continue to be significant at the 1% level. The evidence suggests that high rather than low wage industries outsource janitors. For instance, finance and manufacturing, two industries with high wage premia, tend to outsource these labor services disproportionately. Overall, these Input-Output based measures of industries that engage in contracting out do not support the hypothesis that underlying industry wage premia are responsible for the outsourcing wage differential.

Unobserved Skill Differentials

To evaluate whether the outsourcing wage gap is primarily due to rent differentials or to unobserved skill differentials, we exploit the longitudinal characteristic of the CPS, where each person is interviewed twice, one year apart. The two-year panel allows us to observe how wages change as janitors and guards switch their outsourcing status, thereby controlling for a time-invariant individual fixed effect. In our first fixed-effect specification, we only use individuals who worked as janitors (or guards) in both periods. We are able to match 28% of the janitors and 26% of the guards across years. The procedure requires not only that the individuals can be matched across years, but also that they have the same occupational code in the two time periods. Therefore, our sample size drops, for both janitors and guards, by between 80% and 90%. Since these are two relatively high turnover occupations, it is not surprising that the matching rate is somewhat low.

We estimate our baseline wage equation with individual fixed effects in the first difference form, while allowing for state, year and central city specific trends:

$$(4) \qquad \Delta\ln(w_{it}) = \gamma_1 \Delta O_{it} + \gamma_2 \Delta U_{it} + \gamma_3 \Delta PT_{it} + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \varepsilon_{it}$$

The results are reported in row 7 of Tables 3A and 3B. For janitors, we find that the outsourcing penalty is somewhat greater in the fixed effects specification (–0.068) than in the cross-sectional specification (–0.045), and the coefficient continues to be statistically significant at the 5% level. For guards, the outsourcing penalty is smaller in the fixed effects specification (–0.115) than in the cross-sectional one (–0.202), but it continues to be substantial and statistically significant at the 5% level.

Identification in equation (4) comes from "switchers"—workers who switch their outsourcing status. It is possible that such switchers do not represent the workforce as a whole, since they may have different latent wage trajectories. For example, perhaps young workers are more likely to switch from outsourced to in-house positions and young workers generally have greater wage growth

(whether or not they switch). If this is the case, then wage differentials from a regression analysis of the "switchers" may merely reflect the underlying trends of young workers who are both moving in-house and experiencing wage gains.[14]

In row 8 of tables 3a and 3b, we control for observable dimensions that may be correlated with changes in outsourcing status and with changes in wages. For each worker, we regress the change in log wages on changes in outsourcing status, part-time status and unionization status while controlling for the level of demographic and geographic factors. This specification allows workers to have different underlying wage growth that vary by age, education, race, and gender, as well as by geography. Otherwise, underlying trends in worker wages may confound the outsourcing coefficient in equation (4).

$$(5)\qquad \Delta \ln(w_{it}) = \gamma_1 \Delta O_{it} + \gamma_2 \Delta U_{it} + \gamma_3 \Delta PT_{it} + X_{it}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \varepsilon_{it}$$

Row 8 in Tables 3a and 3b illustrates that for both guards and janitors, controlling for differential trends across demographic groups does not alter our basic finding that outsourced workers make less. The outsourcing penalty is virtually identical for janitors, –0.068 versus –0.065. For guards, the penalty falls from –0.115 to –0.082. For both occupations, the outsourcing penalty remains significant at the 5% level.

Thus far, the panel sample has been limited to janitors or guards who switch outsourcing status but do not switch occupations. However, the sample of those who stay within their occupations may itself be subject to selection. To account for this possibility, we construct an additional panel sample inclusive of those who change occupations. Using this sample, we estimate the effect of a change in a person's outsourcing status, controlling for their initial occupation:

$$(6)\qquad \Delta \ln(w_{it}) = \gamma_1 \Delta O_{it} + \gamma_2 \Delta U_{it} + \gamma_3 \Delta PT_{it} + X_{it}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + occ_i + \varepsilon_{it}$$

Here, the inclusion of occ_i is a fixed effect for each initial three-digit occupation. The outsourcing coefficient is identified using variation in the outsourcing status of a worker who is a janitor (guard) in the second period, controlling for her occupation in the first period. Row 9 of tables 3a and 3b report the resulting estimates, which are –0.040 for janitors and –0.090 for guards, both significant at least at the 5% level. For both groups, the coefficients continue to be of similar magnitude as the prior fixed effects estimates (rows 7 and 8).

Overall, it appears that the wage loss associated with working for a service contractor is unlikely to be solely due to skill differentials. For janitors, unobserved heterogeneity does not seem to be a factor in explaining wage differentials. For guards, it seems that such heterogeneity does explain some of the differential, but the remaining wage penalty continues to be substantial. Moreover, our results suggest that selection in switching outsourcing status is unlikely to be driving the results in our specifications with individual fixed effects. Although there may be remaining concerns about endogeneity of outsourcing status in the fixed-effects regression, they require the switching of outsourcing status to be correlated with unobservable skills, but *uncorrelated* with observable skills or future occupations—something that we believe is unlikely.

Results on Health Benefits and Compensation

While low rent differentials or unobserved skill differentials may be correlated with the outsourcing wage penalty, one final explanation for this penalty is that outsourced workers receive a compensating differential for higher non-wage benefits such as healthcare. Data on health care benefits is available in the March Supplement to the CPS (using the Unicon extraction). Specifically, we consider the effects of outsourcing on employer sponsored health insurance (ESI) coverage.[15] Both outsourced janitors

[14] Topel and Ward (1992) found that about a third of young men's wage growth comes from job changes.

[15] Note that we do not consider the other main source of non-wage compensation: pension benefits.

and outsourced guards are less likely to be insured through their employer. As Table 2 illustrates, over the entire period 59.8% of in-house security guards had ESI coverage, in contrast to 38.0% of their outsourced counterparts. The differences are similar for janitors. Of all in-house janitors, 49.4% have ESI coverage, as compared to 23.6% of their outsourced counterparts.

There are additional reasons why outsourcing may be correlated with, but not causally related to, lower levels of health benefits. First, since outsourced janitors are more likely to be part-time and part-time workers are less likely to have ESI coverage, the health coverage gap may be attributable to part-time status. Second, unionized employees are more likely to have health insurance, and outsourced workers are less likely to be unionized; this could contribute to the health insurance gap. Finally, as with any compensation, skills and geographic factors could be behind the insurance differential.

We estimate a linear-probability model of ESI coverage on the same set of demographic and geographic variables, union status, part-time status, and outsourcing as our baseline specification (equation (1)). The results are reported in Table 4 (row 1). The health insurance gap remains large after controlling for demographic variables, unionization and part-time status and does not fall substantially compared to the raw estimates. For janitors, the conditional ESI coverage penalty is –0.203, while for guards it is –0.209. Both coefficients are statistically significant at the .01 level. Analogous to wages, we estimate a fixed-effects model to control for unobserved heterogeneity (similar to equation (4). Since unionization status is only reported for the outgoing rotation groups in March (1/4 of the sample), we do not include the union dummy in this specification due to sample size limitations.[16] For janitors, the outsourcing coefficient in the fixed-effect specification is substantially smaller; it is –0.050, though it is still significant at the 5% level. For security guards, coefficient is marginally smaller in magnitude compared to the cross-sectional estimate (–0.145).

We also regress the log of hourly compensation on the same set of control variables, where compensation is defined as wages plus the monetary value of hourly employer contribution on health benefits. As with health coverage, we estimate both cross-sectional and fixed-effects specifications, reported in rows 3 and 4 of Table 4. In the cross-section, the gap between in-house and outsourced janitors in terms of the value of compensation is –0.116, which is more than the gap in wages alone (–0.045). For guards, the compensation gap of –0.262 is similar to the wage gap of –0.202.[17] The compensation gap in the fixed effects model is only somewhat smaller than the cross-sectional estimates (Table 4). Overall, the findings indicate that outsourcing reduces both wages and benefits, and that the wage gap cannot be explained by a compensating differential to outsourced workers for better health-care packages. Although we do not report the results here, the outsourcing differential for benefits and compensation appears to be driven mostly by full-time workers. For part-time workers, there is essentially no differential for janitors and a much smaller differential for guards. These results are similar to those on wage differentials.

We are also interested in whether outsourcing changes the benefits share of compensation. The last two rows in Table 4 report the regression results of benefits share on the same set of independent variables as in the compensation and ESI coverage regressions. Outsourcing "tilts" compensation towards wages because it reduces the benefits share of compensation by 2.25 percentage points for janitors and by 2.56 percentage points for guards in the cross-section. The fixed effects model produces somewhat smaller estimates, both of which are statistically significant at the 5% level.

[16]However, the outsourcing penalty without using the unionization dummy in the cross-section is quite similar to the actual specification—implying that the non-inclusion of the unionization in the fixed effect model is not an important factor.

[17]One should treat the compensation variable with some caution, however, for the Census Bureau's estimation of employer contribution is probably noisy

Table 4. Effect of Outsourcing on Health Benefits and Compensation

	Janitors			*Guards*		
	Outsourced	*N*	R^2	*Outsourced*	*N*	R^2
Employer Sponsored Health Insurance						
(1) Cross Section	–0.203 (0.008)***	18934	0.27	–0.209 (0.018)***	5544	0.29
(2) Fixed Effects	–0.05 (0.023)**	6394	0.08	–0.145 (0.037)***	1926	0.79
Log Compensation						
(3) Cross Section	–0.116 (0.016)***	16156	0.45	–0.262 (0.023)***	4993	0.42
(4) Fixed Effects	–0.066 (0.07)	5116	0.86	–0.133 (0.061)**	1616	0.79
Benefits Share of Compensation						
(5) Cross Section	–0.019 (0.002)***	16156	0.15	–0.024 (0.002)***	4993	0.22
(6) Fixed Effects	–0.011 (0.005)**	5116	0.73	–0.022 (0.006)***	1616	0.75

Notes: Employer-sponsored health insurance data come from the March Annual Demographic Supplement to the Current Population Survey (1983 to 2000). if the employee reports having employer-provided health insurance we record a 1, and zero otherwise; Log Compensation and the Benefits Share of Compensation use the annual monetized value of health benefits that is imputed by the Census Bureau based upon whether respondents to the CPS employee provided health care claim to pay all, some, or none of their health care premia and other characteristics. Compensation is defined as annual earnings plus the annual monetized value of health benefits; all cross-sectional regressions include dummies for no education, primary school, some high school, high school completion, and some college (college completion excluded), race and ethnicity dummies, a quadratic polynomial in age, year X state dummies, a union dummy, and dummies for central city and MSA status; fixed effects specifications regress the change in the outcome variable on the changes in outsourcing and PT status, and include year X state dummies, and dummies for central city and MSA status. Since union status is not reported every month, fixed effects regressions are estimated without union status. Standard errors are clustered at the level of individual year and are robust to heteroskedasticity.

The above results are consistent with a benefits-avoidance theory of outsourcing. For outsourced workers, we find that benefits are systematically smaller and comprise a smaller portion of overall compensation. However, we do not see any compensating differentials for benefits avoidance since total compensation is also lower for these workers. Our evidence strongly suggests that outsourcing reduces labor market rents for workers.

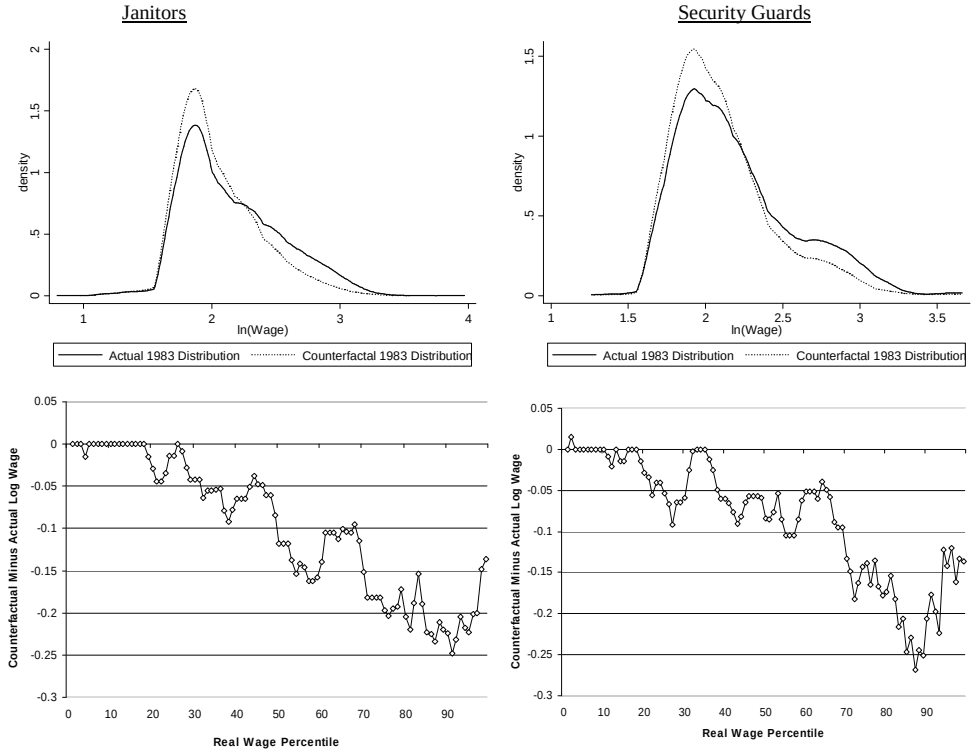
Impact of Outsourcing on the Distribution of Wages

In this section, we provide evidence on how outsourcing has affected the distribution of wages within these two occupations. In so doing, we are also able to infer where in the wage distribution outsourcing has had the largest impact. We use a semi-parametric decomposition first used by DiNardo, Fortin, and Lemieux (1996). First, we estimate the probability of being outsourced conditional on covariates for the years 1983 and 2000 separately using a probit model. Covariates include dummies for unionization and part-time status, all the demographic controls, year and state fixed effects, and dummies for central city status:

$$(7) \qquad P(O_{ist}) = \gamma_1 U_{ist} + \gamma_2 PT_{ist} + X_{ist}\beta + \alpha_{st} + \delta_{CC} + \nu_{MSA} + \varepsilon_{ist}$$

Then, we estimate two kernel densities. The first is of the actual 1983 wage distribution. The second is a counterfactual distribution that reweights the 1983 wage distribution with the ratio of the conditional probability of being outsourced in 2000 relative to 1983. The estimation equation for the reweighted-

Figure 1. Semiparametric Decomposition of Real Wage Distribution in 1983: Actual versus Counterfactual Using Outsourcing Rate in 2000



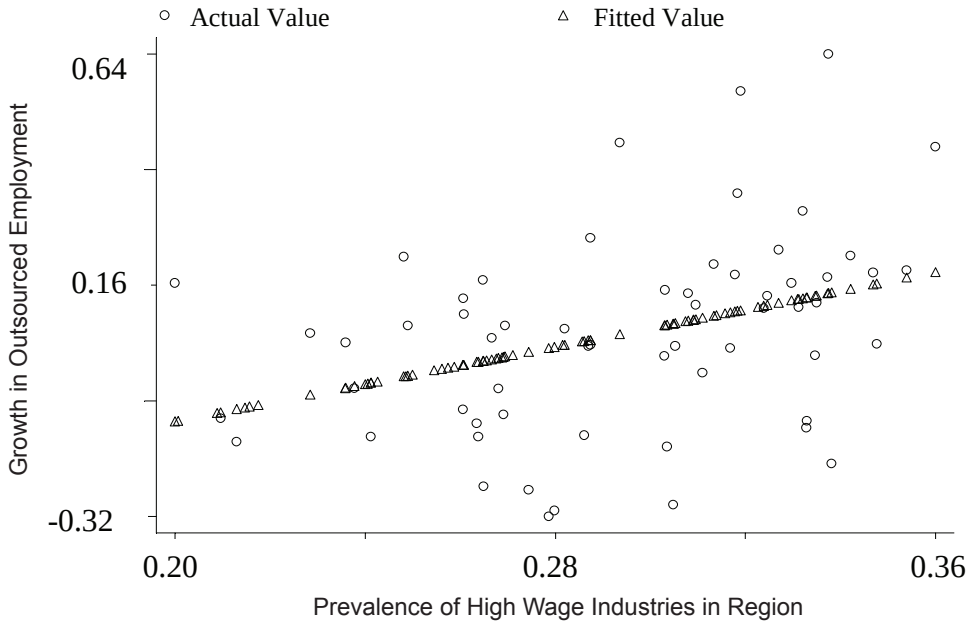
distribution is given by:

$$(8) \qquad f(w;\, t_w{=}2000;\, t_z{=}1983) = \Sigma_{i\in 1983}(\phi_i/h)\Psi(Z_i)\mathrm{K}[(w-W_i)/h]$$

In the above equation, *K* is an Epanechnikov kernel density estimator, *h* is an optimally set bandwidth, Φ_i are a set of population weights, W_i are the wage observations, is the base year for the wage distribution, is the weighting year, Z_i is the vector of explanatory variables in equation (7), and $\Psi(Z_i)$ is a reweighting function. $\Psi(Z_i)$ is given by the ratio of the conditional probability of being outsourced in the year 2000 (equation (7)) to the conditional probability of being outsourced in the year 1983.

The top panels of Figure 1 show the kernel density estimates. The bottom half of the two densities look relatively similar, which likely reflects the binding presence of the minimum wage and hence the absence of an effect of outsourcing on wages. In contrast, there is considerably greater right skew in the actual wage distribution (that is, with lower outsourcing) compared to the counterfactual one. In a bottom panel of Figure 1, we also plot the wage gap between the actual and reweighted distributions by wage percentile. We calculate wage percentiles for the actual 1983 wage distribution, as well as for counterfactual distribution, and take the difference at each percentile. For both janitors and guards, most of the wage loss associated with outsourcing is concentrated in the middle and upper part of the wage distribution. Overall, outsourcing appears to have altered the wage distribution by taking mid- to high-paying jobs and turning them into lower paying ones. The evidence presented in this section is consistent with the regressions from Tables 3A and 3B on underlying industry controls. The industries that outsource tend to be high rent indus-

Figure 2. Growth in Outsourced Employment and Prevalence of High Wage Industries - Janitors (2 Digit Level)



tries which had been paying janitors and guards higher than average wages.

Intertemporal Evidence on Industries that Outsource

We provide additional evidence that high- rather than low-rent industries have outsourced their service workforce. These results complement our findings in the section on low-rent pass through that controlling for underlying industry, if anything, raises the magnitude of the outsourcing coefficient. That is, high- rather than low-rent industries outsource, and our results in the previous section shows the concentration of wage loss in the upper tail of the occupational wage distribution. Using time-series variation, we show that high rent industries reduced their in-house service workforce over this period. Then we document that regions with greater incidence of high rent industries saw sharper growth in outsourcing.

First we construct a measure we call Industry Wage Premium as the mean residual for each two-digit industry over the 1983–1986 period, excluding building services and protective services industries, from a regression of log wage on education, age, age squared, race, sex, union status, state dummies and year dummies estimated separately for the two occupations. We estimate the following regressions of change in log janitorial employment on change in log total employment and the initial industry wage premium.

$$(9)\qquad \begin{aligned} &\ln(N_{j,t2}) - \ln(N_{j,t1}) \\ &= \alpha_0 + \alpha_1 * IndustryWagePremium_{j,t1} \\ &\quad + a_2(\ln(E_{j,t2}) - \ln(E_{j,t1})) + e_j \end{aligned}$$

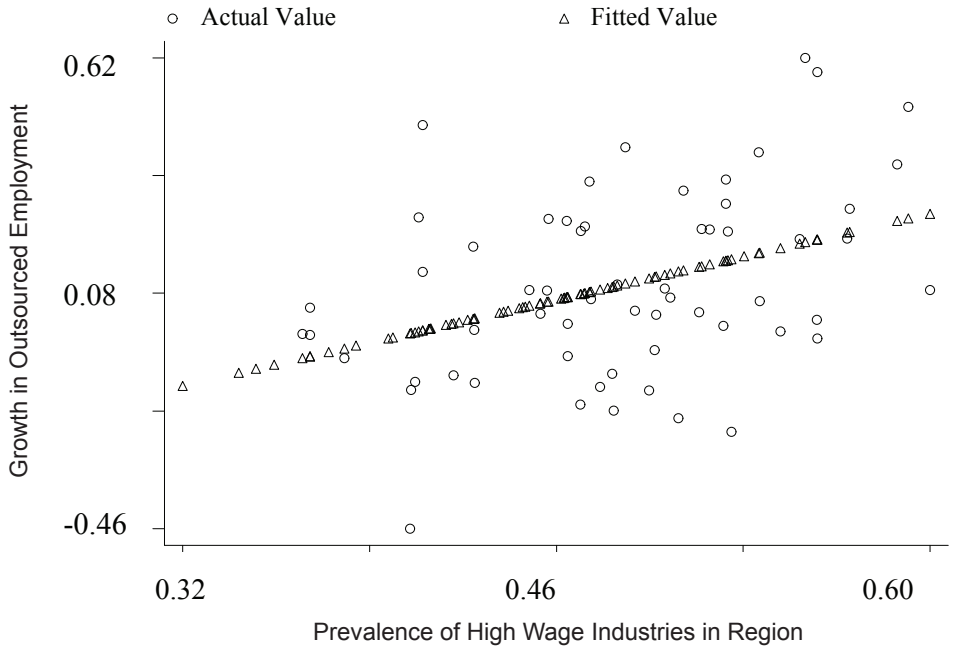
Here $N_{j,tk}$ is janitorial or security guard employment in industry j and time period tk and E_{jtk} is the overall employment in industry j and time period tk. We define $t1$ as an indicator for the 1983–1986 period and $t2$ as an indicator of the 1997–2000 period. Because *IndustryWagePremium* is an estimate from a previous regression, the standard errors for the regression are bootstrapped. We find that there is a strong

Table 5. Employment Dynamics and Rent: Employment Growth for Service Contractors and Other Industries

	By Industry				*By Region*			
	Janitors		*Guards*		*Janitors*		*Guards*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Industry Wage Premium	–0.0202***	–0.0122***	–0.0243**	(–0.008)				
	(0.004)	(0.005)	(0.010)	(0.005)				
Change in Log Total Emp.		–0.0050***		0.0202***				
		(0.002)		(0.005)				
Percent High Wage Indust.					0.0501***	(–0.006)	0.0355***	–0.0079*
					(0.015)	(0.004)	(0.006)	(0.004)
Dependent Variable:								
% Emp. Growth of:								
Outsourced Workers					Y		Y	
In-House Workers	Y	Y	Y	Y		Y		Y
R^2	0.33	0.43	0.11	0.47	0.54	0.51	0.51	0.37

Notes: All data come from the merged outgoing rotation groups of the Current Population Survey from 1983–2000; bootstrapped standard errors are in parentheses; first, wage regressions, controlling for education, gender, age, age squared, race, ethnicity, with year and urban fixed effects are run for the years 1983–1986. 2-digit industry dummies are also included. In the by industry regressions, the change in janitors' or guards' employment by industry between 1983–86 and 1997–2000 is regressed on the industry dummies ("industry rent dummies"). Then, all industries are classified as either high or low rent depending upon whether the industry rent dummy is greater or lower than the median. The change in log employment between 1983–1986 and 1997–2000 for service contractor employment in a region (15 regions total) as well as non-service contractor employment in a region are regressed on the fraction of janitors' or guards' employment in high rent industries between 1983 and 1986. *Statistically significant at the .10 level; **at the .05 level; ***at the .01 level (two-tailed tests).

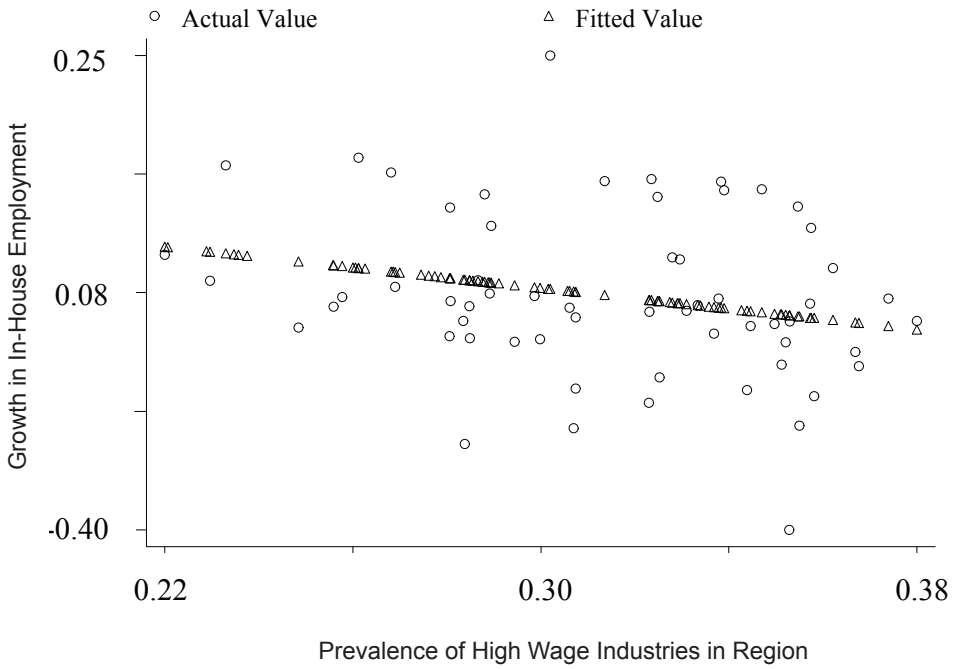
Figure 3. Growth in Outsourced Employment and Prevalence of High Wage Industries - Guards (2 Digit Level)



negative association between the presence of high-wage industries and growth in employment for these occupations. Table 5 shows that the coefficient of industry wage premium is statistically significant in predicting janitorial employment at 1% level even after controlling for overall industrial employment growth (column 2). For guards, the finding is similar. As reported above, we find a strong negative correlation between industry wage premium in the early eighties and direct employment growth in the subsequent period (column 3). Once we control for the general employment growth of the industry, the association is still negative, though the statistical significance drops below the 10% level (column 4). Although this broadly supports the claim that higher wage industries were more likely to outsource work, we cannot rule out an alternative hypothesis: that higher wage industries were simply more likely to reduce employment of janitors and guards without "rehiring" them as contract workers. This disemployment effect was the general conclusion in Borjas and Ramey (2000).

We use region-specific growth in outsourcing to address this issue. We aggregate states into 15 geographic regions and calculate the prevalence of high rent industries in those regions in a given three-year period. We define a two-digit level industry to be "high wage" if it is above the 50th percentile of IndustryWagePrem. This is done separately for janitors and guards. Regional prevalence PctHighWage is measured as the percentage of janitors or guards employed by "high wage" industries in the region in the three-year period. We then calculate the growth in the employment of outsourced (or in-house) janitors and guards in those regions between three-year periods. Table 5 reports the results from the following regressions (each for both occupations), allowing for regional trends in outsourced and in-house employment ($f_{j,OS}$ and $f_{j,IH}$).

Figure 4. Growth in In-House Employment and Prevalence of High Wage Industries – Janitors (2 Digit Level)



$$(10) \quad \ln(N_{j,OS,\,t+1}) - \ln(N_{j,OS,\,t}) = \beta_0 + \beta_1 * PctHighWage_{j,t} + e_{t,OS} + f_{j,OS}$$

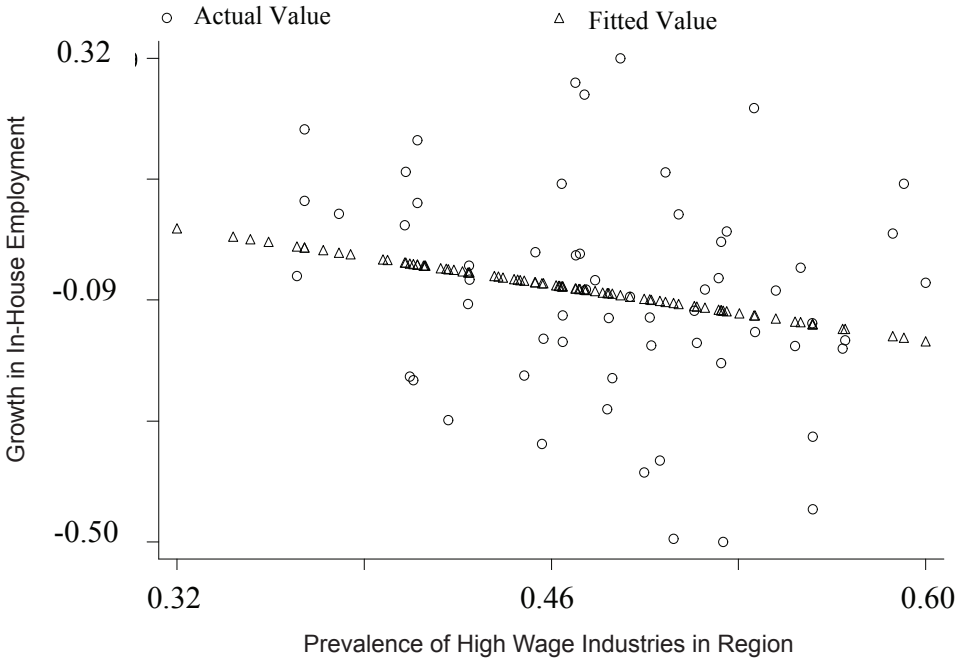
$$(11) \quad \ln(N_{j,IH,\,t+1}) - \ln(N_{j,IH,\,t}) = \delta_0 + \delta_1 * PctHighWage_{j,t} + e_{t,IH} + f_{j,IH}$$

Figures 2, 3, 4 and 5 provide visual representations of the correlation between growth in outsourced (or in-house) employment and the level of the prevalence of high-wage industries in the region. Since the measure of high-wage industries in a given region is itself estimated from a previous regression, we use bootstrapped standard errors. For both occupations, the initial employment share of high-wage industries is a statistically significant predictor of the subsequent positive growth of outsourcing (Table 5, columns 5 and 7). Moreover, a higher initial share of high-wage industry employment also predicts a negative growth in in-house employment for janitors and guards although the coefficient is statistically significant only for guards (columns 6 and 8). Overall, the results indicate that regions with prevalence of industries with high-wage premium saw considerably greater growth in service contractor employment over the 1980s and 1990s. The combined evidence indicates that it was high- and not low-wage industries that outsourced workers, reinforcing the conclusion that it is unlikely that the wage differential between direct and outsourced workers can be explained by the underlying industry wage differentials.

Conclusion

Over the past few decades, we have seen a substantial rise in the share of janitors and security guards who are employed by service contractors. These outsourced workers receive lower pay, unionize at substantially lower rates, and are paid lower union wage premia. Our results point us away from

Figure 5. Growth in In-House Employment and Prevalence of High Wage Industries – Guards (2 Digit Level)



theories that explain the outsourcing wage and benefits penalty as "pass through" or solely as a competitive wage differential due to differences in skill mixes used by contractors in comparison with other employers. Moreover, evidence suggests that benefits decrease with outsourcing, both in an absolute sense and in relation to wages. And yet, we do not find compensating wage differentials associated with this reduction in benefits. Although service contractors on average use different compositions of full- and part-time workers, this difference itself is not a source of the wage differentials, since such differentials exist primarily for full time workers. Evidence from workers switching outsourcing status strongly suggests that a substantial portion of the wage gap lies in rent differentials. Based on evidence from Input-Output tables as well as from regional growth patterns, it appears that outsourcing is occurring in "high rent" industries. Reweighting the 1983 distribution of wages with year 2000 probabilities of outsourcing, we provide a graphical illustration of the erosion in wages at the middle to high end of the wage distribution. Overall, the recent increase in the use of service contractors seems to be associated with some shifting of rents away from workers.

REFERENCES

Abraham, Katharine. 1988. "Restructuring the Employment Relationship: The Growth of Market-Mediated Work Arrangements." In Robert A. Hart, Ed., *Employment, Unemployment and Hours of Work*, London: George Allen and Unwin, pp. 288–311.

____. 1990. "Restructuring the Employment Relationship: The Growth of Market-Mediated Work Arrangements." In Katharine Abraham and Robert McKersie, *New Developments in the Labor Market: Toward a New Institutional Paradigm*, pp. 85–119. Cambridge: MIT Press.

____, and Susan Taylor. 1996. "Firms' Use of Outside Contractors: Theory and Evidence." *Journal of Labor Economics*, Vol. 14, No. 3, pp. 394–424.

Akerlof, George, and Janet Yellen. 1990 "The Fair Wage-Effort Hypothesis and Unemployment." *Quarterly Journal of Economics*, Vol. 105, No. 2, pp. 255–283.

Autor, David. 2003. "Outsourcing at Will: Unjust Dismissal and the Growth of Temporary Help." *Journal of Labor Economics*, Vol. 21, No. 1, pp. 1–42.

Berlinski, Samuel. 2008. "Wages and Contracting Out: Does the Law of One Price Hold?" *British Journal of Industrial Relations*, Vol. 46, No.1, 59–75.

Borjas, George, and Valerie Ramey. 2000. "Market Reponses to Inter-industry Wage Differentials." NBER Working Paper 7799.

Brown, Charles, and James Medoff, 1989. "The Employer Size Wage Effect." *The Journal of Political Economy*, Vol. 97, No. 5, pp. 1027–1059.

DiNardo, John, Nicole Fortin, and Thomas Lemieux. 1996. "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semi-parametric Approach." *Econometrica*, Vol. 64, No. 5, pp. 1001–1044.

Dube, Arindrajit, and Ethan Kaplan. 2003. "The Labor Boundaries of the Firm: Employment-at-Will and Contracting Out." Working Paper.

Freeman, Richard. 1984. "Longitudinal Analyses of the Effects of Trade Unions." *Journal of Labor Economics*, Vol. 2, No. 1, pp. 1–26.

Gibbons, Robert, and Lawrence Katz. 1992. "Does Unmeasured Ability Explain Inter-Industry Wage Differentials?" *Review of Economic Studies*, Vol. 59, No. 200, pp. 515 – 535.

Grossman, Sanford and Oliver Hart. 1986. "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration." *Journal of Political Economy*, Vol. 94, No. 4, pp. 91–719.

Krueger, Alan, and Lawrence Summers. 1988. "Efficiency Wages and the Inter-industry Wage Structure." *Econometrica*, Vol. 56, No. 2, pp. 259–293.

Segal, Lewis M. and Daniel G. Sullivan. 1997. "Wage Differentials for Temporary Services Work: Evidence from Administrative Data." Federal Reserve Bank of Chicago Working Paper 98–23.

Simon, Herbert. 1951. "A Formal Theory of the Employment Relationship." *Econometrica*, 1951, Vol. 19, No. 3, pp. 293–305.

Topel, Robert and Michael Ward, 1992. "Job Mobility and Careers of Young Men." *Quarterly Journal of Economics*, Vol. 107, No. 2, pp. 439–479.