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

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AUGUST 22, 2008

Acknowledgement: The authors would like to express their thanks for comments from: David Autor, Kenneth Chay, Oeindrila Dube, Richard Freeman, Maitreesh Ghatak, Lawrence Katz, David I. Levine, Alan Manning, Steven Pischke, Canice Prendergast, Michael Reich, Noah Schierenbeck and seminar participants at the London School of Economics, the University of Chicago, the University of California at Berkeley, and the 2003 American Economic Association Meetings.

1 Introduction

Over the past several decades, there has been a marked increase in the use of service contractors in low-wage service occupations. During 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 non-standard work relations, with an attendant impact on wages. As common as this reasoning is in popular discussion, there has been only limited empirical research on whether contracting out has reduced wages.

This paper considers the contracting out of janitors and security guards over the nineteen eighties and nineties. These are 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 outsourced or in-house is easily identifiable using industrial and occupational codes.

We assess a number of different explanations behind the outsourcing wage differential which have not been rigorously explored in the literature. These include unobserved heterogeneity in skills, compensating differentials in benefits, as well as 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. Together, the set of evidence presented 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.

2 Relation to Existing Research

To date, formal empirical work on outsourcing has been limited. Using the Current Population Survey, Abraham (1990) showed that wages as well as non-wage benefits tend to be lower for outsourced workers than for those employed in-house. However, she does not address whether these gaps reflect rent differentials due to outsourcing, or simply 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.

Berlinski (2008) uses 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. However, his sample size is small (the sample contains less than 60 outsourced workers). Furthermore, his cross-sectional analysis is unable to shed much light on whether the reduced wage associated with outsourcing reflects lower labor market rents.

In addition to the work mentioned above, there is some related research on the temporary help industry. Segal and Sullivan (1997) note that workers in the temporary help industry are outsourced because potentially, they could be hired temporarily by the firms using their services. They document, using the CPS, that, conditional on

covariates, workers employed in the temporary help industry have lower wages, benefits and unionization rates. This mirrors our findings for permanent outsourcing. Autor (2003) shows that the temporary help service industry increased most after states made firing workers more difficult and 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) document that significant industry wage premiums 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 differences 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 that is outsourcing the work. We assess this possibility empirically in this paper by looking at what types of industries actually outsource service work.

In addition to estimating the *mean* impact on wages from being outsourced, we also 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 observables, using a semi-parametric estimator devised by Dinardo, Fortin and Lemieux (1996).

Finally, we investigate whether outsourcing allows firms to lower inter-industry wage premiums. Firms that are unable to fully reduce rents going to direct employees may be able to do so by contracting out these services. Borjas and Ramey (2001) find 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. In a similar spirit, we find that industries with high wage premia were more likely to outsource work. This suggests that some of the employment reduction which Borjas and Ramey document most likely reflects outsourcing of labor services, as opposed to a reduction in actual employment.

3 Theoretical Predictions on Outsourcing and Wages

There are two broad types of theories that can explain why outsourced workers earn less than directly employed workers. Wages may differ either due to competitive reasons or

due to differences in rents. The main purpose of this paper will be to empirically differentiate between these theories.

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, some firms may outsource their low wage workers. Outsourced workers may also have greater difficulties in unionizing and may 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.

In this paper, we will address the following questions. 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?

4 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 2 wage observations per individual exactly 12

[1] Dube and Kaplan (2003) discusses 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. The basic conclusion is 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. As a corollary, the union threat effect may be lower in an outsourced as opposed to a directly employed environment, 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.

months apart. We match individuals across years by household ID and line number, as well as race, Hispanic origin, sex, age, and education level.

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

Finally, 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.

5 Measurement of Outsourcing

In this paper, we focus on two occupations, janitors and security guards. These are two low-wage occupations where outsourcing has been very prevalent, and where it is possible to unambiguously determine 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 mainly provides labor services 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 are supplying services only to other businesses. In contrast, there are other occupation/industry groupings where workers are providing both intermediate services to other firms and final services to consumers. An example of this case is given by the Kitchen Workers/Food Preparation occupation (439). University dining halls often provide meals through contractors such as Sodexho. Workers at such dining halls are outsourced as 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 are providing final services to consumers, making it

[3] We do not consider a janitor or a security guard working for a temp 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, i.e., 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] Katherine Abraham (1988) also used this method for identifying outsourced workers in the CPS.

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.

Finally, 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]

6 Descriptive Statistics

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

7 Results on Wages

[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 outsourcing wage differential may be larger than what we find.

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

7.1 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 difference out confounding variables. We argue that conditional on covariates, wages are unlikely to be correlated with unobservable factors that are correlated with workers' outsourcing status. Therefore, our estimates here reflect the penalty 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 outsourcing on the distribution of wages. Later in the paper, we will provide some 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.[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 (i.e., the level of individual months). In Tables 3A and 3B, we report coefficients for outsourcing status (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 show 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 substantially 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

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

[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 .001.

that for men (-0.041). In contrast, for guards, the penalty among *men* (-0.213) is somewhat larger than among women (-0.165) .

The specification in row 4 of Table 3A and 3B also includes interaction terms between outsourcing and 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 show 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), while 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 differences in hours of work between in-house and part time workers.

7.2 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 outsource would have had low rent jobs whether or not they chose to outsource. In this case, low rent industries pass through low wages to outsourced workers but there is no causal effect of outsourcing on wages. We address this issue empirically in several ways. Since janitors are the only workers employed by building service contractors who are outsourced, other occupations should not have a wage penalty from 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. We use clerical workers because they are the largest non-managerial occupations working for contractors besides the security guards and janitors themselves.[11] 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 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) over and 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

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

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 faced by janitors and guards in their respective industries. Thus, the outsourcing penalty is unlikely to be explained by low-wage industries outsourcing.

Our second way of ascertaining whether low outsourcing wages are "passed through" from low-rent industries is by utilizing 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[12] BEA Benchmark Input/Output Use Tables to construct a distribution of 1-digit SIC industry purchases of janitorial and protective services. This is constructed as the proportion each 1-digit industry's purchases of janitorial and protective services respectively: $I_j = \frac{Purchases_j}{\sum_{k=1}^{n} Purchases_k}$. We did not utilize more disaggregated industry categories because of sample size issues for 2-digit industries, as well as 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 1-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 1-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.

[12] 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.

7.2 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 does not only require that the individuals can be matched across years, but that they also 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 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 are not representative of 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 switchers regression may merely reflect underlying trends of young workers who are both moving in-house and experiencing wage gains.[13]

In row 8 of tables 3A and 3B, we control for *observable dimensions* that may be correlated with both 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 for different latent wage growth by age, education, race and gender as well as geography, which may otherwise confound the outsourcing coefficient in equation 4.

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

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

Row 8 in Tables 3A and 3B shows that for both guards and janitors, allowing for selection on observables in switching keeps the outsourcing penalty 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 3-digit occupation. The outsourcing coefficient is being 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 switching of outsourcing status to be correlated with unobservable skills, but uncorrelated with observable skills or future occupations—something that we think is unlikely.

8 Results on Health Benefits and Compensation

A final explanation for the outsourcing wage penalty is that the outsourced workers receive a compensating differential for higher non-wage benefits. We focus on healthcare benefits. 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[14].

Both outsourced janitors and outsourced guards are less likely to be insured through their employer. As shown in Table 2, 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

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

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 1% 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.[15] 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.[16] 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 seems to be almost driven mostly by full-time workers. For part-time workers, there essentially is no differential for janitors and a much smaller differential for guards. These results are similar to those on wage differentials.

Finally, 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, as it reduces the benefits share of compensation by 2.25 percentage points for janitors and by 2.56 percentage

[15] 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.

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

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.

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 points strongly to the conclusion that outsourcing reduces labor market rents for workers.

9 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 distribution is given by:

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

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, t_z is the base year for the wage distribution, t_w 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 lack of an effect of outsourcing on wages. In contrast, there is considerably greater right skew in the actual wage distribution (i.e., with lower outsourcing) as 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 industries which had been paying janitors and guards higher than average wages.

10 Intertemporal Evidence on Industries that Outsource

Finally, we provide additional evidence that high rather than low rent industries have outsourced their service workforce. These results complement our findings in section 7.3 that controlling for underlying industry, if anything, raises the magnitude of the outsourcing coefficient (i.e. that high not low rent industries outsource), and our results in the previous section that 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.

$$(9) \qquad \ln(N_{j,t2}) - \ln(N_{j,t1}) = \alpha_3 + \alpha_4 * IndustryWagePremium_{t1} + \alpha_5 (\ln(E_{j,t2}) - \ln(E_{j,t1})) + e_j$$

Here N_{jtk} 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 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 is broadly supportive of 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 3-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 3-year period. We then calculate the growth in the employment of outsourced (or in house) janitors and guards in those regions between 3 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 $f_{j,IH}$).

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

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

Figures 2,3,4 and 5 provide visual representation 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 eighties and nineties. The combined evidence indicates that it was high and not low-wage industries that outsourced workers, reinforcing that it is unlikely that the wage differential between direct and outsourced workers can be explained by the underlying industry wage differentials.

10 Conclusion

Over the past two 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, have substantially lower unionization rates, and have lower union wage premium.

Our results point us away from 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. There is also evidence that benefits fall with outsourcing, both in an absolute sense and in relation to wages. However, 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 is rent differentials. Finally, based on evidence from Input-

Output tables as well as 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.

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

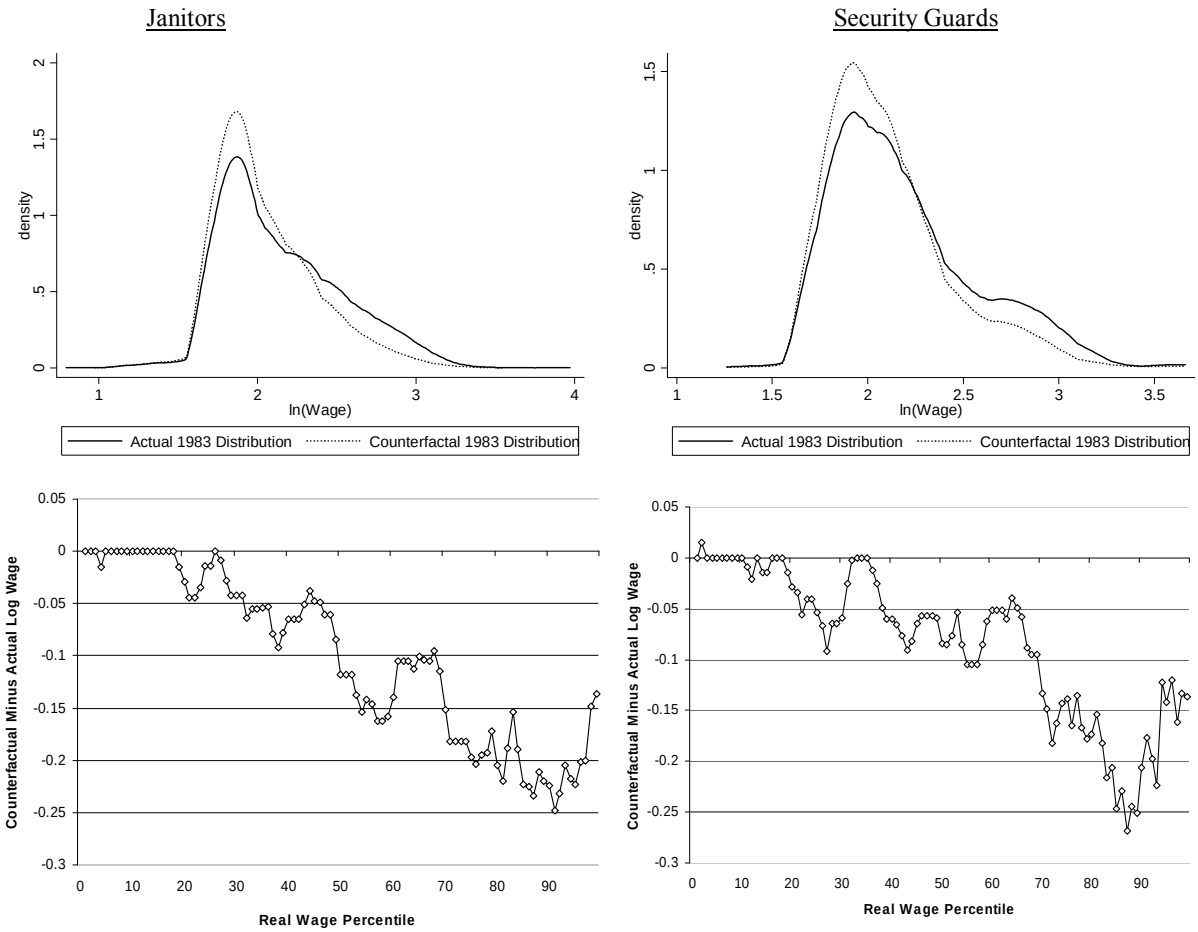

Figure 2: Growth in Outsourced Employment and Prevalence of High Wage Industries - Janitors (2 Digit Level)

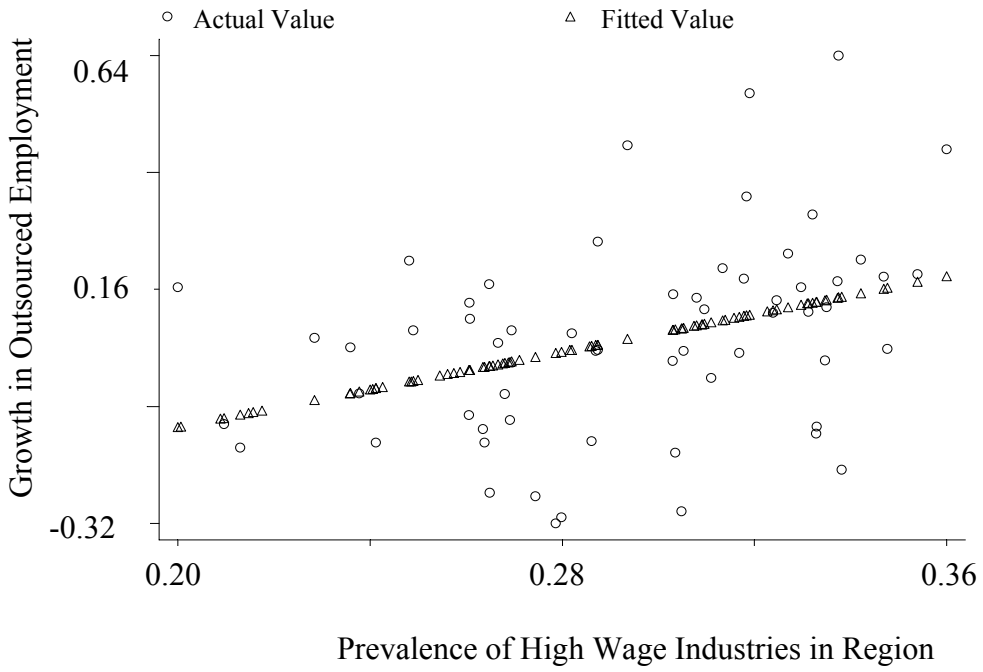

Figure 3: Growth in Outsourced Employment and Prevalence of High Wage Industries - Guards (2 Digit Level)

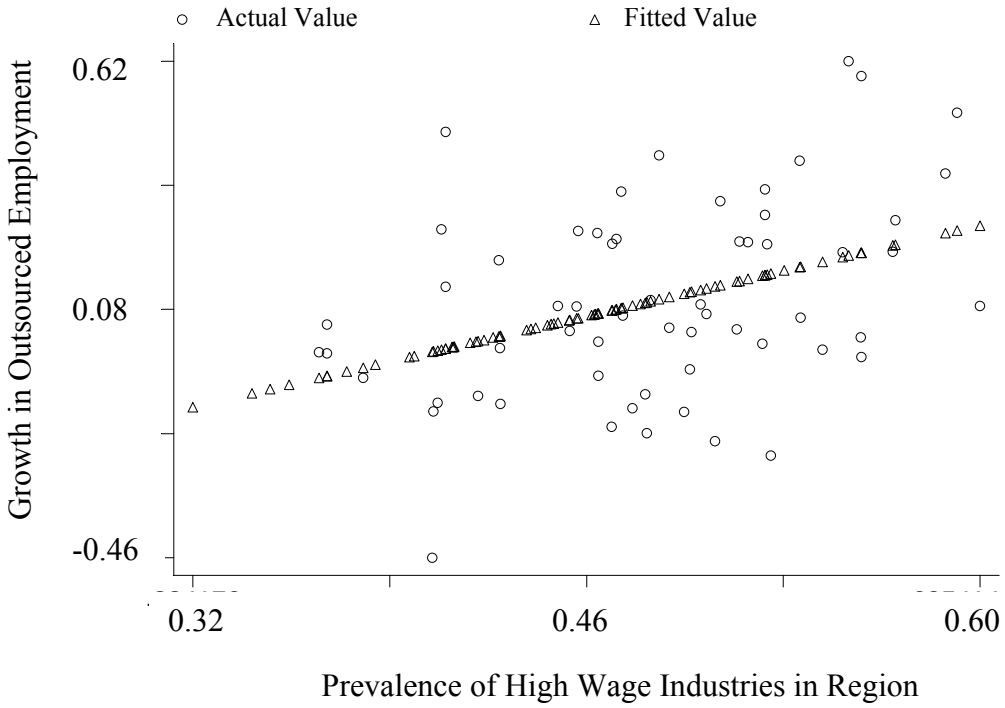

Figure 4: Growth in In-House Employment and Prevalence of High Wage Industries – Janitors (2 Digit Level)

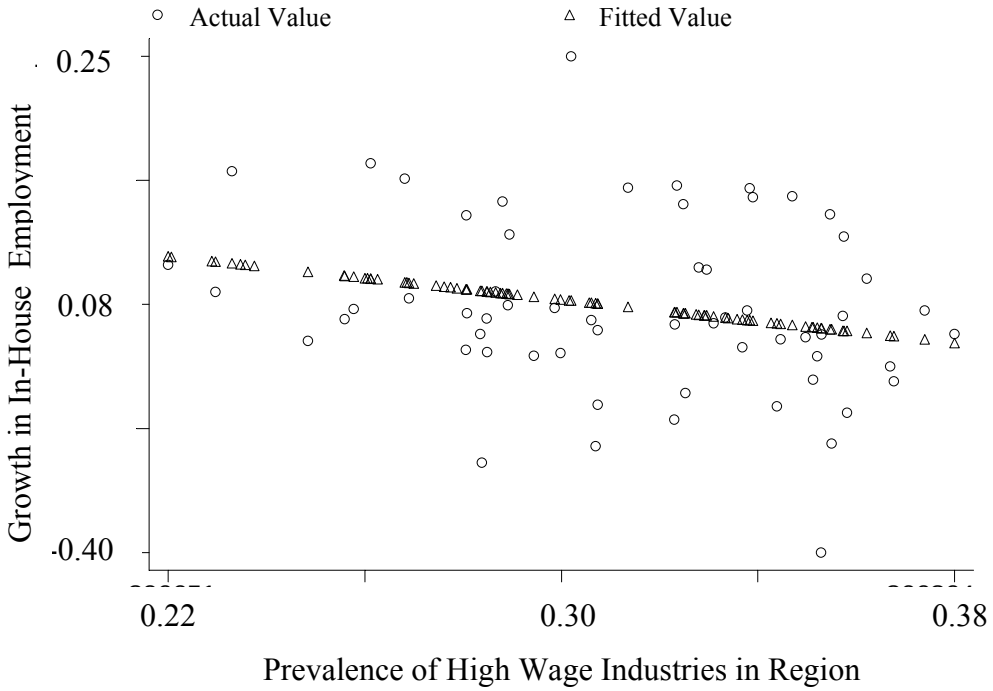

Figure 5: Growth in In-House Employment and Prevalence of High Wage Industries – Guards (2 Digit Level)

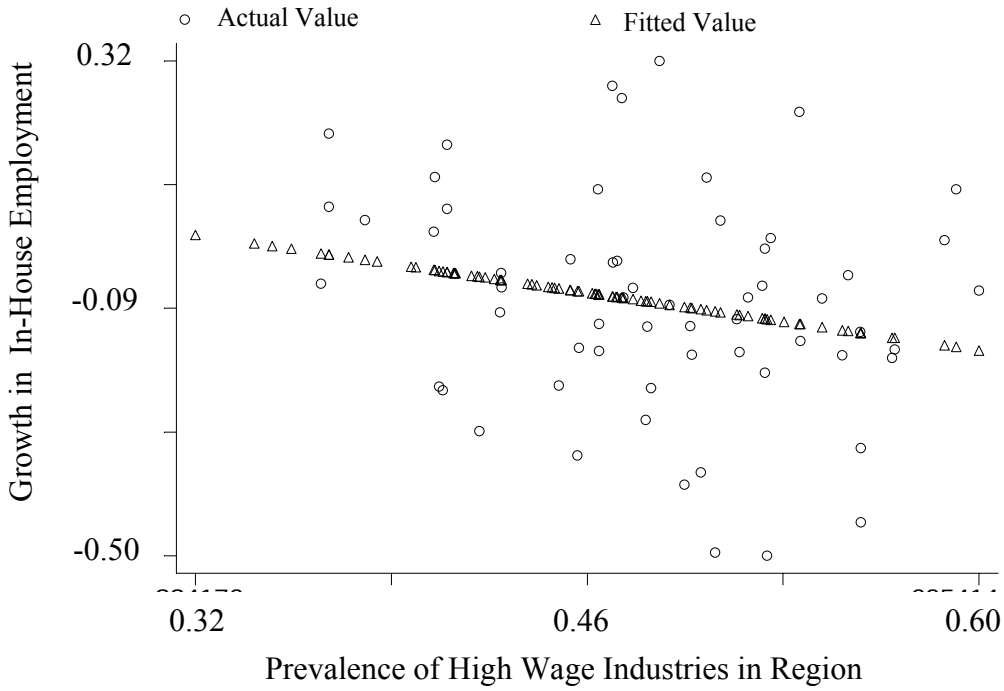

Table 1: Incidence of Outsourcing over Time

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

* significant at 10%; ** significant at 5%; *** significant at 1%

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	0.494	0.236	-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	-0.344	41.676	40.110	-1.566
	(0.072)	(0.124)	(0.143)***	(0.156)	(0.179)	(0.247)***

Notes: (a) Data are averages from the Current Population Survey merged outgoing rotation groups from 1983-2000, (b) Standard deviations are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

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: (a) Data comes 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. (b) 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. (c) Specification 4 also includes interactions of outsourcing status with union and part-time status (d) 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. (f) 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. (g) 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. (h) Specification 8 adds all the demographic controls in levels as added controls. (i) 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. (j) 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. * significant at 10%; ** significant at 5%; *** significant at 1%

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 Occupatiopnal Differencing	-0.151 (0.016)***	0.256 (0.003)***	-0.192 (0.002)***			268083	0.44
			Panel with Individual Fixed Effects				
(7) Within Occuption 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 (0.041)**	0.027 (0.043)	-0.145 (0.045)***			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: (a) Data comes 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. (b) 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. (c) Specification 4 also includes interactions of outsourcing status with union and part-time status (d) 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. (f) 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. (g) 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. (h) Specification 8 adds all the demographic controls in levels as added controls. (i) 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. (j) 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. * significant at 10%; ** significant at 5%; *** significant at 1%

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: (a) Employer sponsored health insurance data comes from the March Annual Demographic Supplement to the Current Population Survey (1983 to 2000). It is equal to one if the employee reports having employer provided health insurance and zero otherwise. (b) 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. (c) 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. (d) 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. (e) Standard errors are clustered at the level of individual year and are robust to heteroscedasticity.

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: (a) All data comes from the merged outgoing rotation groups of the Current Population Survey from 1983-2000, (b) Bootstrapped standard errors are in parentheses, (c) 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, (d) 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. * significant at 10%; ** significant at 5%; *** significant at 1%