"Recent Longitudinal Evidence of Size and Union Threat Effects by Gender on Wages and Benefits^"

Phanindra V. Wunnava
David K. Smith '42 Chair in Applied Economics
Research Fellow at IZA
Fellow at GLO
WNS 502F
Middlebury College
Middlebury, Vermont 05753
802.443.5024 Fax 802.443.2185
wunnava@middlebury.edu
www.middlebury.edu/~wunnava

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Abstract

It is evident (empirics based on data from the NLSY79 covering years 2000 through 2016) that both male and female workers in medium/large establishments receive not only higher wages but also have a higher probability of participating in benefit programs than those in smaller establishments. This corroborates the well-documented firm/establishment *size* effect. Further, the firm size wage effects are larger for men than for women. The union wage effect decreases with establishment size for both genders. This supports the argument that large nonunion firms pay higher wages to discourage the entrance of unions (i.e. the union *threat* effect argument). In addition, the union wage premium is higher for males across firm sizes relative to females. This implies that unions in large establishments may have a role to play in achieving a narrowing of the gender union wage gap. Further, given the presence of noticeable gender differences in estimated union effects on benefits [such as health insurance, maternity leave, life insurance, and retirement], unions should not treat both genders similarly.

Keywords: *size effect, threat effect, fringe benefits, compensation, gender, union-nonunion, wage differential, random effects, NLSY79*

JEL Codes: *J16, J31, J32, and J51*

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1. Introduction

Since the publication of Lewis (1963), a canonical study of union-nonunion wage gaps, there has been substantial literature devoted to studying the wage premia associated with unionization. Freeman and Medoff (1984) in their comprehensive book, *What Do Unions Do?*, used CPS microdata to estimate the determinants of union membership and the union premium with individual data and found a 16 percent union wage premium. They also found that unionization has a positive effect on the provision and expenditures of fringe programs, and the effect of unionization on fringe benefits is considerably greater in percentage terms than the union wage effect. Since then, union density has been on a dramatic decline, hitting a low of 11.1 percent in 2015 according to the U.S. Bureau of Labor Statistics, which is approximately half of the percentage in 1980 (Farber et al 2018). Alongside the reduced union density, union effects on wage and other non-wage benefits might have changed since Freeman and Medoff (1984).

As far as women are concerned, the documented research in the area of union-nonunion wage/benefit differentials across establishment sizes is somewhat dated and is mostly cross-sectional. In a life cycle context, a purely cross-sectional analysis assumes that one is following an individual over his/her lifetime. This implies that all individual differences can be accounted for by exogenous variables so that each person can be considered identical. This may be a very dubious assumption. Some researchers (Polachek et. al., [1986, 1987], Wunnava and Okunade [1991, 1996]) have suggested that unobserved characteristics of workers are very different, and such unmeasured characteristics can be captured by using panel or longitudinal data. Panel data enables the researcher to avoid unmeasurable sample heterogeneity by concentrating on changes in measured variables for given individuals, under the assumption that unmeasured variables remain constant over time. For example, the National Longitudinal Survey (NLS) used for the empirics in this study will enable a researcher to exploit the richness of longitudinal nature of the data.

This study not only focuses on female union-nonunion wage/benefit differentials across establishment sizes in a longitudinal framework, but also compares the results to those of their male counterparts. This is relevant given a relatively higher concentration of women in smaller firms, and unions' realization in recent years that treating men and women similarly with respect to wages and fringe benefits is not necessarily a good idea. For example, provision of such benefits as maternity (parental) leave, day care, and flextime is likely to be of greater interest to women than to men.[1] This paper is related to several strands of literature. *First* is the firm size effect on hourly wages and non-wage benefits. The firm size effect theory predicts that larger firms pay higher wages and non-wage benefits for reasons including workers' sorting and matching, paying efficiency wages to deter shirking or/and lowering turnover costs, the operation of internal labor markets, and the difference in human capital accumulated on the job between small and large firms or establishments. The *second* strand of literature is the union threat effect on wages and non-wage benefits. There are at least two theoretical explanations of why the union-nonunion wage/benefit differential may vary by establishment/firm size. Firstly, large establishments may offer higher compensation than smaller firms to lessen the likelihood of unionization. Secondly, as pointed out in Bramley et al. (1989), there appears to be a maximum wage for a particular job. The *third* strand of literature to which our paper is related is unionism and gender. Evidence from past studies (Oaxaca, 1975: Parsley, 1980; Freeman and Leonard, 1987: Even and Macpherson, 1993; Hartmann et al., 1994; Wunnava and Peled, 1999) highlights two important findings. First, the union wage premium for women exceeds that of men, and second, women are more likely than men to vote for union representation. Despite the female propensity to vote for representation, other studies (Freeman and Medoff, 1984; Even and Macpherson,

1993) show that women are 50% less likely than men to be union members. This empirical evidence suggests that there are barriers to entry to labor unions for women. Even and Macpherson (1993) point out three possible sources of gender difference in unionism: labor characteristics, employer/union discrimination, and unobserved gender differences in characteristics that affect the demand for unionism. To the extent that low union density implies weaker bargaining power, a low participation rate of female workers will transfer to a lower wage premium and a lower union-nonunion fringe differential than they would otherwise receive. Women may be concentrated in industries that are less unionized, in which unions may have less bargaining power. Even if they work in a highly unionized industry, their lack of representation means that fringe benefits won by unions are less valuable to women (Freeman and Medoff 1984).

In this paper we employ National Longitudinal Survey of Youth79 data for the years 2000-16[2] [covering wages and such benefits as medical, retirement, life insurance, and maternity (paternity) leave] to estimate the gender union-nonunion wage/benefit differentials across establishment sizes in a longitudinal framework. We generate evidence based on Random Effects Generalized Least Squares Regression for real wage and Random Effects Logistic Regression for fringe benefits. We also include a comprehensive set of controls to account for individual, region, and industry fixed effects, as well as time-varying observables. The conclusions drawn from this study may refocus collective bargaining agendas to support women's concerns. Such issues could include increasing the representation of women in leadership positions and designing compensation packages specifically for women. The paper proceeds in five sections. In section 2, we discuss insights from recent literature. In section 3, we describe our data sources and methodology. In section 4, we discuss our empirical results. Section 5 is our conclusion.

2. Insights from Recent Literature

(i) Firm Size Effect

The relationship between employer size and earnings is well-documented (Lester, 1967; Masters, 1969; Mellow, 1982; Dunn, 1986; Brown and Medoff, 1989; Evans and Leighton, 1989; Morissette, 1993; Lallemand et al., 2005, 2007). According to Gibson and Stillman (2009), a large-firm wage premium exist independently of an establishment size effect. Other researchers, however, were guarded about accepting this possible positive link between firm size and wage premium (Idson and Oi, 1999; Kruse, 1992). Recent national figures support this relationship: for private industry, total compensation (i.e., wages plus benefits) as well as relative weight of fringe benefits increase with the size of the establishment.

[Table I about here]

In a recent empirical study based on the National Employer Survey covering 1994 and 1997, Pedace (2010) provides a number of reasons for positive firm size effect on wages. One of the explanations for wage premium is the differences in both human and physical capital investments between employers of different sizes. Larger firms have not only more capital but also more sophisticated capital, which complements skilled workers (Dunner and Schmitz, 1995). Heterogeneity in worker quality and large firms' inclination to hire skilled workers result in worker sorting and matching (Champlin, 1995; Troske, 1999; Garicano and Rossi-Hansberg, 2006). In fact, Bloom et al (2018) find that the average worker observable and unobservable characteristics can explain approximately 20 percent of the large firm wage premium, which implies that large firms hire higher-quality workers. However, Gibson and Stillman (2009) show empirically that controlling for both education and workplace literacy has no substantial impact on the wage premium of large firms, concluding that large firms really pay more than small firms for workers with

comparable skill levels. This could be possible because large firms may pay efficiency wages to deter shirking or/ and lower turnover costs (Campbell, 1993: Kruger, 1991; Cappelli and Chauvin, 1991; Allgulin and Ellingsen, 2002). An alternative explanation is that larger firms may earn higher rents and share them with their workers. The profit-sharing could be because of perceptions of fairness, because of the bargaining between workers and firms, or because of the presence or threat of unions (Bloom et al, 2018). In addition, Lallemand, Plasman, and Rycx (2007) suggest that job stability may explain a part of the firm-size wage premium. They observe that job stability is higher within large organizations for various reasons including intensive training programs or a lower risk of bankruptcy. This argument is related to literature that examines the role of internal labor markets in inducing an employer-size wage premium (Doeringer and Piore, 1971; Robinson and Wunnava, 1991).

Recent theories also suggest that the difference in human capital accumulated on the job between small and large firms or establishments as a possible cause for the wage differential across firm sizes (Troske, 1999; Oi and Idson, 1999; Zabojnik and Bernhardt, 2001). However, Feng (2009), by using the NLSY79, shows empirically that there is a significant wage differential associated with establishment size even for those who do not receive any training. Relatedly, Lallemand, Plasman, and Rycx (2007) show the existence of a positive and significant establishment-size wage premium, even when controlling for human capital variables, occupations, and gender.

(ii) Union Threat Effect

Much of the theoretical literature on the spillover effects of union has been dedicated to examining whether a strong union presence represents an economic threat to nonunion employers (Farber, 2005; Podgursky, 1986). Theoretically, a strong union presence can threaten nonunion firms and affect nonunion workers via several channels. First, nonunion employers, to avoid unionization efforts within their firms, may raise wages and improve fringe benefits to the union levels. Union spillover effects are largest in industries and occupations with a high concentration of union membership, because employers are under more pressure to raise wages or fringe benefits to prevent unionization. Farber (2005) proposes a model of wage determination by a nonunion employer when faced with the union threat, which suggests that the nonunion wage will be directly related to and the union wage gap inversely related to the threat of union. Second, a strong union representation may draw nonunion workers to the union jobs with higher pay. Therefore, nonunion employers may raise wages in an attempt to retain talents. Another possible channel suggested by Taschereau-Dumouchel (2020) is that nonunion firms, when faced with a union threat, hire more high-skill workers and fewer low-skill workers to increase the employees' opposition to the union. In addtion, threatened firms hire fewer workers, produce less and, due to decreasing returns to labor, pay higher wages.

On the empirical front, estimates of the effect of the threat of unionization on nonunion wages and the union-nonunion wage gap have been mixed. Belman et al (1997) shows empirically using 1991 CPS microdata that the extent of public sector unionization appears to be positively correlated with earnings for both states and local government workers and for those covered and not covered by collective agreements, albeit the effect for non-covered employees is smaller than that for covered ones. On the contrary, Belman and Voos (1993) find that there is neither a positive nor a negative relationship between union coverage and nonunion wages in both local market industries and national market industries. Neumark and Wachter (1995), by using CPS data between 1973 – 1989, shows that an increase in union density is associated with a decrease in the nonunion industry wage, implying that crowding effects, not threat effects, are the predominant effects of unionization on the union-nonunion wage gap. However, at the city level, an increase in union density is associated with an increase in the nonunion city wage differential, suggesting that threat effects prevail. Similarly, Farber (2005), using CPS data between 1977 – 2002, finds very little relationship between either nonunion wages or the union wage gap and effect, concluding that the threat effect found in

literature is likely biased by omitted industry-specific factors correlated with both wages and union density. On the contrary, a more recent paper, Rosenfeld and Denice (2019), also using CPS data between 1977 - 2015, find stable and substantially large positive effects of state-level public sector union strength on nonunion public sector worker's wages.

(iii) Union Threat Effect and Firm Size

As described in Bramley et al. (1989), there are at least two theoretical explanations of why the union-nonunion wage/benefit differential may vary by establishment/firm size. Firstly, large establishments may offer higher compensation than smaller firms to lessen the likelihood of unionization. Larger nonunion firms recognize that they are the best union targets since the large firm provides a larger worker pool than a small firm. The larger worker pool allows more workers to be solicited into entering the union at a lower cost to the union organizers than at a small firm. There are economies of scale in union organization. Consequently, the large nonunion firm raises compensation in order to maintain worker satisfaction and discourage unionization (Voos, 1983; Podgursky, 1986). Secondly, as pointed out in Bramley et al. (1989), there appears to be a maximum wage for a particular job. This is because the wage dispersion effects of unions presuppose the existence of a binding upper limit constraint on the wage for a particular job (Freeman and Medoff, 1982). In large nonunion firms, the wage is often close to the maximum but in smaller nonunion firms the wage is far below the maximum. When the large firm becomes unionized there will only be a small increase in wages so that the maximum is not surpassed. However, if the small firm becomes unionized the wage can increase a relatively large amount without reaching the maximum. Consequently, the same factors that lead to higher wages in larger firms also lead to larger union-nonunion wage differentials in small establishments. These arguments clearly predict larger union-nonunion benefit differentials should occur in small plants. However, given the finding by Bramley et al. (1989) of the U-shaped pattern with regard to pension coverage, it is unclear if that is an anomaly, or if other benefits also tend to follow a similar pattern. Thus, by studying a number of benefits for both genders, we may be able to discern how union strategies differ across establishment sizes and gender when it comes to the relative weights of wages and benefits.

Podgursky (1986) was one of the first researchers to merge the effect of firm size and union affiliation on wages in a study. Podgursky has shown empirically the impact of firm size on union-nonunion wage differentials for men. He concludes that union-nonunion wage differential is largest in small plants. He attributes this phenomenon to union threat effects, i.e., large nonunion firms are able to pay higher wages to decrease the threat of unionization. Similarly, Waddoups (2008), shows that there is an inverse relationship between the employer size-wage effect and union-nonunion wage differential among male workers. Among women no such pattern is detected. Barth, Bryson, and Dale-Olsen (2020) shows empirically that increasing union density at the firm level leads to substantial increase in both productivity and wages, noting that the wage effect is larger in more productive firms in Norway. To the extent that large firms are more productive than small firms, this result implies that the union wage effect increases with firm size. However, one should note that differences in the national systems of employment relations and institutional underpinnings of the US and Norway may influence the magnitude and significance of the union threat effects.

Following Podgursky's lead, later studies investigated the pattern of union-nonunion benefit differentials across plant sizes for men (Bramley et al., 1989; Okunade et al., 1992; Wunnava and Ewing, 1999) and for both genders (Wunnava and Ewing, 2000). This is a timely issue given the importance of fringe benefits as a part of total compensation for union workers relative to nonunion workers.

[Table II about here]

(iv) Union Effect by Gender

Most articles in the past focus on size effects and gender specific union effects separately and show empirically that unionization will have positive effects on wages of female workers and may narrow the gender wage gap. In one of the recent papers examining the differential in union wage effects between men and women, Elvira and Saporta (2001) show that the gender wage gap is significantly smaller in unionized establishments for six manufacturing industries, controlling for occupation and establishment gender composition. Overall, women covered by collective bargaining have a 2.2 percent wage advantage, while nonunion female workers have a 5.7 percent wage disadvantage, compared to nonunion male workers. Rosenfeld and Denice (2019), by using panel CPS data between 1977 and 2015, shows that while public sector unionization is associated with higher nonunion public sector wages for both men and women, it only raises nonunion private sector wages for women. Gender segregation by firm/establishment size combined with the expected large union wage premium for small firms implies that female workers should stand to benefit the most from a strong union presence. This idea resonates with Rosenfeld and Denice (2019) who reason that, since heavily unionized public sector occupations with analogous private sector counters, including teaching, nursing, and administrative assistants, are overwhelmingly female, unorganized private sector women should benefit from a strong public sector union presence.

Another strand of literature has examined the decline in unionization in the US since the 70s and the 80s, and its impact on the gender wage gap. Even and Macpherson (1993) examine why between 1973-1988, private sector unionism has fallen more for men and the extent to which this greater decline in unionism among males can explain the narrowing wage gap. If males and females received similar union wage premia, the percentage gap in wages would diminish. They find that of the 9.3 percent decline in the wage gap, 14.3 percent is due to the decline in unionization.On the same note, Doiron and Riddell (1994) analyze the impact of unionization on male-female earnings differences in Canada between 1981-1988 and find that the decrease of the gender unionization gap during that period prevented an increase of 7 percent in overall wage differential. These findings show that the gender wage gap persisted because of the higher union wage premium enjoyed by male workers. These findings also highlight the critical role of equal union wage premia between the two genders in narrowing the gender wage gap. However, Blackburn (2008) suggests that, between 1983 and 2005, there is a declining trend in the union wage differential for women. The results are robust across different estimators. In the case of male workers, there is an apparent decline in the wage differential only for workers not represented by unions.

(v) Union Effect on Fringe Benefits

Nonwage compensation accounted for approximately 30 percent of total compensation in March 2021 according to the Bureau of Labor Statistics. There is heterogeneity in the weight of benefits in the total compensation package. Those who work in goods-producing industries have a fringe package that is 32.4 percent of their total compensation. On the other hand, fringe benefits received by service-producing workers make up only 28.9 percent of the total compensation package. In addition, the weight of fringe benefits tends to increase with firm size for both goods-producing and service -providing industries.

Past empirical studies have identified a positive relationship between fringe benefits and unionization. Montgomery and Shaw (1997) conclude that large and unionized firms are offering more generous pensions to workers. In terms of employer-sponsored health-insurance, Buchmueller, DiNardo, and Valletta (2002) show empirically that the union effect on health insurance coverage rates was large in the 80s and the 90s, despite the declining unionization. In the private sector, Olson (2019) finds evidence that the decrease in state-level private sector union density in the last decades caused a drop in percentage

of workers whose health insurance is covered by their employers. Wunnava and Ewing (1999) also show that unionization increases the probability of workers receiving fringe benefits including health insurance, life insurance, retirement pensions, and maternity leave. Similarly, Buchmueller, DiNardo, and Valletta (2005), using PSID and CPS data between 1972 and 1992, suggest that union workers consistently have more vacation, more likelihood of dental, health, maternity, retirement, and pension benefits, compared to nonunion workers with the same attributes. They also find that there was a decline in the magnitude of the fringe-benefit differentials over time, which is consistent with the decline in the union density and the potentially the decline in unions' influence. Recently, Knepper (2020) find that although there is no effect of unionization on wage, unionization increases annual average worker compensation by 7 percent to 10 percent. With the backdrop of the relevant issues discussed regarding the firm size, unions effects on wages/benefits for both genders, the methodology and data employed is presented in the next section.

3. Data and methodology

The data are from the National Longitudinal Surveys of Youth (NLSY), which has interviewed respondents annually from 1979 to 1994 and biannually since 1994. The preliminary results reported in this paper are based the NLSY79 data consists of persons who worked full time for pay for the waves 2000, 2002, 2004, 2006, 2008, 2010, and 2012 in the nonagricultural, private sector.
The author plans to update the reported results by including [rounds 26 (2014), and 27 (20160] in coming months. We categorize workers as belonging to one of the following three employer establishment sizes: *Size*1 (1 to 100 workers), *Size*2 (101 to 499 workers), and *Size*3 (500 or more workers). Workers are identified as being union or non-union members. See **Table III** for selected variable definitions and descriptive statistics of the overall sample as well as the sample disaggregated by gender and establishment size.

[Table III about here]

The "fringe benefit" variables are based on responses to the question of whether or not the respondent's employer offers or makes available a particular benefit. Dummy variables are constructed such that they equal one (i.e., $P_i = 1$) if the respondent reported that his/her employer offered or provided the particular benefit, zero otherwise (i.e., $P_i = 0$). We focus on a total of *four* benefits[3]: medical, retirement, life insurance, and maternity (paternity) leave. As shown in Table III, the proportion of workers reporting the availability of benefits increases by establishment size for all of the fringe benefits for both genders.[4] The average of the natural log of wage also increased with establishment size for both genders. As one would expect, male wages are higher than their female counterparts for every firm size. The proportion of workers belonging to a union increased over all three size-categories for men, while for females, the union membership was slightly lower (20.0 percent) in the third category relative to the second category (21.4 percent). Since our main objective is to investigate the pattern of union-nonunion gender *(wage)* /*[benefit]* differentials across establishment sizes, the following is our empirical specification [eq. 1] based on a stacked sample of fulltime male and female workers:

$$(lnwage_{it})/[P_{it}] = \alpha + \beta \mathbf{s_2}(Size_2)_{it} + \beta \mathbf{s_3}(Size_3)_{it} + \beta \mathbf{ms_1}(MSize_1)_{it} +$$

$$\beta \mathbf{ms_2}(MSize_2)_{it} + \beta \mathbf{ms_3}(MSize_3)_{it} + \beta \mathbf{u_1}(U_1)_{it} + \beta \mathbf{u_2}(U_2)_{it} + \beta \mathbf{u_3}(U_3)_{it} +$$

$$\beta\mathbf{mu_1}(MU_1)_{it} + \beta\mathbf{mu_2}(MU_2)_{it} + \beta\mathbf{mu_3}(MU_3)_{it} + \underline{\text{Other Controls}}^* + v_i + \varepsilon_{it} \quad \textbf{[eq. 1]}$$

*Other Controls: Age/Age^2, vector of educational attainment dummies, Tenure/Tenure^2, Marital Status, Number of Children, Race dummies, vector of Occupation dummies, vector of Industry dummies, and vector of Regional dummies.

The *two* dependent variables are $lnwage_{it}$ = natural logarithm of hourly wages of the respondent i in year t, and P_{it} = 1 if the respondent i reported that his/her employer offered or provided the particular benefit in year t, zero otherwise; v_i = the random individual differences; ε_{it} = error tem.

Regarding the control variables, ***Size***/***MSize*** are vectors of establishment size/gender interaction terms. $Size_2$ equals 1 for workers in the second establishment size [i.e., 101-499 workers] and 0 otherwise, $Size_3$ equals 1 for workers in the third establishment size [i.e., 500 or more workers], and 0 otherwise (hence first establishment size [i.e., 100 or less workers] is the omitted category). ***MSize*** is a vector of interactions between ***Size*** and a male (***M***) dummy (= 1 if an observation belongs to a male, and 0 otherwise). Hence, $\beta\mathbf{ms_i}$ captures the male establishment size differential relative to females (captured by $\beta\mathbf{s_i}$), and the sum of ($\beta\mathbf{s_i} + \beta\mathbf{ms_i}$) will be the establishment size effect for males.[5] Similarly, ***U***/***MU*** is a vector of union-establishment size/gender interaction terms. U_1 equals 1 for union workers in the smallest establishment size and 0 otherwise, U_2 equals 1 for union workers in the second establishment size, and U_3 equals 1 for union workers in the third establishment size.[6] The ***MU*** vector is entered into the model as an interaction between the ***U*** vector and a male (*M*) dummy. So, $\beta\mathbf{mu_i}$ captures male union differentials relative to females (captured by $\beta\mathbf{u_i}$) for each of the establishment sizes. In other words, the sum of ($\beta\mathbf{u_i} + \beta\mathbf{mu_i}$) will be the union effect for males.

Given the richness of the NLSY79 data it is possible to construct a measure of work experience that represents actual weeks worked. There are several reasons why a measure of actual experience is preferred to using potential work experience (usually defined as age-education-6). Potential experience may understate the returns to experience because it does not draw a distinction between time working and time not working. This is particularly troublesome when estimating wages of persons who are more likely to have intermittent labor force participation. To circumvent this problem, we used 'Age' and 'Age^2' in addition to 'Tenure' and 'Tenure^2' at the current firm to capture the work experience of the respondent. Additionally, we include vectors of industry and occupation controls, which presumably capture much of the heterogeneity in monitoring technology not captured by establishment size. Other variables include controls for marital status, actual number of children in the household, race, education level (as measured by number of years of schooling completed), region, etc.

4. Empirics

Based on the descriptive statistics presented in **Table III** [Panels B and C], both male and female workers in medium [101-499]/larger [500 or more] establishments receive not only higher wages but also have a higher probability of participating in benefit programs than those in smaller [1-100] establishments. This reinforces the well-documented *'size'* effect. Further, from Table III [Panel A] one could note that workers employed in small firms [i.e., $Size_1$] are the majority. They encompass 56.4% of the sample followed by medium size firms [i.e., $Size_2$: 24.5%], and large size firms [i.e., $Size_3$: 19%], respectively.

The Radom Effects GLS lnwage model is presented in **Table IV**, and the Random Effects Logistic Regression results for each of the benefits considered in this paper are presented in **Tables V through VIII**. For robust checks, additional results are presented in **Tables IX**, and **X**.

[**Table IV about here]**

- *lnwage wage model*:

Based on **Table IV** lnwage regression results, we find the evidence for both size effects (**S**) as well as threat effects (**T**). The firm size wage effects[7] are much larger for men (**M+**) than women. Specifically, in the mid-size firms the gender size differential favoring men is about 24.76 % [= e^(.29456 - .0733) - 1 x 100]. This differential is about 23.1% [= e^(.3387 - .13) - 1 x 100] in the larger firms. The union wage effect seems to decrease with establishment size for both genders. This supports the argument that large nonunion firms pay higher wages to discourage the entrance of unions (i.e., the '*threat'* effect argument). Further, the union wage premium seems to be higher for males across firm sizes [specifically, for smaller firm 14.2% = e^(.133) - 1 x 100; for medium size firm 9.34% = e^(.0893) - 1 x 100; for larger firm 8.1% = e^(.078) - 1 x 100], relative to females [7.6% = e^(.0733) - 1 x 100; 5.6% = e^(.0546) - 1 x 100; 2.3% = e^(.0225) - 1 x 100]. One could also note that the male-female wage gap for union members ranges from [6% = 13.3% - 7.3% for small firms; 3.5% = 8.9% - 5.4% for mid-size firms; and 5.5% = 7.8% - 2.3%]. This implies that unions across the firm sizes may have a role to play in achieving a narrowing of the gender union wage gap. In other words, not only the threat of unionization could reduce union wage premiums for both genders as firm size increases, but also play a critical role in narrowing gender wage gap.

[Table V about here]

-*logistic models:*

Given the qualitative nature of dependent variables (which take a value of '1' if a particular fringe is offered or provided by the employer; '0' otherwise) and the longitudinal nature of our data, we estimated the above model for each of the fringe benefits by a random effects logit model.[8] As an alternative to a logit, one may employ a LPM (i.e., linear probability model).[9] The summary[10] of random effects estimates of logistic regression models for four benefits [i.e., 'med', 'retire', 'lifeins', and 'matlv'] are presented in **Tables V through VIII**. The corresponding *marginal probabilities* are reported for both genders (for females: in column **[5]**, and for males: in column **[10]**).

An intuitive interpretation of reported marginal probabilities is in order. For example, the reported marginal probabilities for females in **Table V** [column 5] could be interpreted as follows: The workers in the medium firm size category [i.e., $Size_2$] and larger firm size category [i.e., $Size_3$] have a 4.2% and 3.9%, respectively, *higher* probability of employer provided 'medical' insurance relative to the smaller firm size [i.e., omitted category]. This finding could be collaborated with some of the existing literature. According to Abraham et.al. (2009) workers employed at small establishments are less likely to be offered medical (health) insurance than workers in large establishments. Based on their benefit comparison analysis, the authors attribute those prohibitively expensive administrative costs as a major obstacle for smaller firms to offer health insurance. Glauber and Young (2015) focusing on working women also documented significant size effect as well as a strong union effect in providing maternity leave and medical (health) insurance. They also provide strong evidence that for select family-friendly benefits, urban women fare better than rural women do. In an earlier study, Rand and Tarp (2011) showed that female owned small and medium-

sized firms in Vietnam had a higher coverage of maternity leave with pay and medical (health) insurance than the firms owned by males.

The reported marginal probabilities for U_1, U_2, and U_3 could be interpreted as the female union workers have a 3.2%, 2.2%, and 2%, respectively, *higher* probability of employer provided 'medical' insurance than their non-union counterparts, in each of the firm sizes. Similar logic could be used to interpret the reported marginal probabilities for males. Specifically, column 10 of Table V indicate that the male union workers have a 3.8%, 1% *higher* probability of employer provided 'medical' insurance than their non-union counterparts, in small and medium size firms, respectively. For the largest firm size, there seems to be no difference between male union and nonunion workers with respect to the provision of medical insurance.

[Tables VI/VII/VIII about here]

For both genders, union-nonunion benefit differentials for retirement [see **Table VI**] decrease with the size of the establishment. Specifically, the female marginal probabilities reported in column [5] for U_1, U_2, and U_3 are 8.7%, 3.8%, and 1.4%, respectively. While for the males reported in column, [10] are 10.3%, 5.3%, and 3.1%, respectively. One could find a similar pattern for life insurance [see Table **VII**]. This once again supports the union threat effects argument that the union-nonunion benefit differentials are inversely related to the firm size. As per the results reported in Table **VIII**, regarding the availability of maternity (paternity) leave (usually valued highly by females), the size effects for females (refer to column [5]: $Size_2$ = 15%; $Size_3$ = 15.8%) are much larger/stronger than for males (refer to column [10] corresponding entries). Further, we also see evidence for union threat effect argument for both genders with respect to this benefit. Accordingly, unions could use availability of this highly valued fringe benefit in attracting workers of both genders irrespective of the firm size.

5. Conclusion

Based on the empirics presented in this paper, it is evident that both male and female workers in medium/larger establishments receive not only *higher* wages but also have a *higher* probability of participating in the benefit programs provided by the employer [such as medical/health insurance, life insurance, maternity/paternity leave, and retirement] than those in smaller establishments. This reinforces the well-documented *'size'* effect. Further, the firm size wage effects are much larger for men than women. The union wage effect decreases with establishment size for both genders. This supports the argument that large nonunion firms pay higher wages to discourage the entrance of unions (i.e., the '*threat'* effect argument). In addition, the union wage premium is higher for males across firm sizes relative to females though the gender gap is inversely related to the firm size. This implies that unions in the large establishments may have a role to play in achieving a narrowing of the gender union wage gap.

Further, there seems to be noticeable gender differences in estimated union effects on employer provided fringe benefits. Accordingly, unions should not treat both genders similarly with respect to wages and benefits. For example, unions may be successful in attracting more female workers to join the unions, if unions could play an active role in making those benefits valued most by females. Therefore, the findings of this study could be beneficial for making necessary modifications to our labor policy.

Notes

1 In a recent paper published in this journal, Artz (2011) demonstrated that this supports the hypothesis of 'voice effect of unions'. Specifically, the unions should be pushing for those family friendly benefits that are valued by females to increase their membership.

2 These data are biannual consisting of the years 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, and 2016.

[3] The correlations between tenure and availability of fringe benefits were relatively low. Specifically, correlations were 0.2194 (medical), 0.2246 (retirement), 0.2035 (life insurance), and 0.1917 (maternity (paternity) leave). Hence, the presence of certain benefits does not seem to have any significant effect on tenure.

4 This phenomenon is known as '*small firm hypothesis*'. Focusing on availability of employer provided health insurance, Cebula (2008) empirically showed that the greater the percentage of firms in the U.S. that are '*small*', the greater the percentage of the population that can be expected to be without health insurance.

5 $(MSize_1)_i$ is included in the specification to capture the differential effect of first establishment size on males. To avoid the problem of perfect multicollinearity, "pure" dummy variable M is omitted from the specification.

6 For a justification of introducing establishment specific union dummy variables as well as gender specific union dummy variables into the model, see Wunnava and Ewing (2000).

7 Rickne (2014) using the Chinese data showed that the 'size effect' on wages was supported for the firms in the private sector and *not* for the firms in the state-owned sector. In fact, he found that there seems to be a negative size effect in the public sector. The most plausible explanation for this result is that larger firms in China employ a higher ratio of blue-collar workers relative to white-collar workers.

8 The Breusch and Pagan [BP] Lagrangian multiplier test to see whether a random effects model is preferred to the pooled OLS for the lnwage model was conducted. The test statistic was highly significant and hence the random effects method is employed for the lnwage model. Please refer to Table IV for the BP test results. Similarly, a Likelihood Ratio [LR] test could be conducted to see whether a random effects logit is preferred to a regular logit model for pooled data. For all four benefits, the LR test is highly significant and hence the random effects model is employed. These results could be obtained upon a request.

9 However, the LPM based predicted probabilities were *unbounded*. Specifically, there were 10.3% for 'med', 8% for 'retire', 4.4% for 'lifeins', and 4% for 'matlv' with the predicted probabilities > 1. Accordingly, a logit model (which ensures *bounded* probabilities) is preferred to a LPM.

10 Full regression results can be obtained upon a request.

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Empirics

Table I: Employer costs per hour for employee compensation and costs as a % of total compensation: Private industry workers, by establishment size **[September 2021]**

	1-99 workers	**100-499 workers**	**500 workers +**
	Cost [%]	**Cost [%]**	**Cost [%]**
Total Compensation	$31.03 [100]	$38.06 [100]	$54.80 [100]
Wages and salaries	23.12 [74.5]	26.63 [70.0]	35.71 [65.2]
Total benefits	7.91 [25.5]	11.43 [30.0]	19.09 [34.8]

Source https://www.bls.gov/news.release/ecec.htm (Table 6. Accessed 12/25/2021)

Table II: Private industry, by major industry group and establishment size and bargaining status: Cost per hour worked **[September 2021]**

	Compensation [%]	**W&S [%]**	**Benefits [%]**
A. Goods-producing industries[1]	$41.41 [100]	$28.03 [67.7]	$13.38 [32.5]
1-99 workers	35.23 [100]	25.06 [71.1]	10.17 [28.9]
100-499 workers	43.61 [100]	29.03 [66.6]	14.58 [33.4]
500 workers or more	52.78 [100]	33.07 [63.7]	18.81 [36.24]
Union [U]	54.04[100]	31.03 [57.4]	23.01 [42.6]
Nonunion [NU]	39.24 [100]	27.52 [70.1]	11.72 [29.9]
	$36.39 [100]	$26.02 [71.5]	$10.38[28.5]
1-99 workers	30.33 [100]	22.80 [75.2]	7.53 [25.8]
100-499 workers	36.55 [100]	25.97 [70.1]	10.58 [28.9]
500 workers or more	55.24 [100]	36.17[65.5]	19.06 [34.5]
Union [U]	51.31 [100]	30.67 [59.8]	20.64 [40.2]
Nonunion [NU]	36.05 [100]	25.99 [72.1]	10.06 [27.9]

Source https://www.bls.gov/news.release/ecec.htm (Table 5. Accessed 12/25/2021)

[1]Includes mining, construction, and manufacturing. The agriculture, forestry, farming, and hunting sector is excluded.

[2]Includes utilities; wholesale trade; retail trade; transportation and warehousing; information; finance and insurance; real estate and rental and leasing; professional and technical services; management of companies and enterprises; administrative and waste services; educational services; health care and social assistance; arts, entertainment and recreation; accommodation and food services; and other services, except public administration.

Table III: Sample characteristics of selected variables [NLSY79 2000-16 pooled sample]:

Panel A: Overall sample [n = 38,410]

Variable*	Mean	Std. Dev
lnwage	3.008942	0.6068308
med	0.8210362	0.383327
lifeins	0.7299401	0.4439963
matlv	0.7382713	0.4395814
retire	0.7504035	0.4327851
male	0.4930227	0.4999578
size1	0.56415	0.4958742
size2	0.2450404	0.4301167
size3	0.1908097	0.3929445
union	0.1837022	0.3872462

Panel B: Female sample disaggregated by firm size

	Size 1 [n = 10,941]		Size 2 [n = 4,900]		Size 3 [n = 3,632]	
Variable*	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
lnwage	2.780453	0.5692795	2.923477	0.5049668	3.140689	0.5278633
med	0.7137373	0.4520343	0.9234694	0.2658723	0.9570485	0.2027758
lifeins	0.5965634	0.4906093	0.8689796	0.3374571	0.9256608	0.2623582
matlv	0.6906133	0.4622619	0.902449	0.2967369	0.935848	0.2450572
retire	0.6377845	0.4806626	0.874898	0.3308683	0.9369493	0.2430875
union	0.1332602	0.3398713	0.2220408	0.4156609	0.2029185	0.4022277

Panel C: Male sample disaggregated by firm size

	Size 1 [n = 10,728]		Size 2 [n = 4,512]		Size 3 [n = 3,697]	
Variable*	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
lnwage	3.021332	0.6176835	3.197392	0.5827661	3.403039	0.5945923
med	0.7324758	0.4426887	0.9481383	0.2217723	0.9710576	0.1676673
lifeins	0.6016033	0.4895908	0.8882979	0.3150345	0.9272383	0.2597801
matlv	0.5542506	0.4970713	0.8368794	0.3695166	0.8812551	0.3235319
retire	0.6185682	0.4857608	0.891844	0.3106118	0.9453611	0.2273048
union	0.1390753	0.3460412	0.2641844	0.4409468	0.2945632	0.4559078

***Definitions**:

lnwage = natural logarithm of hourly wage
med = 1 if medical/ health insurance is offered/ provided by the employer, 0 otherwise
lifeins = 1 if life insurance is offered/ provided by the employer, 0 otherwise
matlv = 1 if maternity (paternity) leave is offered/ provided by the employer, 0 otherwise
retire = 1 if retirement plan is offered/ provided by the employer, 0 otherwise
male = 1 if gender of the respondent is male, 0 otherwise
size1 = 1 if employed in a firm with 1-100 workers; 0 otherwise
size2 = 1 if employed in a firm with 101-499 workers; 0 otherwise
size3 = 1 if employed in a firm with 500 or more workers; 0 otherwise
union = 1 if belongs to a union, 0 otherwise

Table IV: Summary Random Effects GLS regression results [dependent variable: 'lnwage']

Number of observations = 38,410

Wald $\chi^2_{(46)}$ = 6897.59 [Prob $\chi^2 > = 0.000$]

Overall $R^2 = 0.4376$

Female				**Male**			
Variable	**Coefficient Estimate**	**z**	**P > |z|**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**
$Size_2$	.0732956 [**S**]	9.02	0.000	$Size_2$ + $Msize_2$	.2945569 [**S, +M**]	22.09	0.000
$Size_3$	.1305653 [**S**]	12.60	0.000	$Size_3$ + $Msize_3$	.3387324 [**S, +M**]	22.32	0.000
$Union_1$	.0732921 [**T**]	4.80	0.000	U_1 + MU_1	.1327387 [**T, +M**]	9.10	0.000
$Union_2$	.0546328 [**T**]	3.40	0.001	U_2 + MU_2	.0893005 [**T, +M**]	5.54	0.000
$Union_3$	.0225369 [**T**]	1.22	0.224	U_3 + MU_3	.0780349 [**T, +M**]	3.58	0.000

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage [+M] Male Advantage

Variable definitions:

$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise

$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise

U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise

U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise

U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise

M = 1 if an observation belongs to a male, 0 otherwise

$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$

$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Table V: Summary Random Effects Logistic regression results [dependent variable: 'med']

Number of observations = 38,410

Wald $\chi^2_{(46)}$ = 2339.35 [Prob $\chi^2 > = 0.000$]

Log likelihood = -11300.359

Female					**Male**				
Variable	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [5]**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [10]**
Size2	1.784054 **[S]**	14.58	0.000	.0445208	Size2 + Msize2	2.753494 **[S, +M]**	18.02	0.000	0.0687768
Size3	2.079708 **[S]**	13.18	0.000	.0451888	Size3 + Msize3	3.097296 **[S, +M]**	15.92	0.000	0.0697861
U1	1.972468 **[T]**	9.35	0.000	.0352149	U1 + MU1	2.279024 **[T, +M]**	10.67	0.000	0.0444609
U2	.7510283 **[T, +F]**	2.97	0.003	.0192597	U2 + MU2	.6577207 **[T]**	2.16	0.030	0.0159252
U3	1.054668 **[T, +F]**	3.08	0.002	.0240043	U3 + MU3	.3630587 **[T]**	0.97	0.330	-0.0084488

** Marginal probability reported in columns [5] and [10] is derived as $\partial P_{it}/\partial X_{j,it} = [\beta_{X_j} * P_{it}(1 - P_{it})]$ evaluated at gender specific sample means.

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage [+M] Male Advantage

Variable definitions:

$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise

$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise

U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise

U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise

U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise

M = 1 if an observation belongs to a male, 0 otherwise

$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$

$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Table VI: Summary Random Effects Logistic regression results [dependent variable: 'retire']

Number of observations = 38,410

Wald $\chi^2_{(46)}$ = 2776.33 [Prob $\chi^2 > = 0.000$]

Log likelihood = -13634.874

Female					**Male**				
Variable	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [5]**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [10]**
Size2	1.698823 **[S]**	16.73	0.000	.1079402	Size2 + Msize2	2.157687 **[S, +M]**	17.52	0.000	0.1418998
Size3	2.382283 **[S]**	16.70	0.000	.1255947	Size3 + Msize3	2.824895 **[S, +M]**	18.07	0.000	0.1582535
U1	1.822086 **[T]**	9.74	0.000	.0876615	U1 + MU1	2.282142 **[T, +M]**	12.60	0.000	0.1206793
U2	.5754552 **[T]**	2.61	0.009	.0399949	U2 + MU2	.6743239 **[T, +M]**	3.12	0.002	0.0481021
U3	.2023386 **[T]**	0.72	0.472	.0159967	U3 + MU3	.4961579 **[T, +M]**	1.75	0.080	0.0383594

** Marginal probability reported in columns [5] and [10] is derived as $\partial P_{it}/\partial X_{j,it} = [\beta_{X_j} * P_{it}(1 - P_{it})]$ evaluated at gender specific sample means.

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage; [+M] Male Advantage

Variable definitions:

$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise

$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise

U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise

U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise

U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise

M = 1 if an observation belongs to a male, 0 otherwise

$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$

$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Table VII: Summary Random Effects Logistic regression results [dependent variable: 'lifeins']
Number of observations = 38,410
Wald $\chi^2_{(46)}$ = 2669.13 [Prob $\chi^2 > = 0.000$]
Log likelihood = -14503.12

Female					**Male**				
Variable	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [5]**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [10]**
Size2	1.738158 **[S]**	17.08	0.000	.1373259	Size2 + Msize2	2.349445 **[S, +M]**	18.78	0.000	0.191476
Size3	2.278795 **[S]**	16.53	0.000	.1528999	Size3 + Msize3	2.892729 **[S, +M]**	18.78	0.000	0.2066806
U1	1.672488 **[T,+F]**	10.25	0.000	.1059665	U1 + MU1	1.621737 **[T]**	10.05	0.000	0.1005103
U2	.2618578 **[T]**	1.36	0.174	.0253305	U2 + MU2	.3249007 **[T, +M]**	1.61	0.108	0.0318408
U3	.2218899 **[T, +F]**	0.88	0.377	.0217097	U3 + MU3	-.1931341 **[T]**	-0.85	0.398	-0.0290353

** Marginal probability reported in columns [5] and [10] is derived as $\partial P_{it}/\partial X_{j,it} = [\beta_{X_j} * P_{it}(1 - P_{it})]$ evaluated at gender specific sample means.

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage; [+M] Male Advantage

Variable definitions:
$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise
$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise
U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise
U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise
U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise
M = 1 if an observation belongs to a male, 0 otherwise
$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$
$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Table VIII: Summary Random Effects Logistic regression results [dependent variable: 'matlv']

Number of observations = 38,410

Wald $\chi^2_{(46)}$ = 2864.02 [Prob $\chi^2 > = 0.000$]

Log likelihood = -15715.717

Female					**Male**				
Variable	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [5]**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [10]**
Size2	1.625819 **[S, +F]**	17.24	0.000	.1504349	Size2 + Msize2	.7906795 **[S]**	7.99	0.000	0.0246412
Size3	1.92591 **[S, +F]**	16.24	0.000	.158093 .1150991	Size3 + Msize3	1.129472 **[S]**	9.56	0.000	0.0380007
U1	1.480953 **[T, +F]**	9.13	0.000	.0307467 .042113	U1 + MU1	1.336084 **[T]**	9.74	0.000	0.0967107
U2	.2775692 **[T]**	1.45	0.147		U2 + MU2	.7704719 **[T, +M]**	4.57	0.000	0.0811628
U3	.3963427 **[T, +F]**	1.68	0.094		U3 + MU3	.2638082 **[T]**	1.39	0.163	0.0253415

** Marginal probability reported in columns [5] and [10] is derived as $\partial P_{it}/\partial X_{j,it} = [\beta_{X_j} * P_{it}(1 - P_{it})]$ evaluated at gender specific sample means.

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage; [+M] Male Advantage

Variable definitions:

$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise

$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise

U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise

U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise

U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise

M = 1 if an observation belongs to a male, 0 otherwise

$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$

$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Robustness Check

Table IX: Summary Random Effects GLS regression results [dependent variable: 'lnwage'] if the number of observations per respondent is at least 3:
Number of observations = 35,847
Wald $\chi^2_{(46)}$ = 6037.48 [Prob $\chi^2 > = 0.000$]
Overall $R^2 = 0.4384$

Female				**Male**			
Variable	**Coefficient Estimate**	**z**	**P > |z|**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**
Size2	.0721106 [S]	8.71	0.000	Size2 + Msize2	.2855008 [S, +M]	20.37	0.000
Size3	.1264671 [S]	11.85	0.000	Size3 + Msize3	.3349635 [S, +M]	21.24	0.000
Union1	.0645717 [T]	4.14	0.000	U1 + MU1	.1328275 [T, +M]	8.86	0.000
Union2	.0492918 [T]	3.01	0.003	U2 + MU2	.0893769 [T, +M]	5.45	0.000
Union3	.0155059 [T]	0.82	0.412	U3 + MU3	.0688341 [T, +M]	3.12	0.002

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage; [+M] Male Advantage

Variable definitions:
$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise
$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise
U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise
U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise
U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise
M = 1 if an observation belongs to a male, 0 otherwise
$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$
$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$

Table X: Summary Random Effects Logistic regression results [dependent variable: 'med'] if the number of observations per respondent is at least 3:

Number of observations = 35,847

Wald $\chi^2_{(46)}$= 2017.37 [Prob $\chi^2 > = 0.000$]

Log likelihood = -9974.6658

Female					**Male**				
Variable	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [5]**	**Variable**	**Coefficient Estimate**	**z**	**P > |z|**	****Marginal Probability [10]**
Size2	1.784398 **[S]**	13.57	0.000	.035936	Size2 + Msize2	2.75771 **[S, +M]**	16.62	0.000	0.0554452
Size3	2.021638 **[S]**	11.96	0.000	.0357967	Size3 + Msize3	3.106499 **[S, +M]**	14.74	0.000	0.0564086
U1	2.07367 **[T, +F]**	8.80	0.000	.0288769	U1 + MU1	2.220134 **[T]**	9.84	0.000	0.0326668
U2	.6585562 **[T, +F]**	2.53	0.011	.0140083	U2 + MU2	.4644667 **[T]**	1.49	0.310	0.0081746
U3	1.125685 **[T, +F]**	3.03	0.002	.0200095	U3 + MU3	.1507877 **[T]**	0.40	0.943	-0.0223418

** Marginal probability reported in columns [5] and [10] is derived as $\partial P_{it}/\partial X_{j,it} = [\beta_{X_j} * P_{it}(1 - P_{it})]$ evaluated at gender specific sample means.

[S] Size Effect; [T] Union Threat Effect; [+F] Female Advantage; [+M] Male Advantage

Variable definitions:

$Size_2$ = 1 if worker belongs to a firm with 101-499 workers, 0 otherwise

$Size_3$ = 1 of worker belongs to a firm with 500 or more workers, 0 otherwise

U_1 = 1 if worker is a union member of an establishment 0-100 workers, 0 otherwise

U_2 = 1 if worker is a union member of an establishment 101-499 workers, 0 otherwise

U_3 = 1 of worker is a union member of an establishment 500 or more workers, 0 otherwise

M = 1 if an observation belongs to a male, 0 otherwise

$MSize_2 = (M \times Size_2)$; $MSize_3 = (M \times Size_3)$

$MU_1 = (M \times U_1)$; $MU_2 = (M \times U_2)$; $MU_3 = (M \times U_3)$