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New Evidence from the Americas

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Abstract

Using a common methodology, the effects of unions on wage levels and wage dispersion are estimated for two neighboring countries, Bolivia and Chile, and for the U.S. The analysis shows that unions have broadly similar effects on the wage distribution within these three economies. The findings suggest that the political economy of unions, coupled with market constraints on labor costs, produce commonality in union wage effects that transcend other economic and institutional differences.

Keywords: Unions, wages, wage dispersion, Latin America

JEL codes: J31 (Wage Level and Structure), J51 (Trade Unions)

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Introduction

There is a large empirical literature estimating the effects of labor unions on wages in developed countries. Two clear-cut results emerging from this literature are that (1) unions increase wages for their members relative to similar nonunion workers and (2) wage dispersion is reduced in union workplaces. Most of this literature has focused on the U.S. or other developed countries possessing stable institutions, similar production technologies, and roughly similar levels of physical and human capital. Less clear in the literature is how unions affect wages outside the western world and in less developed economies. Results seen for the U.S. need not apply to countries with different economic and institutional attributes, in particular, the political and legal framework in which unions operate and the level of economic development.

This paper provides new evidence on the impact of unions on wage gaps and inequality for Bolivia and Chile, two neighboring countries in Latin America at different stages of economic development and which have received little prior attention from economists. Both countries have had historically strong union organizations deeply involved in the political development of their countries (Alexander and Parker 2005; Ulloa 2003) and have similar union density (between 13-14%) in their formal labor markets. At the same time, these countries have clear-cut differences in their legal frameworks, the size of the informal sector, and the overall level of development and inequality, with Chile being more developed than is Bolivia

To analyze the effect of unions on the wage distributions of these countries, we use recent household data and apply the decomposition methodology introduced in Firpo, Fortin, and Lemieux (2007) to measure and decompose union-nonunion wage differences into those due to the wage structure (coefficients) and measured endowments. Union wage gaps are identified at the mean and throughout the distribution (quantiles), while union effects on inequality are identified using measures of variance and inter-quantile gaps. For comparison, estimates are provided for the U.S. using identical methods and similar household data.

The results show that unions have broadly similar impacts on the wage distributions in Bolivia and Chile, which in turn are similar to those found for the U.S. and in the larger literature for developed countries. Specifically, we find average union wage gaps between 0.12 and 0.14 log points. In both countries, the estimated gaps are similar throughout much of the distribution before falling off in the right tail. Despite differences between the countries in the degree of wage inequality and (unadjusted) union-nonunion differences, estimates of union effects on wage variance (and other measures) across the countries are highly similar. Unions appear to affect the overall wage structures similarly in Bolivia and Chile. Compared to the U.S., we find identical qualitative patterns of union wage effects in Bolivia and Chile, but with somewhat lower union wage gaps than in the U.S.

In what follows, we provide a brief overview of theory and prior literature, followed by a description of the history and legal framework for unions in Bolivia and Chile. We then describe data sources and our methodological strategy, followed by presentation and analysis of results. Reasons for the similarity in results across the Bolivia, Chile, and the U.S. are discussed in a concluding section.

How Do Unions Affect Wages?

Labor unions are employee associations whose primary purpose is to improve their members' well-being. In most countries, labor law provides them with rights to organize and, if successful, with protected and exclusive bargaining rights to negotiate and establish collective contracts with their employers. In doing so, unions affect the level and distribution of wages and benefits, along with other aspects of the workplace (e.g., governance, economic performance).[1]

There is a strong consensus that standard union wage gap estimates fall in the range of 10-20% (Fuchs, Krueger, and Poterba 1998; Jarrell and Stanley 1990; Lewis 1986). Given that union status is not randomly determined, there is less of a consensus that standard estimates provide causal measures of union wage effects. Selection methods modeled on Lee (1978) and other early work provided highly variable and sometimes implausible estimates of union wage effects (see Lewis 1986). In retrospect, this

[1] A large literature examines "what unions do." For a comprehensive overview, see the invited papers in Bennett and Kaufman (2007), organized for the twentieth anniversary of Freeman and Medoff's (1984) *What Do Unions Do?*

is not surprising. It has proven difficult to identify measurable factors that affect the probability of union membership but not the wage (i.e., independent of a wage equation error term) similarly throughout the distribution. Selection into unionism can vary across the wage distribution, with positive selection by employers toward the bottom of the distribution, negative selection by workers in the right tail of the distribution, and perhaps little selection on average and toward the middle of the distribution (e.g., Abowd and Farber 1982; Card 1996). Concern that employers fully offset union wage increases through "skill upgrading" need not follow in theory (given repeated bargaining) or practice (Wessels 1994; Hirsch 2004). On balance, selection may not produce substantial bias in estimates of average union wage effects or in union wage gaps toward the middle of the distribution. The reliability of union gap estimates in the tails of the distribution is far less certain.

Selection also has been addressed through use of longitudinal models identifying union gaps based on wage changes among those switching between union and nonunion jobs. As shown by Freeman (1984), because true union status changes over brief time periods are infrequent, estimates of union gaps are severely attenuated by even a small degree of measurement error in union status. Card (1996) provides an explicit adjustment for measurement error in union status and obtains panel estimates that on average are similar to OLS wage level estimates. Hirsch and Schumacher (1998) adopt sample restrictions that exclude a large share of falsely-recorded union switchers and obtain panel wage gap estimates only modestly lower than standard gaps. Whereas wage level union gap estimate decrease sharply moving from the left to right tail of the wage distribution, both Card and Hirsch-Schumacher find a far weaker pattern based on panel estimates, consistent with positive selection in the left tail, negative selection in the right tail, and weak selection on average.

Recent papers have provided what are arguably causal estimates of union effects using a regression discontinuity (RD) design based on a comparison before and after union elections decided by a tiny margin. DiNardo and Lee (2004) find few short-run differences in outcomes – wages, productivity, or otherwise – in establishments with close union wins versus close losses. Because one does not directly observe whether or not a first contract was obtained, this is more a test of the effects of union representation than collective bargaining coverage. A subsequent paper by Lee and Mas (2012) extends and improves the data set developed in DiNardo and Lee and examines the effects of elections on firm market value (abnormal returns). They confirm the result that there is little short-run effect comparing firms with close union wins and losses, but they find substantial negative effects on market valuation when they extend the time horizon to 15-18 months following unionization and when they examine union wins based on large rather than small margins.

Frandsen (2012) builds on the approach of DiNardo-Lee, but matches election data to establishments and household (employee) records (non-public data accessed through a Census Research Data Center). He is able to compare workers' earnings (but not hourly wages) in the year prior to and following closely won versus closely lost certification elections. Frandsen finds small wage effects at the middle of the earnings distribution, large wage effects in the left tail of the distribution and negative effects at the top of the distribution, supporting prior evidence of union wage compression. He finds suggestive evidence that some of the lower-tail compression occurs through employment declines among lower wage workers, suggesting loss of employment for workers not in the covered bargaining unit and consistent with skill upgrading immediately following unionization.

Each of these papers have (inherent) data limitations but, taken together, they appear to indicate that the short-run union effects from closely-won versus closely-lost elections are quite modest (these are elections where a quick first-contract may be least likely), that union wage effects differ across the distribution so as to compress wages, that union effects take time to evolve, and that unions have larger effects where union sentiment among workers (measured by votes) is strong.

Unions have a theoretically ambiguous impact on wage dispersion, although U.S. evidence clearly points to a net effect in which unions decrease dispersion across the economy and within establishments, particularly so for men (Freeman 1980). Unions affect dispersion in at least four ways. First, even if unions increase wages by the same proportion throughout the wage distribution, thus having no effect on union wage dispersion, aggregate dispersion can increase or decrease depending on whether workers' wages on balance are pushed away from or toward the middle of the distribution. Second, unions reduce managerial discretion over pay and standardize wages within collective bargaining contracts based on position and seniority (Freeman 1980), thus reducing dispersion among workers with similar measured attributes. Third, unions may narrow pay differentials from top to bottom, thus reducing the returns (the β's) associated with measured and unmeasured proxies for skill (e.g., schooling). And fourth, the production technology within many unionized establishments, coupled with standardized pay, may attract workers who have relatively similar abilities (but not fully reflected by measurable attributes). In short, union establishments have relatively homogeneous workforces. Empirically, one can account for and identify the extent to which unions have higher or lower wage dispersion owing to measurable differences in worker and job endowments (referred to subsequently as "composition effects").

Evidence from the U.S. clearly establishes that unions reduce wage inequality within establishments, within the union sector, and across the economy, more so for men than for women (Freeman 1980, 1982; Hirsch 1982; Card 2001; Card, Lemieux, and Riddell 2004; Frandsen 2012). Lower union dispersion is due in part to unobserved heterogeneity, as emphasized in studies using panel data methods (Card 1996; Lemieux 1998). A related literature has arisen estimating how much of the economy-wide growth in wage inequality has resulted from the decline in private sector unionism, with estimates ranging as high as a quarter (Frandsen 2012), although generally lower (DiNardo, Fortin, and Lemieux 1996; Card 2001).

The literature on the economic effects of unions in developing economies is sparse, primarily because of limited data. In a recent overview of economic development and labor market institutions, Freeman (2010) summarizes what are rather variable results on unions and wages in developing economies. For example, studies of African economies report negative union wage gaps in Ghana, Senegal, and Zimbabwe. Freeman (2010) suggests that negative gaps are implausible and hypothesizes that unions in these countries are not standard unions, but may be political worker fronts whose workers are suffering political pressures. In contrast, Shultz and Mwabu (1998), analyzing survey data for South Africa, report that African union workers earn between from 19% to 145% more than comparable nonunion workers, while estimated wage gaps for white workers are -24% to 21%.

Existing studies of Latin America suggest positive but modest union wage effects. Cassoni, Labadie, and Fachola (2005) and Arbache and Carneiro (1999) obtain union wage gap estimates below 10% for Uruguay and Brazil, respectively. In contrast to the literature from developing countries, Arbache (1999) finds union coverage in Brazilian manufacturing during the early 1990s to be positively correlated with wage dispersion, which he suggests is related to unmeasured heterogeneity between union workers across different sectors of the economy.[2]

This paper contributes to the literature in two principal ways. First, it provides new evidence on both the average union effect on wages and union effects throughout the wage distribution for two developing countries, Bolivia and Chile. To the best of our knowledge, there has been no formal analysis of these topics for Bolivia, while the study of unions and wages in Chile has been quite limited (Landerretche, Lillo, and Puentes 2011). A second contribution is that the study uses similar data and a common methodology and time period for three countries, Bolivia, Chile, and the U.S., thus providing a reliable cross-country analysis, albeit one limited to these three countries.

Unions and the Economies in Bolivia and Chile: History and Legal Background

Bolivia and Chile are neighboring South American countries. Both were Spanish colonies with much in common in their heritage and history. These countries inherited from their colonial past large extractive and agricultural sectors, which in turn influenced the early development of their economies and labor organizations. Both suffered periods of dictatorship. And both faced debt crises that affected their economic development from the 1970s through the early 1990s. During these years, unions developed into political agents that played a crucial role, often acting outside the law, representing, organizing and defending the working class against the dictatorship (Alexander and Parker 2005; Ulloa 2003).

Despite their common experiences, the two countries followed somewhat different economic paths (Quiroga 2010). After the debt crisis during the 1980s, both countries tried to promote economic

[2] The edited volume from Kuhn and Márquez (2005) provides a number of excellent economic studies on unions and performance in Latin America. The Cassoni, Labadie, and Fachola study, using data from Uruguay, is the only paper with an emphasis on wage effects, with other papers in the volume focused on union density, teachers unions, and aspects of economic performance other than wages.

development thorough policies of industrialization, import substitution, and open market economies (Edwards 1989). Chile was relatively successful in producing a strong industrial sector and creating well-functioning institutions that facilitated transition to a largely free market economy. Bolivia was less successful establishing an environment that supported such a transition.

Chile has one of the largest economies in the region, with GDP per capita in 2009 of $6,077 (in U.S. dollars), almost six times GDP per capita in Bolivia ($1,203), ranked among the poorest in Latin America. Only 15% of the population in Chile is below the poverty line, compared to more than 60% in Bolivia. Both countries have high levels of inequality, Bolivia with a Gini index for family income of 0.56 in 2008 and Chile 0.52 in 2009 (World Development Indicators 2011). The most fundamental difference in their economic structure may be the size of their informal sectors. Gasparini and Tornaroli (2009) estimate that about 65.5% of the workforce in Bolivia was informal in 2002, compared to 37.5% in Chile in 2003.[3] A recent paper by Ronconi (2012) examines the enforcement of labor market regulations in eighteen Latin American countries. By most measures of enforcement, Bolivia ranks very low and Chile ranks high. Cross-country regressions show that most measures of enforcement are positively related to union density, although statistical significance is low.

Bolivia and Chile are typically characterized as having had strong unions that played an active and important role in the political arena. According to Hudson and Hanratty (1991) and Carriere, Haworth, and Roddick (1989), unions in Bolivia could be considered one of the more powerful and politically active parties in Latin America. The Chilean labor movement is recognized as one of the oldest in Latin America, being perhaps the first to organize nationwide and obtain legal concessions from the state (Carrière, Haworth, and Roddick 1989; Ulloa 2003). Union participation in political activities, however, does not necessarily enhance their ability to acquire gains for their members through collective bargaining (Freeman 2010).

In both countries, organized labor emerged in various institutional forms, attempting to support and defend workers' rights and improve working conditions. Important landmarks for the countries were

[3] In Gasparini and Tornaroli (2009), workers are classified as informal if they have zero income or are unskilled workers either self-employed or employed in small private firms.

the creation of the Confederacion de Trabajadores Chilenos (CTCH) in Chile in 1936 (later replaced by the Central Unica de Trabajadores or CUT) (Alexander and Parker 2005) and the Central Obrera Boliviana (COB) in Bolivia in 1952. These union confederations centralized and organized the collective demands of unions in their countries and became key allies of the ruling political parties. Despite sharing similar roots, the COB in Bolivia in its early years was described primarily as a political player but not an effective workplace agent (Hudson and Hanratty 1991; Mansilla 1993). In Chile, however, CUT was characterized as helping workers via its role as a political agent, effectively negotiating with the state for improved social protection, wages, and working conditions (Ulloa 2003). In both countries, most bargaining by the confederations was with the state.

In the aftermath of the 1980s debt crisis in Latin America and the return of democracy, there were substantial changes in the role of unions. In Bolivia, the weakened economy and new economic model that helped the country overcome the 1980s crisis marked a decline in the COB as a powerful agent in the political and labor market arenas. The COB, however, continued its role as a collective institution attempting to protect and organize workers and represent workers in claims against the State. In Chile, after the return of democracy, a new organization was created, the *Central Unitaria de Trabajadores* (CUT), to constitute the main representative of organized labor in the country. As compared to the CTCH, CUT was more decentralized, with bargaining occurring among a large number of individual unions rather than concentrated bargaining at the national level.

The legal framework for unions is not identical in Bolivia and Chile. Both countries have ratified the International Labor Organization (ILO) convention 87 (freedom of association and protection of right to organize) and 98 (right to organize and collectively bargain).[4] According to an OECD (1996) report, however, Bolivia and Chile differ in their implementation and adherence to these principles. Although there are some restrictions to the formation of unions, Chile is characterized as having relatively easy-to-establish independent union organizations, few restrictions on strikes, and adequate safeguards for

[4] Bolivia ratified these conventions in 1965 (c87) and 1973 (c98), whereas Chile ratified them much later, in 1999. The first convention guarantees all workers the right to form unions of their own choice and for employers to form employers' organizations, while the second provides the right of unions to negotiate work conditions on behalf of workers, protecting them against acts of discrimination.

collective bargaining and protection from anti-union discrimination. In Bolivia, political interference and restrictions on association and union formation are more significant. General and solidarity strikes are considered illegal and, even though discrimination is prohibited, enforcement is regarded as inadequate and slow.

Labor law in Bolivia permits collective bargaining and binding agreements between employers and unions with respect to pay and general working conditions. These contracts must be negotiated by unions that are recognized and approved by the *Ministerio de Trabajo* (Department of Labor) and are binding for any current or future union member hired in the workplace. With respect to union recognition, Bolivian law recognizes the rights of association at different levels: workers or employers in the same firm, the same profession or occupation, or different firms or occupations that are similar or interconnected. Public officials and workers in public administration are not allowed to organize, but most public workers (e.g., teachers and the health sector) can be and are organized.[5] A union can be formed with at least 20 workers in case of multi-employer professional or craft-based unions, or at least 50% of workers for unions organized within establishments or firms. For a union to be recognized they must submit a request to and be approved by the Department of Labor, which has final authority as to whether or not a union is legally recognized. Unions are allowed to form federations or confederations in benefit of their common interests, subject to legal recognition.

In Chile, collective bargaining and contracts are recognized and can be negotiated by a group of workers regardless of their affiliation. These contracts can include negotiated agreements on pay and working conditions, as long as they do not limit employers' abilities to organize, direct, and manage the establishment or firm. The law recognizes that all workers in the private and public sectors have the right of free association in unions. As in Bolivia, Chile prohibits collective bargaining in its public administration sector. To be recognized, unions do not need any prior authorization, as long as they follow procedures dictated by law. Single-establishment unions require a minimum of 8 workers. For large establishments (50 or more workers), multi-establishment unions, and unions for independent and

[5] Because there are so few nonunion workers in what are largely public sector occupations (e.g., teachers and health workers), our empirical work is restricted to the private sector.

prospective workers, at least 25 persons are required for union formation. Unions are free to affiliate or disaffiliate with confederations, national or international.

Data and Summary Statistics

This paper uses two principal data sources. For Bolivia, we use publicly available household surveys collected annually by the National Institute of Statistics for the years 2002 through 2009.[6] Due to the sampling strategy, the surveys are not statistically independent from year to year, but are nationally representative (similar to the U.S. Current Population Survey). For Chile, the data used are from the Social Protection Surveys for the years 2002, 2004, 2006 and 2009.[7] These surveys collect detailed job characteristics and job history information for one person in each household, who is followed across years. Although the survey for 2002 was originally structured to represent workers once affiliated to the pension system, starting with the 2004 survey, they included a sample representing the labor force outside of the pension system, becoming nationally representative.

For both countries, the surveys are pooled across years to provide more information for the analysis. Because the surveys from Bolivia are not independent from year to year, and the ones from Chile have a panel component, pooling information together creates a downward bias on the standard error estimates, but should not bias coefficient estimates. To provide a representative sample of the labor force that can potentially be unionized, the sample is restricted as follows. The analysis includes employed adults in the nonagricultural private sector, between 21 and 65 years old, who can be classified as a wage and salary worker on their primary job. It excludes jobs classified as self-employed, employers, and family workers. Workers in the military and extraterritorial organizations are excluded. The final samples contain 9,614 and 17,182 workers for Bolivia and Chile, respectively.

The wage measure is highly similar to that measured in CPS monthly earnings files for the U.S. The hourly wage is measured by monthly labor earnings on the primary job, inclusive of tips, overtime,

[6] Until 2004, these surveys were collected through the *Program for the Improvement of Surveys and the Measurement of Living Conditions in Latin America and the Caribbean (MECOVI* in Spanish) with the cooperation of the World Bank. Since 2004 it has been independently carried out by the national statistical office (INE).
[7] These surveys were collected to obtain information on the labor market and the social protection system in Chile using longitudinal information. They were collected by the Universidad de Chile, and kindly provided by the Subsecretaría de Previsión Social in Chile.

and commissions, divided by average hours worked per month. The wage is measured in the local currency, adjusted for inflation using 2009 as the base year. No measure of non-wage benefits is available; hence, estimates of union wage gaps may not be accurate measures of compensation gaps.[8]

Self-identification as a union member is used to classify workers by union status. Although being a union member does not necessary imply coverage, in the absence of an alternative measure, the assumption is that members are covered. Random misclassification of union status will attenuate union wage effect estimates. Such attenuation should be minimal for cross-section estimates, but can seriously bias longitudinal estimates if few workers change union status across years, thus producing a high ratio of noise to signal (Freeman 1984).

Weighted sample means of key explanatory variables, classified by country and union status, are presented in Table 1. Bolivia and Chile have similar private sector union densities over the entire period, 12.9% and 13.8%, respectively. Chile has experienced increasing unionization over time, while in Bolivia union density appears stable, although estimates vary from year-to-year owing to modest sample sizes and survey sample frame differences in 2002 and 2007. In both Bolivia and Chile, union workers receive higher hourly wages, showing raw wage gaps of 0.27 and 0.24 log points, respectively. On average, union members work more hours and are disproportionately male, more educated, older, more experienced, and more likely married and a household head than their nonunion counterparts.

Empirical Strategy: Estimating Union Wage and Inequality Gaps

Ideally, one would like to estimate the wage effect of unions with information not only on observable union and nonunion wage distributions, but also on what those wage distributions would be absent unionization. Lewis (1986) makes the distinction between union "gaps" and "gains." Gaps measure the proportional difference between observable union and nonunion wages, generally conditional on covariates. Union gains reflect the difference between observable union wages and the unobservable

[8] In the U.S. the union-nonunion gap in health and pension benefits exceeds the gap in wages. This need not be the case in countries with federal health systems (rather than private insurance through employers) and pension systems in which there are few employer-paid supplements beyond rates mandated by the state (thus, little room for union-nonunion differences).

counterfactual of those wages in a nonunion world. If unionization were to have no effect on nonunion wages then gaps and gains would be equivalent. The presence of unions may affect nonunion as well as union wages via threat effects that increase and spillover effects that decrease nonunion wages. As in much of the literature, this paper estimates union wage gaps but not gains.[9]

The impact of unions on the wage distribution is analyzed using four measures. Estimates of relative union-nonunion wages are shown using mean wage gaps, conditional on covariates, as in Lewis and much of the subsequent literature, as well as by recentered quantile wage gaps that show how (and if) union effects differ across the wage distribution. To examine how unions affect wage dispersion (inequality), we provide estimate of union-nonunion differences in the log wage variance and in inter-quantile gaps. Variance estimates, used in prior studies, provide a summary measure of the union impact on inequality. Inter-quantile gaps provide useful information on where in the wage distribution unions most affect inequality, with the added advantage of being relatively insensitive to values in the tails of the distribution.[10]

To evaluate and decompose the estimated union gaps, the methodology proposed by Firpo, Fortin and Lemieux (2007) (hereafter FFL) is applied. This methodology, a generalization of the Blinder-Oaxaca decomposition approach (Oaxaca 1973), involves two steps. The first step involves construction of an appropriate counterfactual distribution with which the observed union and nonunion wage distribution can be compared, coupled with a decomposition of the union gap distributional statistic (v) into portions explained by measured differences in worker, job, and location endowments (a “composition” effect) and by differences in the coefficients or “returns” on the observables (a “wage structure” effect). The latter provides a measure of the union effect, conditional on covariates.

[9] Union density (at the industry or occupation level) can be included in wage equations to approximate “gains” from unionization. Lewis (1986) is skeptical of such results, arguing that density serves as a proxy for employer size and other wage correlates. In work not shown, industry and occupation union density enter positively in both union and nonunion wage equations for Bolivia and Chile. The coefficients decrease in magnitude when employer size is added.
[10] Household data are generally uninformative regarding wages in the far left and right tails of the wage distribution, due primarily to reporting and other forms of measurement error in the tails and because of top coding of high values often used by statistical agencies. In our analysis, a small number of individuals with extreme low and high wage values were dropped.

Although the counterfactual wage distribution cannot be directly observed, FFL (2007) show that under the assumptions of ignorability (conditional on measured covariates) and overlapping support of the covariates, the counterfactual distribution of wages that union workers would have if they were nonunion can be constructed. They do so using a reweighting procedure, where any distributional statistic from the counterfactual distribution is estimated using a weight equal to $\widehat{\omega_c}(X) = \frac{\hat{p}(X)}{1-\hat{p}(X)}$, where $\hat{p}(X)$ is the estimated probability (propensity) of being a union worker conditional on X, the vector of characteristics that determine wages. Once the counterfactual statistic is found, the overall wage decomposition can be estimated as follows:

$$\Delta v = v_u - v_n = \underbrace{(v_u - \hat{v}_c)}_{\Delta S_v: Wage\ structure\ effect} + \underbrace{(\hat{v}_c - v_n)}_{\Delta X_v: Composition\ effect} \quad (1)$$

where Δv is the overall union gap on the distributional statistic v, v_u and v_n are the statistics corresponding to the observed union and nonunion wage distributions, and $\hat{v}_c$ is the estimated statistic of the counterfactual wage distribution.

The second step uses the novel "recentered influence function" (RIF) regression to obtain an approximation of the contribution of the observed variables to the composition and wage structure effects.[11] An RIF-regression is similar to a standard regression, except that instead of using the dependent variable, in this case log(wages), it uses the recentered influence function of the statistic of interest associated with that observation $RIF(w_{i,k}; v_k)$. The RIF function can be intuitively understood as a first order approximation of the overall contribution that each observation has on the estimation of the statistic of interest v. Once this RIF variable is estimated for each observation, it can be used to obtain a linear estimate of the average marginal effect each X has on the distributional statistic v. A linear approximation for the conditional expectation of the RIF is constructed in the form:

$$E(RIF(w_i; v)|X) = X'\gamma \quad (2)$$

from which three set of parameters are estimated:

$$\hat{\gamma}_k = \left(\sum X_{i,k}'X_{i,k}\right)^{-1} \sum X_{i,k}' \widehat{RIF}(w_{i,k}; v_k) \text{ for } k = u, n \quad (3)$$

[11] Details on the procedures used in the decomposition can be found in Firpo, Fortin and Lemieux (2007; 2009).

$$\hat{\gamma}_c = \left(\sum \widehat{\omega}_c(X_{i,n}) \times X_{i,n}{}'X_{i,n}\right)^{-1} \sum \widehat{\omega}_c(X_{i,n}) \times X_{i,n}{}' \ \widehat{RIF}(w_{i,n}; v_c) \quad (4)$$

Here $\widehat{\omega}_c(X_{i,n})$ is the implicit weight found in the first step. Using these parameters, we can define terms equivalent in spirit to an Oaxaca decomposition for any statistic v, thus providing a detailed decomposition of the wage structure and composition effects, shown below:[12]

$$\Delta S_v = X_u'(\hat{\gamma}_u - \hat{\gamma}_c) \text{ and } \Delta X_v = (X_u\hat{\gamma}_c - X_n\hat{\gamma}_n) \qquad (5)$$

Using the familiar Oaxaca terminology, the left-side "wage structure" effect is that portion accounted for by coefficient differences, whereas the right-side "composition" effect is that portion accounted for by differences in endowments.

Model Specification and Wage Gap Estimates

As described above, to estimate wage structure and composition effects it is necessary to create an appropriate counterfactual representing the wage distribution union workers would have faced in the nonunion sector. To construct this counterfactual using the RIF decomposition approach, one first obtains a propensity score $\hat{p}(X)$ using a logit model, where the dependent variable is union status and independent variables are the observed X in the wage equation. Following the literature, X contains a set of standard controls including human capital, demographic, and location characteristics (education, potential experience, broad occupation and industry, gender, ethnicity, marital status, household head designation, children in the household, and region and year fixed effects).[13]

An issue with no clear resolution is whether to include establishment size as a control. There is strong evidence that employer size (establishment and firm size) is an important determinant of wages, in part because they hire more able workers to match with higher levels of physical capital, as well as for

[12] The functional form for the RIF functions corresponding to the statistics proposed in this analysis can be found in Firpo, Fortin and Lemieux (2007).

[13] Potential experience is defined as the minimum of years since age 15 or age minus years schooling minus 6. Ethnicity is available for Bolivia but not Chile. In Bolivia, nine regions (departamentos) are designated and in Chile twelve regions and whether one's residence is in the Santiago metropolitan area. Eleven industry dummies are included for Bolivia (using the classification established in ISIC rev3) and seven for Chile (using ISIC rev2), with mining the base category in each.

other reasons not fully sorted out in the literature (Brown and Medoff 1989; Oi and Idson 1999).[14] Employer size is typically excluded from analyses of union wage effects because such data are not readily available in U.S. household data sets, and because it is difficult to disentangle the separate effects of employer size and unions on wages since the two are highly correlated (i.e., few small employers are unionized).[15] Employer size is excluded from our featured specifications in order to compare results to the broader literature, but we subsequently provide evidence on how union wage gaps vary with size.

As discussed, propensity scores from logit union status equations are used to calculate the weights that identify the counterfactual union wage distributions under a nonunion wage structure.[16] To verify that the weighting procedure appropriately identifies the counterfactual distribution, Table 2 provides statistics of the reweighted sample and the significance of differences between observed characteristics. All differences between union and nonunion workers are statistically significant in the unweighted sample (Table 1); for the reweighted sample (Table 2), none is significant.

Union Wage Gaps at the Mean and Across the Distribution

We first estimate mean and quantile union wage gaps, decomposing the total or raw gaps into portions due to a union effect on the "wage structure" (i.e., coefficient differences, including the intercept) and to a "composition effect" (i.e., endowment differences). As shown in Table 3 and Figure 1, Bolivia has a slightly higher raw union gap than does Chile, 0.27 versus 0.24. Moreover, the raw wage gaps are roughly similar over much of the wage distribution.

After identifying the counterfactual nonunion wage distribution for union workers, our estimates of the mean conditional union wage gaps (labeled the wage structure effect) are similar for the two countries, with a slightly larger premium for Chile than for Bolivia, 0.14 versus 0.12 log points. Further, these union gap estimates are similar to those found in the literature for developed countries (Jarrell and

[14] Even and Macpherson (2012) show that in the U.S. the effect of employer size on wages has declined over time.
[15] In both surveys information on establishment size is provided by workers. The designated size ranges are 1-9, 10-19, 20-49, 50-99, and 100+ workers (plus a "don't know" category, including 17% and 10% of Bolivian and Chilean workers). The 100+ size category includes 14% of workers in Bolivia and 40% in Chile. In studies accounting for employer size (Mellow 1983), union and size effects on the wage are both substantive, but not fully additive, with union-nonunion wage differences among workers in large establishments being rather modest.
[16] Although not shown, the marginal effects of the main demographic variables are available on request.

Stanley 1990; Lewis 1986). Although our principal interest are the conditional estimates of the union effect, it is informative to see that the composition effect (differences in endowments) account for sizable shares of the raw wage gaps, 0.16 of the total 0.27 in Bolivia and 0.10 of the total 0.24 in Chile.

Apart from the far right tail of the distribution, union wage effects in both countries are relatively homogeneous throughout the distribution, with some evidence that union effects are largest toward the middle of the distribution (from the 25^{th} through 75^{th} percentiles). Estimates of the median gaps (Q50) are higher than the mean gaps, 0.15 versus 0.11 in Bolivia and 0.18 versus 0.14 in Chile. For Chile, our median gap estimate is slightly lower than is the mean union gap estimated by Landerretche, Lillo, and Puentes (2011). In Bolivia, unions have an increasing but relatively homogenous effect on union wages across much of the distribution before falling sharply in the right tail of the distribution. For the upper section of the wage distribution, the union wage gap estimate falls below zero in Bolivia (an insignificant -0.06 log points). In Chile, the overall pattern is much the same, with a somewhat flatter union gap gradient before falling to an insignificant 0.04 in the upper tail.

The near zero estimates of union wage gaps in the far right tail of the wage distributions might best be explained by union pay compression, negative selection, and unmeasured worker skills. Union workers hired from the upper tail tend to have low skills compared to statistically comparable nonunion workers, skills not measured by researchers but observable to employers.

Union-Nonunion Gaps in Wage Dispersion

In addition to increasing wages, unions typically reduce wage inequality among their members by reducing wage returns with respect to measured and unmeasured worker attributes. The evidence shown in Table 3 suggests that unions have a relatively modest effect in compressing wages across the distribution, with the notable exception of the upper tail. But unions also reduce inequality by compressing or "standardizing" wages among workers with similarly measured attributes (Freeman 1980), wages being contractually determined based on job position and seniority and managers having limited discretion over individual pay.

As seen in Table 4, in the union and nonunion sectors, wage dispersion in Bolivia is nearly double that seen in Chile (and in the U.S.). The difference is readily evident comparing either the variance of log wages or the inter-quantile differences in wages (Q5010, Q9050, or Q9010). Within each country, however, the raw union-nonunion gap in inequality is remarkably small, the union sector in Chile having a 0.05 lower variance than the nonunion sector, while in Bolivia it has a 0.03 higher variance. The decomposition of variance (and percentile ratios) into union structure and composition effects is informative. Differences in worker endowments mask what are substantial and similar equalizing effects of unions on inequality in the two countries. In Bolivia, unions decrease log wage variance by an estimated 0.11, while composition differences between the union and nonunion sectors increase variance by an even larger 0.14, hence the slightly positive raw union variance gap. In Chile, the union effect is similar, decreasing variance by 0.08, while endowment differences between the union and nonunion sectors modestly increase inequality. Stated alternatively, if union workers faced the wage structure in the nonunion sector, their wage variance would be an estimated 16% higher in Bolivia and 24% higher in Chile than is currently observed. In short, unions in Bolivia and Chile have a substantial equalizing effect on wages.

An identical qualitative pattern can be seen by examining inter-quantile differences. In Bolivia, differences in worker attributes (the composition effect) would lead to substantially higher wage inequality in the union than in the nonunion sector, as seen by estimates of the composition effect on the Q9010 and Q9050 statistics. Composition effects have a similar but smaller effect in Chile. The union effect on the wage structure, however, substantially reduces inequality in Bolivia and Chile through compression from the top of the distribution. In neither country do unions have a significant effect on wage compression from the middle to the bottom of the distribution, as seen by the Q5010 statistics.

Further Insights from the Wage Decompositions

In the previous section, we have summarized the results of decompositions of union wage and inequality gaps into shares due to endowment differences (composition effects) and coefficient effects (wage structure). Each of these can be further decomposed into their component parts, although identification of the effects of each difference in X and difference in β is not without difficulty either for standard mean regressions (Oaxaca and Ransom 1999) or RIF decompositions (Fortin, Lemieux, and Firpo 2011). Because of space limitations, we provide neither detailed tables nor lengthy discussion. As noted long ago by Lewis (1986), among others, unions in the U.S. tend to "flatten" coefficients with respect to skill related factors, thus reducing wage inequality. A roughly similar tendency is found in Bolivia and Chile, although far less systematic than seen with U.S. data. Wage equation coefficients with respect to schooling, potential experience, and most (but not all) explanatory variables tend to be lower in absolute value in union than nonunion wage equations. Perhaps more interesting is how coefficients differ for union and nonunion workers across the wage distribution. Figure 2 shows how union-nonunion coefficient (wage structure) differences with respect to education and potential experience affect relative union-nonunion wages across all quantiles. Union-nonunion differences in returns to schooling clearly reduce dispersion in both Bolivia and Chile. Union workers with low schooling levels are rewarded substantially more than their nonunion counterparts; those with high levels of schooling are rewarded substantially less. In Bolivia, the differences in returns decline throughout the distribution, whereas in Chile the pattern is more variable, with the principal equalizing effect coming from low returns in the far right tail of the distribution. The general pattern found for these two Latin American economies is supportive of both a union flattening of returns and of the two-sided selection model (Card 1996) discussed previously. The evidence on unions, wage dispersion, and schooling returns is broadly similar to that found for the U.S. (Hirsch and Schumacher 1998).

Evidence on wages and experience is less clear-cut. In Bolivia, union-nonunion differences in returns to experience have little effect on the earnings distribution through about the 60th percentile, but beyond that point have a substantial equalizing effect. In Chile, relative union-nonunion returns to experience differ little across the distribution and provide minimal effects on overall wage inequality.

Employer Size and Union Wage Effects

Older U.S. data sets that included measures of employer size found that their inclusion in wage equations decreased union wage gap estimates and that union gaps were largest in small establishments and smallest in large establishments (e.g., Mellow 1983). Little evidence exists on how estimates of union wage dispersion effects are influenced by controlling for employer size.

As summarized below (complete estimates available on request), estimates of union gaps for Bolivia and Chile that control for establishment size display the same pattern as seen in U.S. data. Controlling for size reduces the Bolivian mean union wage structure effect from the estimated 0.116 shown previously to 0.077. In Chile the mean union effect estimate is cut nearly in half, from 0.139 to 0.074. In short, a sizable portion of the union wage advantage reflects a concentration of union workers among larger employers, where pay is higher for both union and nonunion workers.

Although accounting for employer size has a substantial effect on estimates of union wage gaps, it has little effect on estimates of how unions impact wage dispersion. Using the log variance measure shown previously, accounting for establishment size changes the union inequality effect in Bolivia from the previously reported -0.108 to a nearly identical -0.119. In Chile, the union inequality effect changes from -0.084 absent control for employer size to a similar -0.078 with controls.

Comparing Union Effects in the U.S. with Estimates from Bolivia and Chile

The analysis in this paper has compared evidence on union wage effects for developing Bolivia and its more developed neighbor Chile. To generalize results further, the same methodology and similar data are used to obtain estimates for the U.S.

We use data on 167,443 private sector, nonagricultural, nonstudent, wage and salary workers ages 18 to 64 from the 2007 and 2008 Current Population Survey (CPS) monthly outgoing rotation group (MORG) earnings files. We exclude observations with imputed earnings (roughly 30% of the total sample) to avoid substantial attenuation in estimates of union wage gaps and dispersion. Attenuation results from "match bias" in the Census hot deck procedure because union status is not a match criterion used to assign the reported earnings of donors to "similar" nonrespondents (Hirsch and Schumacher 2004).[17] The real wage (in 2008 dollars), is calculated as the reported straight-time wage for hourly

[17] Little information is available regarding the degree of earnings nonresponse or imputation in the Bolivian and Chilean surveys. Our understanding is that the Bolivian data include imputations based on a hot deck procedure that does not include union status. If correct, estimates of union wage effects for Bolivia are attenuated, perhaps a reason

workers who do not receive tips, overtime, or commissions (TOC) and as usual weekly earnings (inclusive of TOC) divided by usual weekly hours for all salaried workers and those hourly workers receiving TOC. For those with top-coded earnings, we assign estimated gender and year-specific mean earnings above the cap based on the assumption of a Pareto distribution above the median.[18] Union members comprise 7.4% of the CPS sample, a lower density than seen for Bolivia or Chile.[19]

In table 5, the results of reweighted RIF-regressions decompositions are shown for the U.S. and compared to those previously presented for Bolivia and Chile. The estimated mean union wage gap for the U.S. is 0.184 log points, as compared to 0.116 for Bolivia and 0.139 for Chile.[20] As seen in prior studies, union wage gaps in the U.S. tend to be higher than in most other developed economies.[21] In contrast to Bolivia and Chile, the average U.S. private sector union worker is an average worker overall, the composition effect accounting for effectively none (zero at three decimal places) of the union wage gap. Across the wage distribution, union wage structure effects take on an inverted-U shape, with estimates up to 0.26 log points at the median, but with a flat slope in the lower half of the distribution and falling steeply in the right tail.[22] These qualitative results are similar to those seen for Bolivia and Chile. In all three countries, the inverted U-shape is presumably due to some combination of union wage compression effects and two-sided selection.

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for lower union wage effect estimates than in Chile or the U.S. We have less information about the Chilean data, apart from a remark by an author using these data that imputations might improve data quality, the suggestion being that nonrespondents are not assigned earnings from a hot deck donor. Only 5% of the employed sample in Chile has missing earnings, however, implying either low nonresponse or that earnings are imputed.

[18] Pareto estimates by gender and year since 1973, calculated by Barry Hirsch and David Macpherson, are posted at http://www.unionstats.com. Estimated mean earnings for 2007-2008 are 1.7 times the cap for women and 1.85 for men.

[19] Union density rates for all U.S. private sector wage and salary workers based on the full CPS-MORG sample (inclusive of imputed earners) and the use of sample weights, were 7.5% and 7.6% in 2007 and 2008 (Hirsch and Macpherson 2012).

[20] Hirsch and Macpherson (2012) provide CPS union gap estimates for 1973 forward using a time-consistent methodology (necessitating less detailed controls than used here). They report private sector gap estimates of 0.195 and 0.186 for 2007 and 2008, respectively.

[21] If imputed earners are included in our U.S. sample, the mean private gap estimate falls from 0.18 to 0.13. Public workers now account for half of all U.S. union members. Union wage gaps from the CPS are roughly half as large among public as among private workers (Hirsch and Macpherson 2012, Table 2a). Thus, estimates of union wage gaps using CPS samples that include imputed earners and both private and public workers produce union gap estimates much lower than those shown in our paper.

[22] For earlier results along these lines, see Card, Lemieux, and Riddell (2004).

Estimates of union wage dispersion effects (the right side of Table 5) indicate that unions across the three countries have remarkably similar effects. Based on the log wage variance measure, the union compression effect is -0.079 in the U.S., as compared to -0.108 and -0.084 in Bolivia and Chile. Using the inter-quantile Q9010 measure, the US estimate is -0.156, almost identical to the estimate for Bolivia and larger than the -0.119 for Chile. As compared to Chile, American unions appear to have greater success in compressing wages from the top toward the middle of the distribution, but with more limited effects in the lower portions of the wage distribution. We cannot know how much of the differences in estimates across countries are due to selection differences not captured by measured wage covariates. A notable (but not surprising) difference between the U.S. and the two Latin American countries is that the union workforce in the U.S. is far more homogenous in measured attributes than the nonunion workforce. Thus, wages in the US union sector are compressed because of both a union effect and compressed worker attributes. In Bolivia and Chile, union effects on inequality are similar to those in the U.S., but worker attributes in their union sectors are more rather than less dispersed than in their nonunion sectors.

Conclusion

Because their history, legal structure, and economic environments differ, one might expect to have seen substantive differences between Bolivia and Chile in union effects on wages, along with sizable differences with the U.S. (and other developed economies). Although there are substantial differences among the economies in unadjusted union-nonunion wages, there is a remarkable consistency across the countries in estimates of adjusted union effects on wage levels and dispersion.

Using similar data and methodology, we find estimates of average private sector union log wage gaps of 0.12, 0.14, and 0.18 for Bolivia, Chile, and the U.S., respectively, differences that are substantive but of the same order of magnitude.[23] Unions are found to have similar and substantial effects in reducing wage inequality in the three countries, much of this the result of reducing right-tail wage dispersion.

At least in retrospect, such similarities in union effects are not surprising. In the private sector, small wage premiums may generate insufficient support from current members and fail to attract new

[23] As noted previously, some if not much of the differences among countries may reflect the impact of imputations on estimates for Bolivia and Chile.

members. If the wage premium is too high, union businesses will find it difficult to be profitable, to invest, and to be sustainable over the long run absent offsetting union effects on productivity and/or a product market environment sheltered from competition. Although sizable wage premiums attract a large queue of workers wanting union jobs, they retard the creation and sustainability of such jobs.

The results here do not imply that differences in countries' history, legal framework, institutions, and economic environments play no role in determining union behavior and outcomes. Each of these matters in ways difficult to isolate, measure, or incorporate into statistical analyses. The analysis and results in this study, however, suggest that common economic and political forces across counties with respect to unions and their impact on wages may largely transcend differences in these nations' legal and economic backgrounds.

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Figure 1: Union Wage Gaps: Quantile Decomposition

Figure 2: Quantile Decomposition Contributions to the Wage Structure Effect

Bolivia Chile

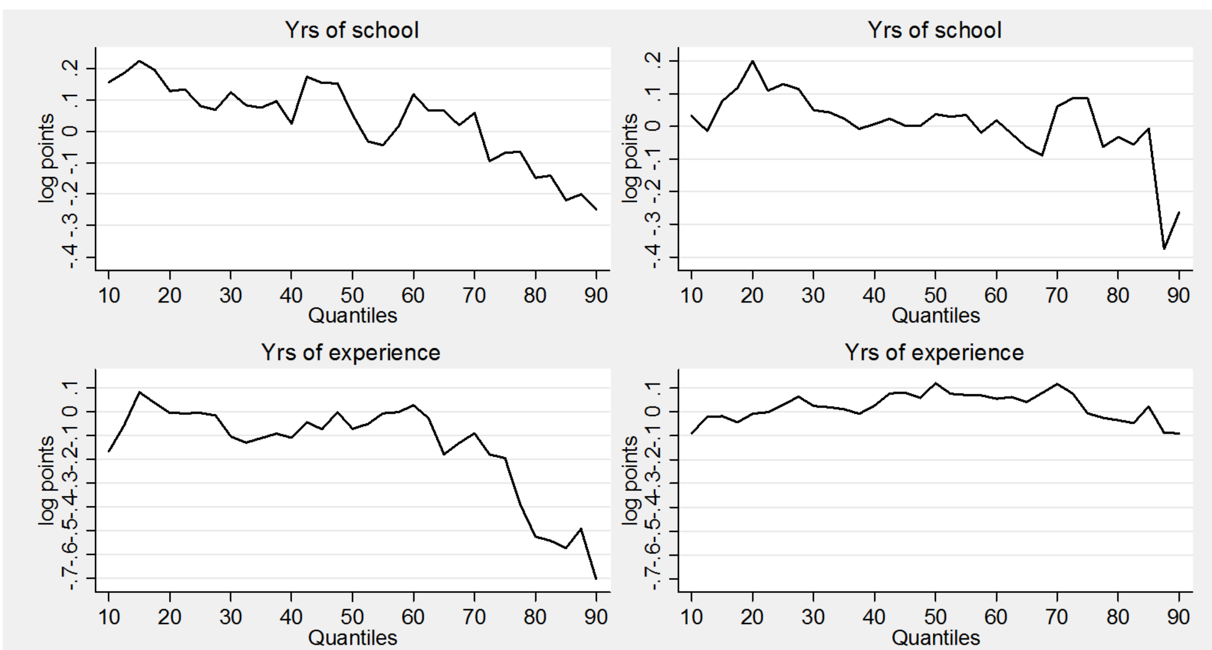

Table 1: Descriptive Statistics

	Bolivia			Chile		
	Union	Nonunion	Diff	Union	Nonunion	Diff
Log wages	1.96	1.69	0.27	7.41	7.18	0.24
	(0.83)	(0.81)	[10.81]	(0.59)	(0.63)	[17.93]
Weekly hours	52.12	50.26	1.86	46.78	46.15	0.63
	(20.01)	(18.17)	[3.08]	(10.55)	(10.93)	[2.70]
Male	0.84	0.71	0.12	0.71	0.63	0.07
	(0.37)	(0.45)	[10.80]	(0.46)	(0.48)	[6.94]
Indigenous	0.25	0.19	0.06	–	–	–
	(0.43)	(0.39)	[4.59]			
Years schooling	11.01	10.67	0.35	12.00	11.63	0.38
	(4.59)	(4.50)	[2.48]	(2.78)	(3.15)	[6.02]
Kids 0-6	0.81	0.77	0.04	0.43	0.46	-0.02
	(0.92)	(0.92)	[1.37]	(0.66)	(0.68)	-[1.6]
Kids 7-17	1.17	1.10	0.07	0.83	0.73	0.09
	(1.32)	(1.25)	[1.79]	(0.95)	(0.91)	[4.41]
Potential experience	19.17	15.96	3.21	19.49	17.48	2.01
	(10.67)	(10.90)	[9.85]	(11.53)	(11.70)	[7.88]
Married	0.78	0.65	0.14	0.62	0.54	0.08
	(0.41)	(0.48)	[10.72]	(0.48)	(0.50)	[7.35]
Household head	0.74	0.56	0.18	0.63	0.54	0.09
	(0.44)	(0.50)	[12.98]	(0.48)	(0.50)	[8.19]
N	1,456	8,158	9,614	2,473	14,709	17,182

Year	Union density	Union density
Average	12.9%	13.8%
2002	14.7%	10.9%
2004	11.1%	13.1%
2005	12.2%	–
2006	12.7%	14.3%
2007	16.4%	–
2008	12.3%	–
2009	11.5%	16.3%

Note: Standard deviations are shown in parentheses. T-statistics are shown in brackets. Statistics calculated using the sample weights.

Table 2: Descriptive Statistics with Reweighted Nonunion Sample

	Bolivia			Chile		
	Union	Nonunion	Diff	Union	Nonunion	Diff
Weekly hours	52.12	52.10	0.02	46.78	46.73	0.04
	(20.01)	(19.85)	[0.03]	(10.55)	(10.99)	[0.19]
Male	0.84	0.84	-0.01	0.71	0.70	0.00
	(0.37)	(0.36)	[0.49]	(0.46)	(0.46)	[0.21]
Indigenous	0.25	0.24	0.01	–	–	–
	(0.43)	(0.43)	[0.40]			
Years Schooling	11.01	11.07	-0.06	12.00	12.01	-0.01
	(4.59)	(4.63)	[0.41]	(2.78)	(2.92)	[0.16]
Kids 0-6yr	0.81	0.81	0.00	0.43	0.43	0.01
	(0.92)	(0.95)	[0.02]	(0.66)	(0.66)	[0.35]
Kids 7-17yr	1.17	1.16	0.01	0.83	0.82	0.00
	(1.32)	(1.25)	[0.34]	(0.95)	(0.95)	[0.13]
Potential experience	20.33	20.33	0.00	19.78	19.78	-0.01
	(11.52)	(11.43)	[0.01]	(11.92)	(11.95)	[0.03]
Married	0.78	0.79	0.00	0.62	0.62	0.00
	(0.41)	(0.41)	[0.15]	(0.48)	(0.49)	[0.26]
Household head	0.74	0.74	0.00	0.63	0.63	0.00
	(0.44)	(0.44)	[0.28]	(0.48)	(0.48)	[0.23]

Note: Standard deviations are shown in parenthesis. T-statistics are shown in brackets. Statistics calculated using sample weights. See text for discussion of the reweighting.

Table 3: Union Wage Gaps: Summary Decomposition Results

	Mean	Quantiles				
		Q10	Q25	Q50	Q75	Q90
Bolivia						
Raw gap	0.272**	0.202**	0.213**	0.267**	0.355**	0.273**
	(0.032)	(0.034)	(0.037)	(0.042)	(0.034)	(0.080)
Wage structure	0.116**	0.096*	0.124**	0.150**	0.164**	-0.062
	(0.028)	(0.044)	(0.038)	(0.033)	(0.041)	(0.077)
Composition effect	0.155**	0.106**	0.089**	0.117**	0.190**	0.334**
	(0.027)	(0.032)	(0.029)	(0.025)	(0.041)	(0.054)
Chile						
Raw gap	0.236**	0.210**	0.210**	0.276**	0.309**	0.207**
	(0.018)	(0.021)	(0.018)	(0.028)	(0.036)	(0.042)
Wage structure	0.139**	0.161**	0.171**	0.178**	0.196**	0.042
	(0.014)	(0.022)	(0.017)	(0.023)	(0.029)	(0.044)
Composition effect	0.097**	0.049**	0.039**	0.098**	0.112**	0.165**
	(0.012)	(0.011)	(0.012)	(0.014)	(0.021)	(0.032)

** p<0.01, * p <0.05.

Note: Bootstrap standard errors are shown in parentheses. Detailed decomposition results are available on request; partial results are shown in Figure 2. The identification of the wage structure and composition effect uses the specification as described in the text.

Table 4: Union Inequality Gaps: Summary Decomposition Results

		Inter-quantile		
	Variance	Q5010	Q9050	Q9010
Bolivia:				
Union	0.689	0.977	1.102	2.079
Nonunion	0.659	0.914	1.099	2.013
Total raw gap	0.030	0.065	0.005	0.070
	(0.034)	(0.045)	(0.081)	(0.082)
Wage structure	-0.108**	0.054	-0.211**	-0.157
	(0.041)	(0.049)	(0.082)	(0.083)
Composition effect	0.138**	0.011	0.217**	0.228**
	(0.028)	(0.023)	(0.046)	(0.054)
Chile:				
Union	0.349	0.576	0.902	1.478
Nonunion	0.397	0.515	0.968	1.483
Total raw gap	-0.048**	0.067*	-0.070	-0.003
	(0.017)	(0.028)	(0.040)	(0.047)
Wage structure	-0.084**	0.017	-0.136**	-0.119*
	(0.018)	(0.027)	(0.047)	(0.051)
Composition effect	0.037**	0.050**	0.067*	0.116**
	(0.011)	(0.015)	(0.029)	(0.032)

** p<0.01, * p <0.05

Note: Bootstrap standard errors are presented in parentheses. Detailed decompositions are available on request. Identification of the wage structure and composition effects uses the specification as described in the text.

Table 5: Union Wage and Inequality Gap Decompositions: U.S. as Compared to Bolivia and Chile

	Mean	Quantiles					Variance	Inter-quantile		
		Q10	Q25	Q50	Q75	Q90		Q5010	Q9050	Q9010
U.S.										
Union	3.007	2.350	2.664	3.018	3.341	3.596	0.242	0.669	0.577	1.246
Nonunion	2.820	2.103	2.338	2.737	3.204	3.657	0.392	0.633	0.920	1.553
Total raw gap	0.187**	0.253**	0.325**	0.279**	0.134**	-0.062**	-0.151**	0.026*	-0.343**	-0.316**
Wage structure	0.184**	0.191**	0.253**	0.259**	0.182**	0.035**	-0.079**	0.067**	-0.226**	-0.156**
Composition effect	0.003	0.062**	0.072**	0.020**	-0.048**	-0.097**	-0.072**	-0.042**	-0.117**	-0.159**
Bolivia										
Union	1.964	0.927	1.355	1.904	2.526	3.006	0.689	0.977	1.102	2.079
Nonunion	1.692	0.724	1.139	1.638	2.169	2.737	0.659	0.914	1.099	2.013
Total raw gap	0.272**	0.202**	0.213**	0.267**	0.355**	0.273**	0.030	0.065	0.005	0.070
Wage structure	0.116**	0.096*	0.124**	0.150**	0.164**	-0.062	-0.108**	0.054	-0.211**	-0.157
Composition effect	0.155**	0.106**	0.089**	0.117**	0.190**	0.334**	0.138**	0.011	0.217**	0.228**
Chile										
Union	7.414	6.761	6.985	7.337	7.824	8.239	0.349	0.576	0.902	1.478
Nonunion	7.178	6.547	6.761	7.062	7.518	8.030	0.397	0.515	0.968	1.483
Total raw gap	0.236**	0.210**	0.210**	0.276**	0.309**	0.207**	-0.048**	0.067*	-0.070	-0.003
Wage structure	0.139**	0.161**	0.171**	0.178**	0.196**	0.042	-0.084**	0.017	-0.136**	-0.119*
Composition effect	0.097**	0.049**	0.039**	0.098**	0.112**	0.165**	0.037**	0.050**	0.067*	0.116**

** p<0.01, * p <0.05.

Note: Bootstrap standard errors are presented in parentheses. Detailed decompositions are available on request. Identification of the wage structure and composition effects uses the specification as described in the text.