

Unions, Wage Gaps, and Wage Dispersion: New Evidence from the Americas*

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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 United States. 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.

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 (Lewis 1986). Most of this literature has focused on the United States 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 United States need not apply to countries in which unions operate under different institutional frameworks and with different levels of economic development.

This paper provides novel evidence on the impact of unions on wage gaps and inequality for Bolivia and Chile, two neighboring countries in Latin America that are at different stages of economic development. Both countries have had historically strong union organizations deeply involved in the political development of their countries (Alexander and Parker 2005; Ulloa 2003) and

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have similar union density (13 to 14 percent) 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 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 to 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 interquantile gaps. For comparison, estimates are provided for the United States 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 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 very similar. Compared with the United States, we find identical qualitative patterns of union wage effects in Bolivia and Chile, but with somewhat lower union wage gaps than in the United States.

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 three countries 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 to 20 percent (Lewis 1986; Fuchs, Krueger, and Poterba 1998; Jarrell and Stanley 1990). 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 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). 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 ordinary least squares (OLS) wage level estimates.² Whereas wage level union gap estimates decrease sharply moving from the left to the right tail of the wage distribution, both Card (1996) and Hirsch and Schumacher (1998) 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.

Due to data limitations, few papers in the union literature have applied statistical methods well designed to uncover causal relationships. DiNardo et al. (2004) use regression discontinuity methods and compare outcomes in businesses before and after very close union representation elections. They find

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?*

² 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.

few short-run differences in outcomes—wages, productivity, or otherwise—among businesses with narrow wins and losses (they do not observe whether a collective bargaining contract was achieved).³

Frandsen (2012) builds on DiNardo and Lee (2004) approach, but matches election data to establishments and household (employee) records using non-public data. He compares workers' earnings (hourly wages are not available) in the year prior to and following closely won versus closely lost elections. Frandsen (2012) finds small wage effects at the middle of the earnings distribution, large positive effects in the left tail, and negative effects in the right tail of the distribution, supporting prior evidence of union wage compression. He finds 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.

The DiNardo et al. (2004), Lee and Mas (2012), and Frandsen (2012) papers have (inherent) data limitations but, taken together, they appear to indicate that: the short-run effects from closely won union elections are quite modest (these are elections where a quick first-contract may be least likely), union wage effects differ across the distribution so as to compress wages, union effects take time to evolve, and 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 finds that unions decrease dispersion across the economy and within establishments, particularly so for men (Freeman 1980). Unions affect dispersion in at least four ways. Even if unions were to increase wages by the same proportion throughout the distribution, thus having no effect on *union* dispersion, aggregate dispersion can increase or decrease depending on whether union wages are being 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. Third, unions may narrow pay differentials from top to bottom, thus reducing the returns (the β s) associated with measured and unmeasured skill attributes (e.g., schooling). Fourth, standardized pay and the production technology within union establishments may attract workers who have relatively similar (measured and unmeasured)

³ Lee and Mas (2012) extend and improve the data set developed in DiNardo et al. (2004) and examine the effects of elections on firm market value (abnormal returns). They confirm that there is little short-run effect between firms with close elections, but find substantial negative effects on market valuation when they extend the time horizon to 15 to 18 months following elections and when they examine union wins based on large rather than small margins.

abilities. Empirically, researchers can identify the extent to which unions have higher or lower wage dispersion owing to wage equation coefficient differences and from measurable differences in worker and job endowments (referred to subsequently as “structural” and “composition” effects).

Evidence from the United States establishes that unions reduce wage inequality within establishments, within the union sector, and across the economy, more so for men than for women (Card 2001; Card, Lemieux, and Rid-dell 2004; Frandsen unpublished data; Freeman 1980, 1982; Hirsch 1982). 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 as high as a quarter (Frandsen unpublished data), but generally lower (Card 2001; DiNardo, Fortin, and Lemieux 1996).

Evidence 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. Schultz and Mwabu (1998) analyze survey data for South Africa and report highly variable union wage gaps for black and white workers.

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 percent for Uruguay and Brazil. 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.⁴

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 union effects on wages in Bolivia, while for Chile we are aware of one study focusing

⁴ The edited volume from Kuhn and Márquez (2005) provides several excellent economic studies on unions and performance in Latin America. The Cassoni, Labadie, and Fachola study (2005), 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.

on union wage effects (Landerretche, Lillo, and Puentes 2013). A second contribution is that the study uses similar data and a common methodology and time period for three countries—Bolivia, Chile, and the United States—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 faced periods of dictatorship beginning in the 1970s, which ended in the early 1980s for Bolivia and in the late 1980s for Chile. During these years, unions developed into political agents that played a crucial role—often acting outside the law—representing, organizing, and defending working class rights (Alexander and Parker 2005; Ulloa 2003). Finally, both economies were hit by debt crises in the early 1980s.

Despite these broad similarities, the two countries proceeded along rather different economic paths following the debt crises of the 1980s (Quiroga 2010). Both countries adopted stabilization and development policies intended to promote the private and export sectors, coupled with reductions in the public sector. Such changes were to be brought about through market-oriented financial reforms, trade liberalization, and greater labor market flexibility (Hudson 1994; Muriel and Jemio 2010). Chile has been more successful than Bolivia in producing a strong industrial sector and creating well-functioning institutions that facilitated long-term economic growth.

Chile has one of the largest economies in the region, with GDP per capita in 2009 of \$6077 (in constant 2000 U.S. dollars), almost six times GDP per capita in Bolivia (\$1203), ranked among the poorest in Latin America. Only 15 percent of the population in Chile is below the poverty line, compared with more than 60 percent 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 Bank 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 percent of the workforce in Bolivia was informal in 2002, compared with 37.5 percent in Chile in 2003.⁵ A recent paper by

⁵ In Gasparini and Tornaroli (2009), workers are classified as informal if they have zero income or are unskilled laborers either self-employed or employed in small private firms.

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 the creation of the Confederación de Trabajadores Chilenos (CTCH) in Chile in 1936 (replaced in 1953 by the Central Unica de Trabajadores [CUT]) (Ulloa 2003) and the Central Obrera Boliviana (COB) in Bolivia in 1952 (Alexander and Parker 2005). 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. Although many countries implemented reforms that strengthened collective labor rights, unionization rates declined generally, due in part to imperfect enforcement of labor laws but, more fundamentally, due to structural changes in the types of jobs, increased competition, and labor reforms (Anner 2008). 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* (also with

the acronym CUT), to constitute the main representative of organized labor in the country. As compared to the CTCH, CUT became more decentralized, with bargaining occurring among a large number of individual unions rather than concentrated 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) conventions 87 (freedom of association and protection of right to organize) and 98 (right to organize and collectively bargain).⁶ According to a report from the Organisation for Economic Co-operation and Development (OECD 1996), 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 collective bargaining and protection from antiunion 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.⁷ A union can be formed with at least twenty workers in case of multiemployer professional or craft-based unions, or at least 50 percent 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.

⁶ Bolivia ratified these conventions in 1965 (c87) and 1973 (c98), whereas Chile ratified them much later, in 1999. Convention 87 guarantees all workers the right to form unions of their own choice and for employers to form employers' organizations, while 98 provides the right of unions to negotiate work conditions on behalf of workers, protecting them against acts of discrimination.

⁷ 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.

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 eight workers. For large establishments (fifty or more workers), multiestablishment unions, and unions for independent and prospective workers, at least twenty-five 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, nationally representative, household surveys collected annually by the National Institute of Statistics for the years 2002 through 2009, with the samples drawn from the 2001 census.⁸ We pool the cross-sections in order to provide sufficient sample sizes throughout the earnings distribution (we include year-by-region fixed effects).

For Chile, the data used are from the Social Protection Surveys for the years 2002, 2004, 2006 and 2009.⁹ These surveys include 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, the survey included a sample representing the labor force outside of the pension system, becoming nationally representative. As with the Bolivian data, we pool the Chilean data across years and include fixed effects. Because the

⁸ 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 the national statistical office Instituto Nacional de Estadísticas (INE) has independently conducted the survey. The surveys are typically collected in November and December of each year. The 2003/2004 household surveys, however, were collected monthly from November 2003 through November 2004. Data were obtained from the INE web page at www.ine.gob.bo.

⁹ These surveys were conducted to obtain information on the labor market and the social protection system in Chile using longitudinal information. The Universidad de Chile collected these surveys, and the Subsecretaría de Previsión Social in Chile kindly provided them to us.

surveys from Chile have a panel component, pooling creates a downward bias on the standard error estimates, but should not bias coefficient estimates.¹⁰

In order to provide a representative sample of the labor force that potentially can be unionized, the sample is restricted as follows. We include 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. Excluded are individuals classified as self-employed, employers, and family workers, as well as those working in the military or extraterritorial organizations. The final samples contain 9614 and 17,182 workers for Bolivia and Chile, respectively.

The wage measure is highly similar to that used subsequently for the United States. The hourly wage is measured by monthly labor earnings on the primary job, inclusive of tips, overtime, 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 nonwage benefits is available; hence, estimates of union wage gaps may not be accurate measures of compensation gaps.¹¹

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 engaged in collective bargaining. 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 percent and 13.8 percent, respectively. Chile has experienced increasing unionization during these years, while in Bolivia union density appears stable, although estimates can vary from year to year (e.g., 2002 and 2007) owing to modest sample sizes or undocumented survey differences. In 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

¹⁰ Estimates from the Chilean data with clustering on individuals have only modestly higher standard errors than those shown based on clustering by primary sampling unit (PSU) by year. Inferences are not affected.

¹¹ In the United States, 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).

married and a household head than their nonunion counterparts. Following the election of Evo Morales as president of Bolivia in 2005, national wage growth increased. However, growth was highly similar for union and nonunion workers throughout the 2002–2009 sample period.

Empirical Strategy: Estimating Union Wage and Inequality Gaps

Our estimates of union wage gaps measure the proportional (log) differences between observable union wages and estimates of what those same

TABLE 1
DESCRIPTIVE STATISTICS

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

workers' nonunion wages would be throughout the distribution. Counterfactual nonunion wages are constructed from the sample of nonunion workers reweighted to look like union workers at each point in the distribution based on measured covariates. We show estimates of relative union–nonunion wages using mean wage gaps, conditional on covariates, as in Lewis (1986) and much of the subsequent literature, as well as by 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 estimates of union–nonunion differences in the log wage variance and in interquantile gaps. Variance estimates, used in prior studies, provide a summary measure of the union impact on inequality. Interquantile gaps provide useful information on where in the wage distribution unions most affect inequality, with the added advantage in our analysis of being insensitive to values in the tails of the distribution lower than the tenth and higher than the ninetieth percentiles.¹²

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), includes two steps. The first step involves construction of an appropriate counterfactual distribution with which the observed union and nonunion wage distribution can be compared. Subsequently, the wage distributions are used to obtain a decomposition of the union gap distributional statistic (v) into portions explained by measured differences in worker, job, and location endowments (referred to as the “composition” effect) and by differences in the coefficients or “returns” on the observables (the “wage structure” effect). The latter provides a measure of the effect of unions on wages, conditional on covariates.

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. Firpo, Fortin, and Lemieux do so using a reweighting procedure, where any distributional statistic from the counterfactual distribution is estimated using a weight equal to $\hat{w}_c(X) = \frac{\hat{p}(X)}{1-\hat{p}(X)}$, 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

¹² Household data are generally uninformative regarding wages in the far right tail (say, the top 1 percent or 2 percent) of the wage distribution, due primarily to top coding of high values to preserve confidentiality. Less is known regarding reporting error in the left tail of the distribution. In our analysis, a small number of individuals with extreme low and high wage values are dropped.

counterfactual statistic is found, the overall wage decomposition can be estimated as follows:

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

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 each of the observed variables to the composition and wage structure effects.¹³ RIF regression does so in a manner similar to that of a standard regression, except that instead of using the dependent variable directly, in this case $\log(\text{wages})$, it uses the recentered influence function of the statistic of interest associated with that observation $RIF(w_{i,k}; v_k)$.¹⁴ 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:

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

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

Here $\hat{\omega}_c(X_{i,n})$ 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:

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

¹³ Details on the procedures used in the decomposition can be found in Firpo, Fortin, and Lemieux (2007, 2009).

¹⁴ The functional form for the RIF functions corresponding to the statistics proposed in this analysis can be found in Firpo, Fortin, and Lemieux (2007: 22–24) and Fortin, Lemieux, and Firpo (2011: 74–87).

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).¹⁵

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 other reasons not fully sorted out in the literature (Brown and Medoff 1989; Oi and Idson 1999).¹⁶ 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).¹⁷ Employer size is excluded from our featured specifications

¹⁵ Potential experience is defined as the minimum of years since age 15 or age minus years schooling minus 6. For Bolivia but not Chile, a variable identifying the indigenous population is available, based on whether a native language (i.e., a language other than Spanish or a foreign language) was learned as a child. We obtain virtually identical union wage gap results when indigenous is self-identified or is defined by one’s language as an adult. 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 International Standard Industrial Classification [ISIC] rev3) and seven for Chile (using ISIC rev2), with mining the base category in each.

¹⁶ Even and Macpherson (2012) show that in the United States the effect of employer size on wages has declined over time.

¹⁷ In both surveys, workers provide information on establishment size. The designated size ranges are 1–9, 10–19, 20–49, 50–99, and 100 + workers (plus a “don’t know” category, including 17 percent and 10 percent of Bolivian and Chilean workers, respectively). The 100 + size category includes 14 percent of workers in Bolivia and 40 percent in Chile, respectively. 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.

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 weights that identify the counterfactual wage distributions of union members were they paid according to the nonunion wage structure. To verify that the weighting procedure creates an appropriate 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.¹⁸

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.,

TABLE 2
DESCRIPTIVE STATISTICS WITH REWEIGHTED NONUNION SAMPLE

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

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

¹⁸ Although not shown, the marginal effects of the main demographic variables are available on request.

TABLE 3
UNION WAGE GAPS: SUMMARY DECOMPOSITION RESULTS

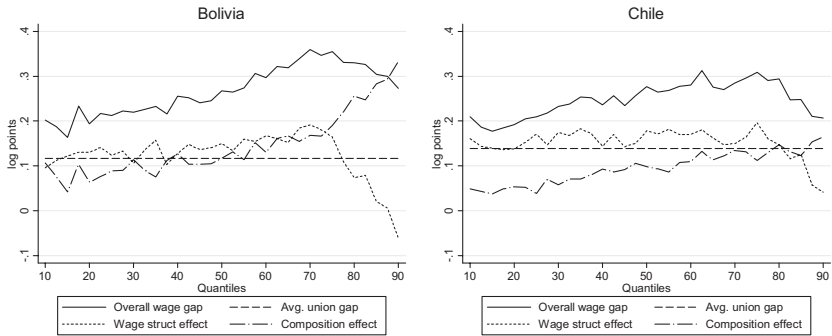
		Quantiles				
	Mean	Q10	Q25	Q50	Q75	Q90
Bolivia						
Raw gap	0.272** (0.032)	0.202** (0.034)	0.213** (0.037)	0.267** (0.042)	0.355** (0.034)	0.273** (0.080)
Wage structure	0.116** (0.028)	0.096* (0.044)	0.124** (0.038)	0.150** (0.033)	0.164** (0.041)	-0.062 (0.077)
Composition effect	0.155** (0.027)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

** $p < 0.01$, * $p < 0.05$.
NOTE: Bootstrap standard errors are shown in parentheses, clustered by PSU for Bolivia and by PSU-by-year for Chile. 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.

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. Because we are using estimated propensity scores and a two-step procedure, standard errors throughout are clustered by PSU (the primary sampling unit) for Bolivia and by PSU-by-year for Chile.

FIGURE 1
UNION WAGE GAPS: QUANTILE DECOMPOSITION



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 Stanley 1990; Lewis 1986). Although our principal interest is 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 twenty-fifth through seventy-fifth percentiles). Estimates of the median gaps (Q50) are higher than the mean gaps, 0.15 versus 0.12 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 (2013). 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 is likely to 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 with statistically similar 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. Unions also reduce inequality by compressing or “standardizing” wages among workers with similarly measured attributes (Freeman 1980), with wages being contractually determined based on job position and seniority and managers having limited discretion over individual pay.

TABLE 4
UNION INEQUALITY GAPS: SUMMARY DECOMPOSITION RESULTS

	Variance	Interquantile		
		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, clustered by PSU for Bolivia and by PSU-by-year for Chile. Detailed decompositions are available on request. Identification of the wage structure and composition effects uses the specification as described in the text.

As seen in Table 4, in both the union and nonunion sectors wage dispersion in Bolivia is nearly double that seen in Chile (and the United States). The difference is readily evident comparing either the variance of log wages or the interquantile 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 substantial and similar equalizing effects of unions on inequality in the two countries. In Bolivia, unions decrease the 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 increase inequality. In short, unions in Bolivia and Chile have a substantial equalizing effect on wages.

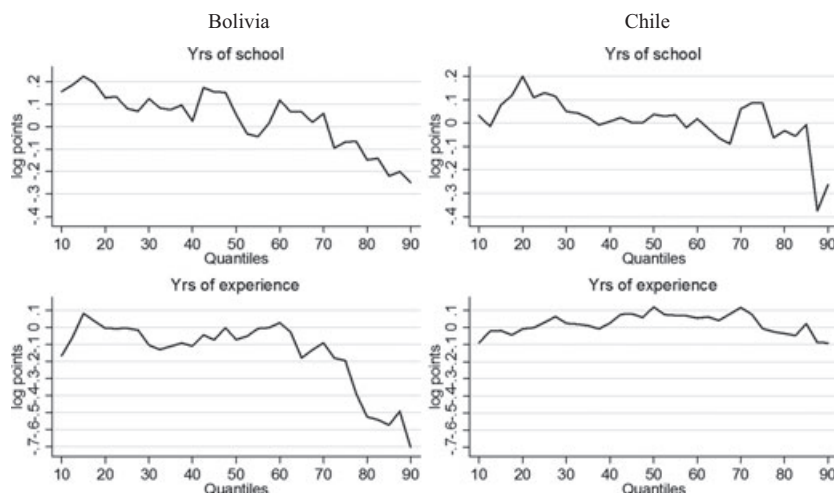
We can see an identical qualitative pattern by examining interquantile differences. In Bolivia, differences in worker attributes (the composition effect) would lead to substantially higher wage inequality in the union than in the nonunion sector, as seen by estimates of the composition effect on the 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 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 United States 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 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 (seen in the left tail of the distribution); 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

FIGURE 2
QUANTILE DECOMPOSITION CONTRIBUTIONS TO THE WAGE STRUCTURE EFFECT



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 United States (Hirsch and Schumacher 1998).

Evidence on wages and experience is less clear-cut. In Bolivia, union–non-union differences in returns to experience have little effect on the earnings distribution through about the sixtieth 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, with gaps being largest in small establishments and smallest in large establishments (e.g., Mellow 1983). Little evidence exists on how 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 (see footnote 17) 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 United States with Estimates from Bolivia and Chile

We have 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 United States.

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 percent 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).¹⁹ The real wage (in 2008 dollars), is calculated as the reported straight time wage for hourly 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

¹⁹ Public information is not readily available regarding the degree of earnings nonresponse or use of imputation in the Bolivian and Chilean surveys. Our understanding, based on a discussion with an economist at INE, is that Bolivian earnings data do not include imputed values. Rather, surveys with numerous missing responses are labeled as incomplete, excluded from the sample, and replaced with another survey. Likewise, two economists involved with the survey data in Chile told us that no imputed earnings values are included. Approximately 5 percent of the employed sample in Chile has missing earnings.

distribution above the median.²⁰ Union members comprise 7.4 percent of the CPS sample, a lower density than seen for Bolivia or Chile.²¹

In Table 5, the results of reweighted RIF-regressions decompositions are shown for the United States and compared with those previously presented for Bolivia and Chile. The estimated mean union wage gap for the United States is 0.184 log points, as compared with 0.116 for Bolivia and 0.139 for Chile. As seen in prior studies, union wage gaps in the United States tend to be higher than in most other developed economies.²² 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.²³ 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.

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 United States, as compared with -0.108 and -0.084 in Bolivia and Chile, respectively. Using the interquantile Q9010 measure, the U.S. estimate is -0.156 , almost identical to the estimate for Bolivia and larger than the -0.119 for Chile. Compared with 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 cova-

²⁰ 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.

²¹ Union density rates for all U.S. private sector wage and salary workers based on the full CPS-MORG sample and the use of sample weights were 7.5 percent and 7.6 percent in 2007 and 2008 (Hirsch and Macpherson 2012).

²² 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. 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.

²³ For earlier results along these lines, see Card, Lemieux, and Craig Riddell (2004).

TABLE 5
UNION WAGE AND INEQUALITY GAP DECOMPOSITIONS: UNITED STATES AS COMPARED WITH BOLIVIA AND CHILE

	Mean	Quantiles					Variance	Interquantile		
		Q10	Q25	Q50	Q75	Q90		Q5010	Q9050	Q9010
United States										
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: Significance levels are based on bootstrap standard errors, clustered by PSU for Bolivia and by PSU-by-year for Chile. Detailed decompositions are available on request. Identification of the wage structure and composition effects uses the specification as described in the text.

riates. A notable (but not surprising) difference between the United States and the two Latin American countries is that the union workforce in the United States is far more homogenous in measured attributes than the nonunion workforce. Thus, wages in the U.S. 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 United States, 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 have expected to see substantive differences between Bolivia and Chile in union effects on wages, in addition to differences with the United States (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 United States, respectively; differences that are substantive but of the same order of magnitude. 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.

In retrospect, such similarities in union effects are not surprising. First, our samples are restricted to sectors that potentially can be unionized, excluding the public sector, agriculture, the self-employed, and family workers. Although these restrictions are appropriate, the samples are not representative of the entire labor force in these economies, particularly Bolivia. More fundamentally, for the private sector wage and salary worker samples in these economies, small wage premiums would not generate sufficient support from current members and would fail to attract new members. If wage premiums were large, union businesses would 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 countries with respect to unions and their impact on wages may largely transcend differences in these nations' legal and economic backgrounds.

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