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# On the Determinants of Changes in Wage Inequality in Urban Bolivia

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**ABSTRACT** *In recent years, Bolivia has experienced a series of economic and political transformations that have directly affected the labor markets, particularly the salaried urban sector. Real wages have shown strong increases across the distribution, while also presenting a decrease in inequality. Using an intertemporal decomposition approach, we find evidence that changes in demographic and labor market characteristics can explain only a small portion of the observed inequality decline. Instead, the results indicate that the decline in wage inequality was driven by the faster wage growth of usually low-paid jobs, and wage stagnation of jobs that require higher education or are in traditionally highly paid fields. While the evidence shows that the reduction in inequality is significant, we suggest that such an improvement might not be sustainable in the long run, since structural factors associated with productivity, such as workers' level of education, explain only a small portion of these wage changes. This suggests that enhanced redistributive policies accompanied by long-term structural policies aimed to increase productivity and educational level should be implemented in order to maintain the trends.*

**KEYWORDS:** Bolivia, Decomposition, Wage, Inequality, RIF regression

**JEL CLASSIFICATIONS:** D63, I31, J31

## 1. Introduction

Over the past decade, inequality in Bolivia has declined sharply. Since the year 2000, the total income inequality in Bolivia fell from a Gini index of 0.63 (2000) to 0.47 (2012), with a small increase reaching 0.50 in 2014. At the same time, poverty has declined from 66% to 39% over the same period of time.<sup>1</sup> This trend is not unique in the region, as many countries exhibited similar declines in inequality over the same period, especially after the second part of the decade (Gasparini, Cruces, and Tornarolli 2011; Gasparini and Lustig 2011; Lustig, López-Calva, and Ortiz-Juarez 2013).

The existing literature suggests three explanations of these trends in inequality, which are close to the Bolivian experience: improvements in the macroeconomic environment for developing countries, establishment of larger and better conditional cash transfer programs,

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changes in the structure of the labor market, and improvement in job conditions (see Gray-Molina and Yañez 2009; Jiménez 2012; Muriel and Ferrufino 2014; Vargas and Garriga 2015). It is undeniable that labor markets play a key role in determining the evolution of inequality in Bolivia. In fact, there is compelling evidence from several countries that shows changes in labor income inequality are the most important determinants of the recent reduction in income inequality.<sup>2</sup> This is also the case for Bolivia considering that labor income accounts for around 80% of total household incomes.<sup>3</sup>

This paper aims to analyze which factors are driving the strong declines in labor income inequality experienced in the wage/salary sector in Bolivia since 2000, as workers in this sector are the ones most likely to be affected by the changes in economic policy and economic structure experienced in the country, due to the contractual nature of their labor income.<sup>4</sup> Using household survey data from 2000 to 2014, we analyze trends in wage levels and distribution among salary workers in Bolivia. A generalization of the Oaxaca-Blinder decomposition proposed by Firpo, Fortin, and Lemieux (2007) is used to determine how different factors may explain the changes observed in wage distribution over the past 12 years. Four lessons can be drawn from our results. First, we have found evidence suggesting that changes in demographic and labor market characteristics explain only a small (and insignificant) portion of the observed inequality decline. Second, most of the wage inequality decline can be explained by faster wage growth in the lower segment of the wage distribution compared to the higher segment. Third, upon closer look, the wage structure decomposition indicates that the fall in the returns on education and changes in the occupational/industry structure of the labor market have been the main contributors to the decline in wage inequality. Finally, there is a large portion of this decline that remains unexplained, which could potentially be linked to the rising minimum wage in Bolivia and other unaccounted factors. To the extent that the changes in the returns to characteristics, particularly education and occupation, are driven by short-term economic policies, these results suggest that improvements in inequality might not be sustainable in the long run. In fact, looking at the results up to 2014 indicate that the Bolivia may have stopped their progress toward inequality reduction.

Different explanations for the decline in wage inequality in Latin America have been offered. Lustig, López-Calva, and Ortiz-Juarez (2013), Fortun-Vargas (2012), Gasparini and Lustig (2011) and Lopez-Calva and Lustig (2010) suggest that the trends in wage inequality have been mainly driven by declining returns on education. Others, like Borraz and Pampillón (2011) and Bosch and Manacorda (2010), have attributed most of the decline in wage inequality to changes in the real minimum wage and to the strengthening of labor unions. Others, like Gray-Molina and Yañez (2009) and Eid and Aguirre (2013), have suggested that demographic changes, greater labor force participation, and (partially) educational improvements have significantly contributed to the decline in wage inequality. Finally, authors such as Snower (1998) and Chen, Snower, and Zoega (2003), Cornia (2014) and Cord et al. (2014) have attributed the decline in wage inequality to a structural shift in occupations and industries caused by macroeconomic shocks.

We argue that changes in the labor market are key when examining wage inequality in Bolivia for two reasons: First, Bolivia, one of the largest exporters of gas in the region, benefited from the increase in commodity prices, an increased control on the gas revenue, which has resulted in higher income and higher economic growth for the country (Muriel and Jemio 2010; Rossell Arce 2010; Kohl 2010). Second, the Bolivian government has implemented aggressive economic policies aiming to improve job conditions especially for workers at the bottom of the wage distribution, mainly driven by increases in the minimum wage, and increasing regulations in the labor market (Rossell Arce 2010; Muriel and Ferrufino 2014).

The Bolivian case is unique for a number of reasons. On one hand, Bolivia has undergone a number of significant political and economic changes that began in 2006 with the election of Evo Morales Ayma, Bolivia's first indigenous and socialist president.<sup>5</sup> The main characteristics of this government are an expansion of the public sector and the establishment of a more comprehensive social assistance system in the form of conditional cash transfers for the poor, particularly children, as well as direct transfers for certain demographic groups (e.g., the elderly and the indigenous) (Durana 2012; Fundación Milenio 2014). In addition, the significant increase in commodity prices (gas in particular) experienced over the past 10 years has led to an increase in disposable income in the country, which is reflected in better macroeconomic conditions as well as a sharp decline in poverty levels (CEPAL 2009; Rossell Arce 2010). Some empirical evidence argues that these changes have had a direct effect on labor market structure through a general equilibrium process that has led to reductions in wage inequality, especially in the formal market (Jiménez 2012), while others suggest these changes on the labor market reforms that aim to improve the working conditions of workers (Muriel and Ferrufino 2014).

There is no conclusive evidence regarding the decline in wage inequality. However, some research, such as that conducted by Jiménez (2012), argues that the macroeconomic shocks that affected Bolivia have been the main explanation for the decline in wage inequality. Other evidence presented by Hernani-Limarino and Eid (2014), Hernani-Limarino et al. (2015) as well as Landa (2002) provide similar explanations suggesting that the decline in education returns, among other characteristics, accounts for most of the wage inequality decline. These explanations are also supported by the evidence presented in this paper.

The rest of the paper is structured as follows: Section 2 briefly presents the trends in wage inequality in Bolivia. Section 3 introduces the data and methods used in the paper. Section 4 summarizes the main results, and Section 5 presents the conclusions and provides some policy recommendations.

## 2. A Decade of Wage Inequality

Labor income, also referred to as wages, is one of the most important sources of household income. On average, they represent 85% of the average Bolivian household's income. Therefore, changes in the distribution of wages have a large impact on welfare across the population (Hernani-Limarino et al. 2015; Vargas and Garriga 2015). As argued by CEPAL (2009), changes in the labor income distribution have been the main contributor to the increase (1990s) and decline (early 2000s) in income inequality in the country.

Between 1995 and 2014, Bolivia went through many political and economic changes that led to changes in the labor market conditions and macroeconomic stability of the country.<sup>6</sup> During the period 1995–1999, Bolivia went through a series of privatization reforms (so-called “second-generation” reforms) in an attempt to follow the regional trend of increasing foreign private investment. The aim of these reforms was to increase the efficiency of newly privatized companies as well as to create jobs. At the end of the 1990s and the beginning of the next decade, Bolivia was affected by international crises such those in Asia, Mexico (at the end of the 1990s), and especially Brazil and Argentina (between 1999 and 2002), yet the economy did not fall into a deep recession during this uncertain period. There is limited evidence on positive effects of privatization in Bolivia. While the reforms were effective in attracting foreign direct investment as well as increasing exports, their results were limited in terms of job creation and inequality reduction (Jemio and Choque 2006).

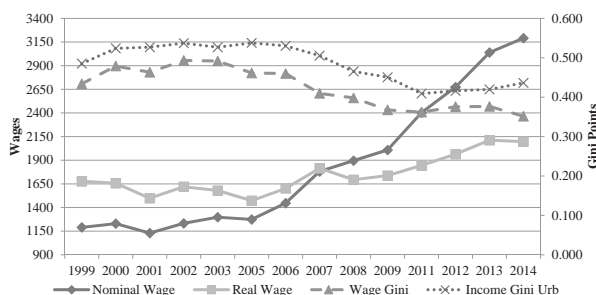
With the election of President Morales in 2006, the new government decided to completely change the economic set up through several policies that aimed to directly affect formal labor markets (Muriel and Ferrufino 2014). Initially, the government implemented a process

of nationalization of strategic companies, which were previously privatized in the mid-1990s.<sup>7</sup> The government also increased the minimum monthly wage from 440 Bolivianos (US\$ 55) in 2005 to 1440 Bolivianos (US\$ 206) in 2014 as a strategy to increase people's well-being. In addition, higher taxes were implemented in the hydrocarbons sector to increase government revenues; there was a large increase in public-sector spending; establishment of various cash transfer programs; and anti-discrimination reforms that aim to reduce all forms of discrimination in the country.

Under these circumstances, it is useful to understand the main trends in the labor markets in Bolivia. The delicate economic environment of the first half of the past decade (2000–2005) had a profound impact on labor markets. Between 2000 and 2005, average nominal wages remained stagnant, but thanks to a fairly low rate of inflation, real wages did not deteriorate (Figure 1). Between 2006 and 2014, a higher rate of economic growth was observed compared to the previous period. Despite the global economic recession of 2009, the economy grew at an average annual rate of 4.7% between 2006 and 2014, mostly spurred by the rise in commodity prices (mainly gas and minerals) (Rossell Arce 2010).<sup>8</sup> Between 2005 and 2014, average nominal wages increased by nearly 150%, which, despite increasing inflation, provided positive growth of nearly 42% in real terms.

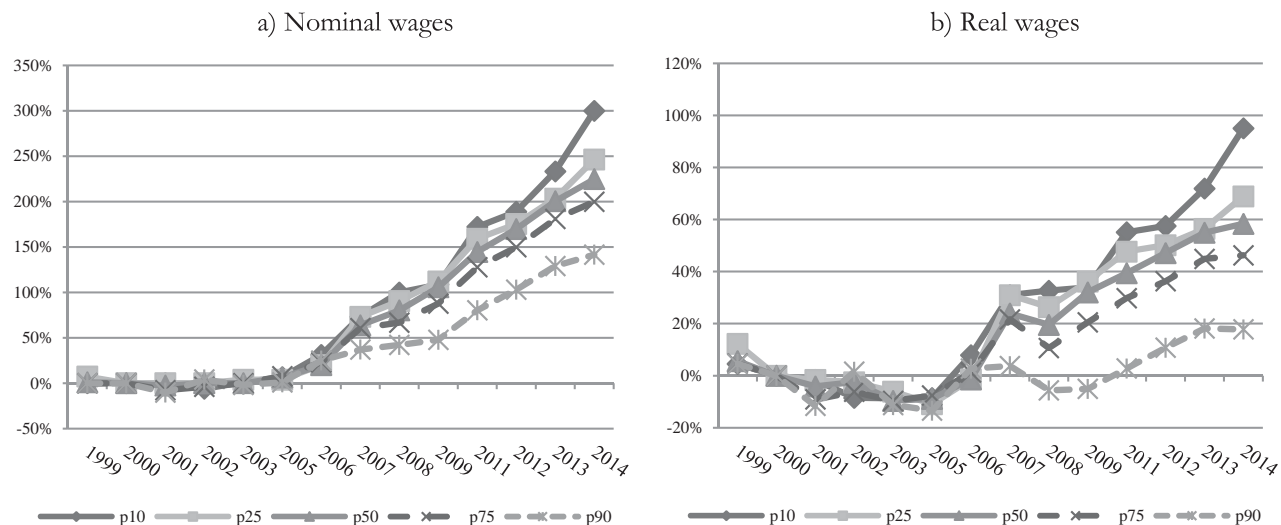
This period of fast wage growth coincided with a sharp reduction in wage inequality. Before 2005, the wage Gini coefficient for salaried workers in the urban sector had hovered around 0.50. After 2005, following the rapid increase in the minimum wage as well as the implementation of other labor market reforms, the Gini coefficient fell to below 0.37 in 2009, remaining low during until 2014 (Figure 1).<sup>9</sup> The decline in inequality can also be observed when looking at the household income per capita Gini coefficient for the total population in urban areas while the income Gini shows a higher degree of inequality compared to the wage Gini, it also presents a similar trend, with substantial declines in inequality starting in 2007, almost no change between 2011 to 2013, and a small increase in inequality in the 2014. This common trend is not surprising since labor income from the main activity represents 80% of total household income, and has been identified as the driving source behind the changes in inequality (Hernani-Limarino et al. 2015; Vargas and Garriga 2015), while other sources such as cash and in-kind transferences programs, taxes, and subsidies have shown to have a low redistributive impact in the country (Paz Arauco et al. 2014).

The main factor explaining the decline in wage inequality was the asymmetric growth of wages across the whole wage distribution. Before 2005, wages across the whole distribution showed little, if any, changes compared to 2000 levels (Figure 2(a)), and small



**Figure 1.** Nominal and real wage and inequality trends.

*Source:* Author estimations based on Household Surveys and Dossier UDAPE (2013). *Notes:* Real wages are deflated using 2007 as the base year. Average wages are estimated using workers in the urban waged and salaried sector only, applying survey weights.



**Figure 2.** Trend of nominal and real wages, cumulative growth since 2000, selected percentiles.

*Notes:* Real wages are deflated using 2007 as the base year. Wage percentiles are estimated using workers in the urban waged and salaried sector only, applying survey weights.

negative changes in real terms (Figure 2(b)). After 2006, while the bottom 75% of wages exhibited a similar increase in wage growth, wages at the top of the distribution showed much lower growth, exhibiting only a 15% growth compared to the 40% growth in the average real wage.<sup>10</sup>

### 3. Data and Methodology

#### 3.1. Data

This paper uses the publicly available and nationally representative household surveys collected annually by the National Institute of Statistics (INE) for the years 2000–2014.<sup>11</sup> While the sample design, sample size, and the survey structure has changed over the years, the information can still be used to make inferences at the national level.

In order to provide a representative sample of the labor force at the national level, and improve comparability across years, the sample was restricted as follows. We included adults between 15 and 65 years of age<sup>12</sup> who are classified as a wage or salary worker at their primary jobs.<sup>13</sup> We focus our analysis on this type of workers since they are the ones most likely to be affected/benefited by the labor market reforms that aim to improve the job conditions in the country, as their remunerations are tied to formal or informal contractual obligations (Muriel and Ferrufino 2014). In this respect, the results presented here can be extrapolated for salaried workers in urban areas only.

Given the volatility of the rural labor market, the sample includes workers in the urban sector only.<sup>14</sup> Individuals classified as self-employed, employers, and family workers, as well as those working in the military, and extraterritorial organizations, were excluded from the sample. Since some of the distribution statistics used here can be sensitive to the presence of outliers, we drop from the sample the top 0.25% of the data.<sup>15</sup> The final sample contained a total of 41,080 individuals across all years, which represents approximately 47% of the employed population between 15 and 65 years old in urban areas and 25% of the total employed population in Bolivia.

Wages were measured as monthly labor earnings from primary jobs, inclusive of tips, overtime, and commissions. Wages were measured in local currency, adjusted for inflation using 2007 as the base year. In order to improve the sample size for our analysis, we divided the sample into five groups. The first two groups correspond to the years 2000–2002 and 2003–2006, which can be considered as the period before Evo Morales, and the last three groups of 2007–2009, 2011–2012 and 2013–2014 cover the period of his presidency. While the corresponding pooled samples do not provide an exact picture of the labor market structure for any given year, they provide an adequate representation of the evolution and average characteristics within the pooled years.

There are some considerations needed in regards with the statistical analysis of the data. Although the household surveys used here have maintained a similar design in terms of data collection (in person interviews), sample coverage (national representation), and survey questions, the changes in the underlying sampling frame and sample size can make statistical inference difficult.<sup>16</sup> There are a few approaches that have been used to deal with this problem. For the estimation of a Poverty Map for Bolivia, Arias and Robles (2007) pooled data for the years 1999, 2000, and 2001 to obtain reliable estimates for small geographical areas. They adjust the sampling weights based on common strata and primary sampling unit information across years. In Hernani-Limarino et al. (2015), the authors describe a standardization of the sampling frame and weight adjustment of all household surveys from 1999 to 2011 based on predicted consumption per capita and the original geographical strata. While the authors indicate the modified survey design allows for a better



description of income trends in Bolivia, their estimates of the Gini coefficient are larger than those in official reports (Hernani-Limarino et al. 2015, chapter 3), which they suggest could be caused by different income aggregates or the changes in the survey weights.

For this study, instead of adjusting the sampling weights as in Arias and Robles (2007) or the survey design as in Hernani-Limarino et al. (2015), we follow the recommendation Deaton (1997) and use the sample weights available in the surveys, which should more appropriately reflect the original survey design. On the one hand, while the grouped data will not be representative of any particular year, it still provides estimates that are comparable and replicable of the average official statistics of the years of interest. On the other hand, since the interest of the paper is to provide statistics at the urban national level, the adjustments suggested by Arias and Robles (2007) are not necessary. In light of the complex survey design, the correct standard errors are estimated using bootstrap standard errors assuming that each survey year is independent from each other.

Tables 1 and 2 provide a statistical summary of the demographic and labor market characteristics across year groups.<sup>17</sup> Based on these statistics, the demographic characteristics of the labor force have experienced some compositional changes. First, there has been an increase in female labor force participation, which reflected an increase in the percentage of women in the waged and salaried workforce from 31% to 37%. Similarly, the percentage of people in the workforce who are identified as indigenous (based on the first language learned)<sup>18</sup> decreased, but has stayed at around 13% since 2007. At the same time, while there were no major changes regarding the age structure of the labor force, there was a small trend indicating some aging of the labor force. In addition, there was a clear increase in average education level, particularly an observed decrease in the share of workers with less than a high school education (19.6–11.1%) and an increase in

**Table 1.** Statistical summary: demographics

	2000–2002	2003–2006	2007–2009	2011–2012	2013–2014
Sex					
Men	68.6%	67.9%	66.1%	63.7%	62.5%
Women	31.4%	32.1%	34.0%	36.3%	37.5%
Ethnicity					
Non-indigenous	79.1%	82.8%	86.7%	86.0%	86.2%
Indigenous	20.9%	17.2%	13.3%	14.0%	13.8%
Age					
15–19	7.8%	8.9%	7.7%	7.0%	6.8%
20–29	36.2%	34.3%	33.9%	32.8%	32.5%
30–39	25.9%	26.9%	28.2%	28.4%	28.6%
40–49	20.1%	18.5%	18.0%	17.3%	17.4%
50–59	8.8%	9.8%	10.1%	11.8%	11.8%
60–65	1.3%	1.7%	2.2%	2.7%	3.0%
Education					
Primary education (1–6)	19.6%	18.0%	14.6%	12.6%	11.1%
Secondary education (6–11)	24.9%	23.4%	20.3%	18.8%	23.5%
High school finished	19.7%	21.8%	24.5%	22.5%	22.9%
Some college	19.8%	18.4%	18.7%	21.0%	18.0%
College or more	16.0%	18.4%	21.9%	25.0%	24.5%
Unionization	21.2%	18.4%	19.4%	20.2%	16.8%
Public sector	24.7%	22.3%	23.9%	25.4%	28.1%
N	6238	6313	6238	9486	11 805

*Note:* Based on our own calculations using weighted averages for salaried workers in the urban sector, using survey expansion factors.



**Table 2.** Statistical summary: labor market

	2000– 2002	2003– 2006	2007– 2009	2011– 2012	2013– 2014
Wage level					
Less than 1 min wage	17.6%	18.2%	9.9%	12.2%	16.2%
1–2 min wages	34.3%	35.8%	25.2%	29.8%	36.5%
2–3 min wages	20.6%	19.7%	25.4%	25.5%	24.3%
More than 3 min wages	27.6%	26.2%	39.5%	32.5%	23.0%
Industry					
Agriculture-Silviculture	3.6%	3.1%	2.5%	2.9%	2.3%
Mining	2.1%	1.8%	2.2%	2.6%	2.9%
Manufacture	17.7%	17.6%	15.5%	14.4%	14.2%
Electricity, gas and water	1.3%	1.1%	0.7%	1.2%	0.9%
Construction	11.2%	11.8%	12.6%	12.0%	12.1%
Retail and repair	12.0%	12.0%	12.1%	13.2%	12.4%
Food and hospitality	3.9%	4.4%	4.4%	5.6%	5.2%
Transport	9.3%	10.5%	10.1%	8.6%	7.7%
Financial services	2.1%	1.5%	2.3%	2.5%	3.3%
Real State	5.6%	5.8%	5.5%	6.0%	6.2%
Public administration	7.6%	7.7%	9.3%	8.7%	9.5%
Education, health and social services	18.4%	17.0%	18.5%	18.6%	20.1%
Other services	5.2%	5.7%	4.2%	3.7%	3.4%
Occupation					
Management	3.2%	3.5%	2.5%	3.5%	4.3%
Professionals	12.4%	13.4%	16.3%	20.4%	22.2%
Technicians and support	13.7%	13.2%	14.6%	11.4%	12.9%
Clerical workers	11.1%	10.1%	10.2%	9.9%	8.6%
Services and retail	11.8%	12.7%	14.0%	14.2%	13.9%
Agriculture	1.1%	1.7%	0.7%	0.7%	1.1%
Mining, construction and manufacture	24.9%	24.6%	22.6%	16.9%	18.6%
Machine operators/installation	10.6%	10.6%	9.2%	8.5%	8.5%
Unqualified workers	11.1%	10.2%	10.0%	14.4%	9.9%

*Note:* Based on our own calculations using weighted averages for salaried workers in the urban sector, using survey expansion factors.

the share of workers with at least a college degree (16.1–24.5%). In average, about 20% of the labor force is unionized, although it declines to 16.8% in the last period, while the share of workers in the public sector increases from around 24% to 28% in the last year of analysis.

Regarding the labor market itself, there has been a sustained increase in average real wages. Between 2000 and 2006, there were no significant changes in the percentage of workers per level of monthly earnings. In the next two periods, however, the percentage of people working for less than one minimum wage drastically decreased by about 7 percentage points while the percentage of people earning more than three times the minimum wage substantially increased. However, in the last period, 2013–2014, the share of workers who earned less than two minimum wages return to levels comparable to the first two periods of data.

In terms of industry and occupation composition, while most industry and occupation categories have shown little change over time, there are two changes worth noting. The percentage of workers in the manufacturing industry has shown a significant decline after 2007, falling overall by about 4% compared to the percentage from the 2000 to 2002

period. In the last two periods, 2011/2012 and 2013/2014, a decline in the share of workers in the Transportation sector is also observed. With respect to occupation, the statistics show that the percentage of workers in manufacturing and technical support has decreased while the percentage of workers in professional occupations and jobs for unqualified workers has increased.

### 3.2. Methodology

To evaluate and decompose changes in inequality across time, we applied the methodology proposed by Firpo, Fortin, and Lemieux (2007). This methodology is a generalization of the Blinder-Oaxaca decomposition approach (Blinder 1973; Oaxaca 1973), which allows one to extend the decomposition analysis to statistics other than the mean. This method has two steps. The first step involves the construction of an appropriate counterfactual distribution with which the wage distribution can be compared across time, abstracting from changes in worker and market characteristics. Subsequently, the constructed counterfactual wage distributions are used to obtain a decomposition of the inequality changes of any statistic ( $v$ ) into portions explained by measured differences in worker and job characteristics (referred to as the “composition” effect) and by differences in the coefficients or “returns” on observables (the “wage structure” effect).

Although the counterfactual wage distribution cannot be observed directly, Firpo, Fortin, and Lemieux (2007) show that under the assumptions of ignorability (conditional on measured covariates) and overlapping support of the covariates, it is possible to construct a counterfactual wage distribution that would be observed if the people living in period  $t_0$  (2000–2002) had experienced the wage structure observed in period  $t_k$  (2011–2012) ( $\hat{v}_{t_0,k}$ ). Firpo, Fortin, and Lemieux (2007) suggests that this counterfactual can be estimated by applying a reweighting procedure where any distributional statistic corresponding to the counterfactual distribution is estimated using observations from period  $t_0$  and a weight equal to  $\hat{\omega}_c(X) = \frac{\hat{p}(X)}{1 - \hat{p}(X)}$ , where  $\hat{p}(X)$  is an estimated probability (propensity). The propensity score is estimated using a probit model, where the dependent variable is a dummy variable that takes the value 0 if the person was observed in the initial period  $t_0$  and 1 if the person was observed in a later period  $t_k$ . The explanatory variables include a vector of characteristics  $X$  that determine wages.<sup>19</sup> Once the counterfactual statistic is found, the overall wage decomposition can be estimated as follows:

$$\Delta v = v_{tk} - v_{t0} = \underbrace{(v_{tk} - \hat{v}_{t0,k})}_{\Delta S_v: \text{Wage structure effect}} + \underbrace{(\hat{v}_{t0,k} - v_{t0})}_{\Delta X_v: \text{Composition effect}}, \quad (1)$$

where  $\Delta v$  is the overall intertemporal gap on the distributional statistic  $v$ ,  $v_{tk}$  and  $v_{t0}$  are the statistics corresponding to the observed wage distributions in time  $k$  and time  $0$ , and  $\hat{v}_{t0,k}$  is the estimated statistic of the counterfactual wage distribution, with characteristics fixed to time  $0$ , and wage structures observed at time  $k$ .

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.<sup>20</sup> RIF regression is similar to 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  $\text{RIF}(w_{i,k}; v_{tk})$ .<sup>21</sup> The RIF can be intuitively understood as a first-order approximation of the overall contribution that each observation makes to 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

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

from which three sets of parameters are estimated:

$$\hat{\gamma}_k = (\sum X_{i,k}' X_{i,k})^{-1} \sum X_{i,k}' \widehat{\text{RIF}}(w_{i,k}; v_k) \text{ for } k = k, 0, \quad (3)$$

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

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

$$\Delta S_v = X_k'(\hat{\gamma}_k - \hat{\gamma}_c) \text{ and } \Delta X_v = (X_k \hat{\gamma}_c - X_0 \hat{\gamma}_0). \quad (5)$$

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

## 4. Results

As indicated above, the RIF regression decomposition can be used to analyze any statistic that describes changes in wage distribution. Given the interest of this paper in analyzing wage inequality changes over time, we implemented the procedure to analyze changes in the Gini coefficient and provide results across quintiles and selected interquintiles. The first statistic provides an overview of the change in income concentration across time, while the interquintiles provide a better picture of changes in inequality along the distribution.

### 4.1. Unconditional Quantile Regressions

To understand how wage structures in Bolivia have changed through time, [Table 3](#) presents the unconditional quintile regressions for selected quintiles for the first and last periods in the analysis.<sup>22</sup> Overall, while wages at the 10th quintile have increased by about 0.611 log points between 2000–2002 and 2013–2014, the observed wage growth at the 90th quintile was only 0.205 log points for the same periods.

The estimated parameters provide some evidence regarding the trends of returns on different characteristics. The parameters related to age show, assuming education as constant, that there has been a drop in returns on experience, particularly for people in the top of the wage distribution. The wage gap between men and women, while still large, shows some reduction across the distribution. The wage penalty of being indigenous shows important progress. The estimates suggest that for the 2013–2014 period, it has been practically eliminated for low wages, it is not statistically significant for wages at the top of the distribution, and there is even a premium for wages around the median. This suggests that the improvements to the gender and ethnic wage gaps could be explained

**Table 3.** Unconditional quantile regressions, selected quantiles

	Q10		Q50		Q90	
	2000/2002	2013/2014	2000/2002	2013/2014	2000/2002	2013/2014
Quantile	5.996	6.607	6.958	7.449	8.042	8.247
Age	0.125*	0.114*	0.067*	0.052*	0.033 <sup>+</sup>	0.011 <sup>^</sup>
	(0.014)	(0.008)	(0.006)	(0.004)	(0.016)	(0.006)
Age^2	−0.152*	−0.130*	−0.071*	−0.051*	−0.021	0.007
	(0.019)	(0.010)	(0.008)	(0.005)	(0.023)	(0.009)
Sex (female)	−0.455*	−0.351*	−0.258*	−0.213*	−0.205 <sup>+</sup>	−0.185*
	(0.062)	(0.032)	(0.024)	(0.017)	(0.080)	(0.029)
Indigenous	−0.193*	0.003	−0.081*	0.071*	−0.125 <sup>^</sup>	−0.052
	(0.066)	(0.043)	(0.031)	(0.025)	(0.071)	(0.034)
Education						
Secondary education (6–11)	−0.052	0.064	0.074 <sup>+</sup>	0.041	0.010	0.132*
	(0.076)	(0.055)	(0.036)	(0.030)	(0.063)	(0.038)
High school finished	0.216*	0.118 <sup>+</sup>	0.168*	0.022	0.129	0.112*
	(0.074)	(0.055)	(0.041)	(0.031)	(0.085)	(0.039)
Some college	0.188 <sup>+</sup>	−0.051	0.254*	0.079 <sup>+</sup>	0.550*	0.095 <sup>^</sup>
	(0.091)	(0.062)	(0.045)	(0.035)	(0.117)	(0.049)
College or more	0.359*	0.190*	0.594*	0.361*	2.267*	0.614*
	(0.089)	(0.059)	(0.052)	(0.036)	(0.213)	(0.057)
Public sector	0.178*	0.279*	−0.001	0.223*	−0.470*	0.169*
	(0.058)	(0.039)	(0.035)	(0.028)	(0.121)	(0.051)
Union member	0.214*	0.152*	0.133*	0.200*	0.080	0.216*
	(0.044)	(0.026)	(0.028)	(0.023)	(0.095)	(0.044)
<i>N</i>	6238	11 805	6238	11 805	6238	11 805
Industry						
Agriculture-Silviculture	−0.183	−0.046	0.069	0.239*	0.726*	0.152
	(0.151)	(0.110)	(0.063)	(0.066)	(0.203)	(0.094)
Mining	0.079	0.182*	0.274*	0.511*	1.101*	1.266*
	(0.125)	(0.054)	(0.080)	(0.047)	(0.328)	(0.137)
Manufacture	0.188 <sup>+</sup>	0.057	0.216*	0.153*	1.020*	0.289*
	(0.094)	(0.059)	(0.051)	(0.037)	(0.166)	(0.066)
Electricity, gas and water	0.226 <sup>+</sup>	0.049	0.462*	0.197 <sup>+</sup>	1.446*	0.541*
	(0.095)	(0.056)	(0.102)	(0.080)	(0.344)	(0.177)
Construction	0.506*	0.322*	0.336*	0.513*	1.057*	0.302*
	(0.101)	(0.061)	(0.058)	(0.040)	(0.187)	(0.069)

(Continued)

Table 3. Continued.

	Q10		Q50		Q90	
	2000/2002	2013/2014	2000/2002	2013/2014	2000/2002	2013/2014
Retail and repair	−0.082 (0.120)	−0.061 (0.065)	0.136* (0.052)	0.138* (0.036)	0.873* (0.170)	0.211* (0.060)
Food and hospitality	−0.197 (0.163)	−0.270* (0.098)	−0.001 (0.070)	0.125* (0.040)	0.824* (0.185)	0.197* (0.059)
Transport	0.075 (0.101)	−0.181* (0.067)	0.107^ (0.058)	0.156* (0.038)	1.040* (0.183)	0.211* (0.069)
Financial services	0.013 (0.129)	0.253* (0.062)	0.368* (0.067)	0.371* (0.048)	1.861* (0.351)	0.331* (0.097)
Real State	−0.020 (0.108)	−0.066 (0.074)	0.215* (0.057)	0.029 (0.039)	1.005* (0.213)	0.172^+ (0.068)
Public administration	0.142^ (0.085)	0.045 (0.036)	0.402* (0.042)	0.148* (0.031)	1.758* (0.184)	0.012 (0.062)
Other services	−0.247^+ (0.125)	−0.290* (0.102)	0.047 (0.057)	0.109^+ (0.049)	0.823* (0.184)	0.111^ (0.066)
Occupation						
Management	0.088 (0.109)	0.311* (0.062)	0.377* (0.055)	0.397* (0.043)	2.712* (0.330)	1.037* (0.103)
Professionals	0.193^+ (0.098)	0.272* (0.059)	0.226* (0.059)	0.261* (0.038)	1.199* (0.241)	0.301* (0.067)
Technicians and support	0.046 (0.095)	0.185* (0.055)	0.250* (0.049)	0.159* (0.034)	0.569* (0.145)	0.183* (0.053)
Clerical workers	0.242^+ (0.098)	0.319* (0.062)	0.301* (0.051)	0.057 (0.038)	0.346^+ (0.144)	0.066 (0.057)
Services and retail	0.087 (0.111)	−0.053 (0.066)	0.072 (0.048)	−0.130* (0.032)	0.136 (0.107)	0.093^+ (0.045)
Machine operators/installation	0.227* (0.084)	0.350* (0.050)	0.175* (0.051)	0.184* (0.041)	−0.013 (0.106)	0.107^ (0.063)
Unqualified workers	0.045 (0.109)	−0.063 (0.062)	−0.075^ (0.043)	−0.223* (0.032)	0.107 (0.084)	0.002 (0.033)
Constant	3.411* (0.278)	4.022* (0.179)	5.119* (0.112)	5.860* (0.084)	5.608* (0.325)	7.132* (0.132)
N	6238	11 805	6238	11 805	6238	11 805

Notes: The base group comprises workers in the private sector, non-unionized, with less than a middle-school education, working in the education/health/social services, or in an occupation within Mining/Construction/Manufacture. All models include a region fixed effect. Estimations are weighted using survey expansion factors. Bootstrap standard errors in parentheses. \* $p < .01$ , + $p < .05$ , ^ $p < .1$ .

by the active role the government has taken against discrimination, in particular racial discrimination.<sup>23</sup>

Perhaps some of the most important changes are the changes in the return on education. Compared to workers with less than six years of formal education, returns to all other levels of education have shown declines for people across the wage distribution. The largest declines to the education returns are observed for people with some college and college or more education. The declines in the returns to higher education are not unique to Bolivia. As indicated in Lustig, López-Calva, and Ortiz-Juarez (2013), Latin American countries have shown increasing levels of higher education enrollment, which has been accompanied by declines in returns to educations.

This phenomenon, as described in Lustig, López-Calva, and Ortiz-Juarez (2013), can have three potential explanations: a relative increase (decline) of the supply (demand) of highly skilled workers; increase in mandated earnings benefiting low-wage workers such as minimum wages; or a degradation of the quality of tertiary education (OECD/CAF/ECLAC 2014). According to Azevedo, Inchauste, and Sanfelice (2013), there is reason to believe that in Bolivia, the decline in the returns to education could have been driven by an increase in the supply of highly educated workers. On the other hand, the rapid expansion of the minimum wage could have also played a role on the observed decline of the returns to higher education, as it has been hypothesized elsewhere (Baudelot and Glaude 1989; Chaplin, Turner, and Pape 2003). However, there is no evidence to discard other explanations.

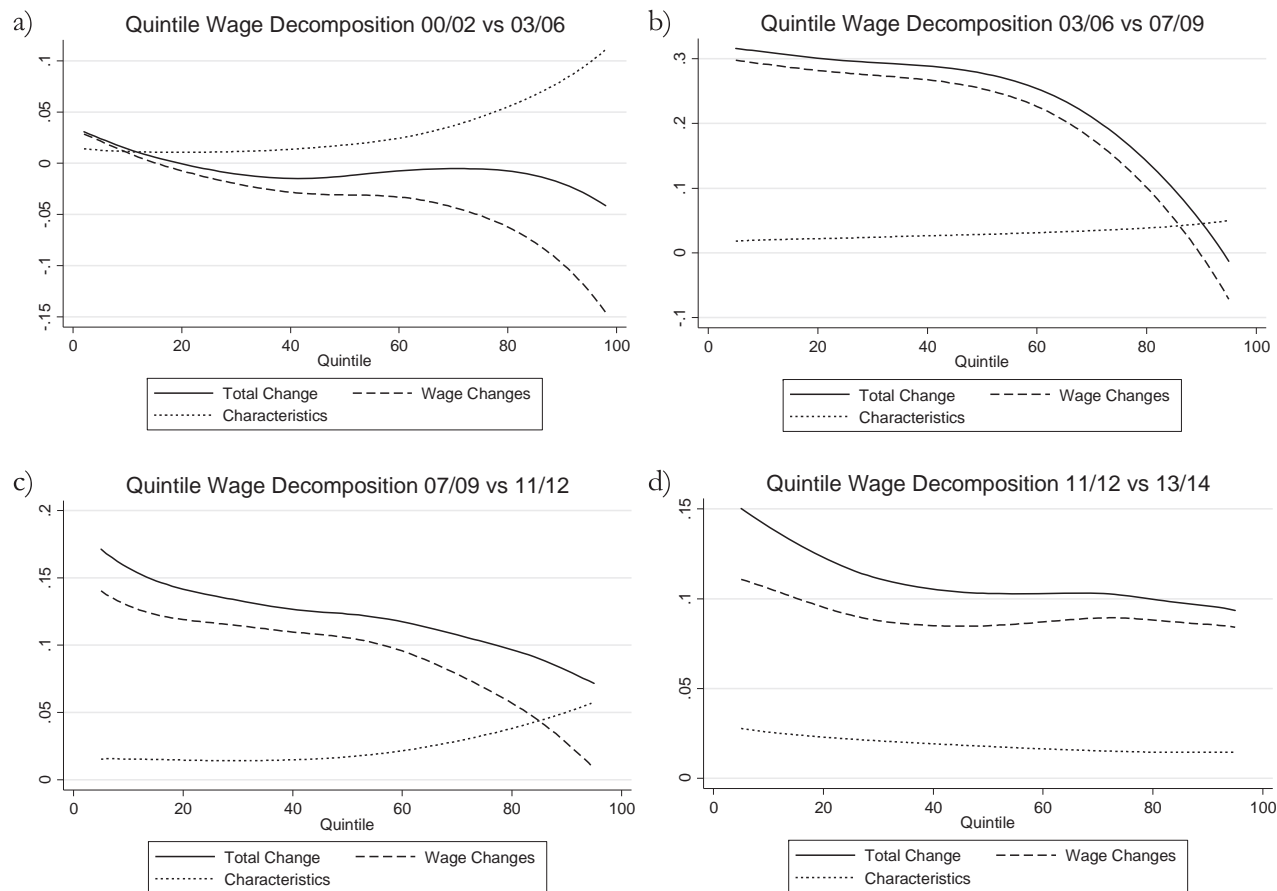
For the estimation of the impact of the market structure, industry and occupation, on wage levels, the education, health, and social services are used as the base group category. Regarding labor market characteristics, there is a strong increase in the returns on working in the public sector across the wage distribution, especially at the top. In contrast, the premium associated with working in public administration has declined in particular for wages at the top of the distribution. Similar to the findings of Rios-Avila and Hirsch (2014), there is a positive union premium across most of the wage distribution, although the estimates here are somewhat larger for the premiums around the tails of the distribution. It can be observed that for workers at the bottom of the distribution, the wage premium seem to have declined between the first and last period of analysis, while that premium increased when measured at the median and at the 90th quantile.

The industry parameters suggest that, compared to the base group, all industries have shown declines in wage premiums at the bottom and top of the distribution, but with less clear changes in their premiums around at the middle of the distribution. Similarly, regarding occupations, while improvements are observed across most occupations at the bottom of the distribution, at the very top, the returns across all occupations dropped, in particular for management and professional occupations.

#### 4.2. Decomposition

Figure 3 provides a first look at wage decomposition across time. Panel A presents the overall decomposition of wage changes between 2000/2002 and 2003/2006. As expected, there has been little change in real wages across the distribution, with less than a 0.03-log point increase in the wage level at the bottom of the distribution, and a 0.05-log point decline of wages at the top.

The aggregate decomposition shows that the changes in the returns to characteristics (wage changes) have had little if any effect on wages for most of the distribution, but with a small tendency contracting wages at the top of the distribution. The change in



**Figure 3.** Aggregate quintile wage decomposition.

*Note:* The information corresponds to the smoothed contributions of the wage structure and characteristics changes to the total wage change between periods.



endowments, however, was large enough that it compensated for the fall in returns, translating to a virtually unchanged wage distribution between 2000/2002 and 2003/2006.

Compared to all other periods, the largest changes in wage inequality reduction are observed between the 2003/2006 and the 2007/2009 period, driven by the changes in the wage structure (Panel B). While the changes in characteristics explain only a fraction of changes across the distribution, it seems they have had a small impact towards increasing the wage gap between the top and bottom of the distribution. Regarding the changes on the returns on observed characteristics (wage structure changes), we observe that such changes have had a rather homogenous impact improving wages for the bottom half of the distribution, suggesting an improvement of over 0.25 log points. For the top half of the distribution, the changes in the wage structure has had decreasing impact on wages, with an even negative growth on wages at the top of the distribution. This indicates that the inequality improvements observed between 2003/2006 and 2007/2009 have been mainly driven by changes in the wage structure, by increasing wages at the bottom of the distribution faster than the increases at the top. Similar results were also found by Landa (2002), when analyzing the increase in wage inequality between 1989 and 1999, suggesting the changes on the returns to characteristics explaining most of the wage gap changes across time. The results regarding the first two periods are also similar to Gutierrez (2008), where the author presents evidence that the wage structure effect, for the 1999–2005 period, slightly improved wage inequality.<sup>24</sup>

The aggregate decomposition between the 2007/2009 and 2011/2012 period (Panel C) indicate that while the wage structure changes have remained the driving factor reducing wage inequality in Bolivia, it has been less effective than in the previous period in reducing wage inequality. While between 2003/2006 and 2007/2009, changes in wage structure contributed to a growth larger than 0.15 log points for the bottom half of the distribution, compared to the 90th percentile wage change, in the 2007/2009 and 2011/2012 comparison, the growth difference between the bottom half and the 90th percentile was only half as large (0.07 log points).

During the last two periods in our sample, 2011/2012 and 2013/2014, three important changes can be observed compared to the previous years. First, the total wage change suggests that there has been far less improvement in wage inequality as wages for most of the distribution (top 75%) have experienced a very similar growth of just over 0.1 log points, albeit with wages at the bottom 25% growing slightly faster (0.03 log points in average). Second, just as suggested by the total wage change, the contribution of the wage structure has had little impact on wage inequality, with only an additional 0.015-log point wage growth for the bottom 25% of the distribution, compared to the rest of the distribution. And third, different from other periods in the data, the changes in the characteristics have slightly contributed to a decline in the wage inequality.

Rather than looking at each individual quintile, it is more informative to implement the decomposition on statistics such as the Gini coefficient and interquintile differences (Table 4), to have a more accurate measure of the changes in wage inequality. As shown above, between 2000–2002 and 2003–2006, there was almost no change in wage inequality, with nonsignificant changes in the interquartile gaps. In terms of the aggregate decomposition of the Gini, however, changes on the wage structure seemed to have a negative and significant impact reducing wage inequality, which was mostly offset by the impact of the characteristics. These effects are not statistically significant when looking at the interquartile differences.

Looking at the estimations for the 2003/2006 and 2007/2009 periods, the estimates indicate that the Gini coefficient decreased by 0.079 Gini points, which translated in a 0.264-log point reduction in the 90/10 interquartile gap. While there is a small, and statistically

**Table 4.** Wage inequality decomposition, selected statistics

	Gini				q10–q90			
	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2012/2014	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2013/2014
Year 0	0.479	0.471	0.392	0.370	2.046	2.032	1.768	1.675
Year 1	0.471	0.392	0.370	0.365	2.032	1.768	1.675	1.640
Total change	–0.008 (0.012)	–0.079* (0.010)	–0.022* (0.006)	–0.005 (0.005)	–0.014 (0.073)	–0.264* (0.050)	–0.093* (0.032)	–0.035 (0.036)
Change on wage structure	–0.025 <sup>+</sup> (0.010)	–0.087* (0.009)	–0.030* (0.006)	–0.001 (0.005)	–0.078 (0.059)	–0.291* (0.049)	–0.108* (0.028)	–0.017 (0.029)
Change on characteristics	0.017* (0.005)	0.008* (0.003)	0.008* (0.002)	–0.004 <sup>^</sup> (0.002)	0.064 <sup>^</sup> (0.034)	0.027 (0.017)	0.015 (0.018)	–0.018 (0.023)
	q10–q50				q50–q90			
Year 0	0.962	0.937	0.913	0.875	1.084	1.095	0.855	0.800
Year 1	0.937	0.913	0.875	0.842	1.095	0.855	0.800	0.798
Total change	–0.025 (0.036)	–0.024 (0.030)	–0.038 <sup>^</sup> (0.021)	–0.033 (0.029)	0.012 (0.065)	–0.240* (0.041)	–0.056 <sup>+</sup> (0.025)	–0.002 (0.023)
Change on wage structure	–0.044 (0.038)	–0.027 (0.031)	–0.022 (0.021)	–0.036 (0.023)	–0.034 (0.050)	–0.263* (0.039)	–0.086* (0.022)	0.019 (0.023)
Change on characteristics	0.019 (0.017)	0.003 (0.012)	–0.016 (0.014)	0.003 (0.021)	0.046 (0.031)	0.023 <sup>^</sup> (0.012)	0.031 <sup>+</sup> (0.013)	–0.021 <sup>+</sup> (0.010)
N	12 551	12 551	15 724	21 291	12 551	12 551	15 724	21 291

Notes: The sample includes wage/salary workers in the urban area only. Bootstrap standard errors in parentheses. Specification includes all controls used for the full model, including region, industry, and occupation fixed effects. \* $p < .01$ , <sup>+</sup> $p < .05$ , <sup>^</sup> $p < .1$ .

**Table 5.** Wage inequality, detailed decomposition (Gini)

	2000/2002 vs. 2003/2006		2003/2006 vs. 2007/2009		2007/2009 vs. 2011/2012		2011/2012 vs. 2013/2014	
	Wage structure	Comp	Wage structure	Comp	Wage structure	Comp	Wage structure	Comp
Total change	−0.008 (0.012)		−0.079* (0.010)		−0.022* (0.006)		−0.005 (0.005)	
Total	−0.025 <sup>+</sup> (0.011)	0.016* (0.005)	−0.087* (0.009)	0.008* (0.003)	−0.030* (0.006)	0.008* (0.002)	−0.001 (0.005)	−0.004^ (0.002)
Demographics								
Age	0.085 (0.172)	−0.004 (0.005)	−0.074 (0.155)	−0.009^ (0.005)	0.000 (0.115)	−0.011* (0.004)	−0.057 (0.097)	−0.004 (0.003)
Age^2	−0.011 (0.093)	0.006 (0.005)	0.034 (0.085)	0.008 (0.005)	−0.004 (0.061)	0.013* (0.005)	0.026 (0.051)	0.003 (0.004)
Sex (1 = Woman)	−0.005 (0.007)	0.000 (0.000)	0.008 (0.007)	0.001 (0.000)	0.004 (0.006)	0.001 <sup>+</sup> (0.000)	−0.007^ (0.004)	0.000 (0.000)
Indigenous	−0.005 (0.005)	0.000 (0.000)	−0.000 (0.003)	0.000 (0.001)	−0.004 (0.002)	−0.000 (0.000)	0.002 (0.002)	0.000 (0.000)
Education								
Sec. education (6–11)	−0.000 (0.004)	0.000 (0.000)	0.006 (0.004)	−0.000 (0.000)	−0.003 (0.004)	0.000 (0.000)	0.002 (0.003)	0.001^ (0.000)
High school finished	0.008 (0.005)	0.000 (0.000)	−0.001 (0.004)	−0.000 (0.000)	−0.003 (0.005)	0.000 (0.000)	0.004 (0.003)	0.000 (0.000)
Some college	0.006 (0.007)	−0.000 (0.000)	−0.005 (0.005)	0.000 (0.000)	−0.002 (0.004)	−0.000 (0.000)	0.007^ (0.004)	−0.000 (0.000)
College or more	0.012 (0.011)	0.006* (0.002)	−0.030* (0.008)	0.003 <sup>+</sup> (0.001)	−0.006 (0.007)	0.002* (0.001)	0.007 (0.006)	−0.000 (0.001)
Public sector	−0.006 (0.011)	0.003^ (0.001)	0.019 (0.012)	−0.000 (0.001)	−0.000 (0.010)	−0.000 (0.000)	0.012^ (0.007)	0.000 (0.001)
Union	−0.004 (0.007)	0.002^ (0.001)	0.000 (0.005)	−0.001 (0.000)	0.008^ (0.004)	−0.000 (0.000)	0.000 (0.003)	0.001 (0.000)
Industry	−0.040 (0.030)	−0.001 (0.002)	−0.011 (0.034)	−0.001 (0.001)	−0.025 (0.024)	0.003 <sup>+</sup> (0.001)	−0.015 (0.020)	−0.001 (0.001)

(Continued)

Table 5. Continued.

	2000/2002 vs. 2003/2006		2003/2006 vs. 2007/2009		2007/2009 vs. 2011/2012		2011/2012 vs. 2013/2014	
	Wage structure	Comp	Wage structure	Comp	Wage structure	Comp	Wage structure	Comp
Occupation	0.008 (0.026)	0.002 (0.002)	−0.008 (0.025)	0.003^ (0.002)	−0.024 (0.016)	0.003* (0.001)	−0.012 (0.014)	0.000 (0.001)
Region	0.018 (0.017)	0.001 (0.001)	−0.034+ (0.015)	0.002^ (0.001)	0.013 (0.010)	0.000 (0.001)	0.005 (0.008)	0.000 (0.000)
Constant	−0.090 (0.100)	0.000 (0.000)	0.014 (0.109)	0.000 (0.000)	0.021 (0.078)	0.000 (0.000)	0.023 (0.063)	0.000 (0.000)
Error		−0.000 (0.002)		0.003^ (0.002)		−0.001 (0.001)		−0.002+ (0.001)
N	12 551		12 551		15 724		21 291	

Notes: The base group comprises workers in the private sector, non-unionized, with less than a middle-school education, working in the education/health/social services, or in an occupation within Mining/ Construction/ Manufacture. All models include a region fixed effect. Estimations are weighted using survey expansion factors. Bootstrap standard errors in parentheses. \* $p < .01$ , + $p < .05$ , ^ $p < .1$ . Industry, occupation, and region report aggregated effect of all industry, occupation, and region dummies in the wage structure and composition effect.

insignificant, reduction of the gap that can be attributable to the lower section of the distribution ( $-0.024$  log points), the largest portion of the wage inequality reduction is explained by a reduction in the gap at the top of the distribution, with the 90/50 interquartile gap falling in  $0.240$  log points. As suggested by the unconditional quintile regressions, these results also indicate that all the inequality improvements have been caused by changes in the wage structure, and that changes in worker and market characteristics have played a minor, albeit statistically significant, role increasing wage inequality.

Based on our estimations, the 2007/2009 and 2011/2012 period is the last one showing a significant improvement on inequality, albeit smaller than in the previous period. The estimates show a statistically significant decline of the Gini coefficient of  $0.022$  log points, and a decline of the 90/10 gap of  $0.09$  log points. This reduction is less than a third of the one observed previously. Other than this, changes in wage structure and characteristics play similar roles on explaining changes in wage inequality as presented above. Finally, for the last two periods of analysis, 2011/2012 and 2013/2014, there is no statistically significant improvement on wage inequality, with the exception of changes in characteristics, which appears to have had a very small but significant effect compressing wages at the top, and reducing wage inequality. These trends are similar to the ones shown in Ferreira, Firpo, and Messina (2016) for Brazil. Based on the results provided in Figure 3, the slow down on wage inequality was not a product of lack of wage growth as in the 2000/2002 and 2003/2006 period. Instead, we observe a more equal, and positive, growth of wages across the distribution.

To better understand which factors are driving the observed changes in the wage structure, Table 5 presents the detailed decomposition of the Gini coefficient with respect to all worker and market characteristics. Among other factors, while the gender gap has shown some reduction along the wage distribution (see Table 3), the detailed Gini decomposition shows that these changes have had a positive, but not significant, estimated impact on inequality during the 2003/2006 to 2011/2012 periods, although the results suggest a small but significant contribution reducing inequality in the last two periods of analysis. The reduction of the wage gap between indigenous and non-indigenous people, and the change of the indigenous composition of the labor force, has had no significant impact on the changes of wage inequality.

Regarding education, the systematic decline in returns on education, particularly for workers with a college degree (17+ years of education), has been one of the most important factors contributing to the decline of the Gini coefficient. Except for the first and last two periods of analysis, changes on returns to education have significantly contributed to a decline of wage inequality in Bolivia, accounting for a decline of  $0.030$  (2003/2006–2007/2009) to  $0.014$  (2007/2009–2011/2012) Gini points, respectively. In the last two periods, however, returns to education explained contributed with almost  $0.02$  Gini points to the increase in wage inequality. The increasing share of workers with college education, however, contributed to a higher wage inequality for most periods in the analysis. As mentioned previously, this is typically observed as a consequence of the so-called “paradox of progress” (Bourguignon, Ferreira, and Lustig 2005).

The increase in the wage associated with working in the public sector has no effect on wage inequality, except for the last periods where it shows a contribution toward higher inequality equivalent to  $0.012$  Gini points. Regarding the impact of unions on the wage structure in Bolivia, while unions have reduced wage inequality on average (Rios-Avila and Hirsch 2014), the evidence shown here indicates that across time, the changes in union wage premiums have had a small and insignificant effect on wage inequality. Despite the large changes observed in the share of unionized workers and share of public-sector workers toward the end of the periods, only the early changes observed

**Table 6.** Wage inequality decomposition for self-employed workers, selected statistics

	Gini				q10–q90			
	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2012/2014	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2012/2014
Year 0	0.520	0.501	0.501	0.443	2.733	2.553	2.570	2.277
Year 1	0.501	0.501	0.443	0.448	2.553	2.570	2.277	2.267
Total change	−0.019 <sup>+</sup> (0.009)	−0.000 (0.012)	−0.058* (0.011)	0.005 (0.006)	−0.179* (0.063)	0.017 (0.065)	−0.294* (0.056)	−0.010 (0.037)
Change on wage structure	−0.022 <sup>+</sup> (0.010)	0.002 (0.012)	−0.051* (0.011)	0.009 (0.007)	−0.265* (0.063)	0.003 (0.067)	−0.293* (0.054)	−0.020 (0.038)
Change on characteristics	0.003 (0.004)	−0.002 (0.003)	−0.007 (0.005)	−0.004 <sup>+</sup> (0.002)	0.086* (0.028)	0.014 (0.032)	−0.000 (0.020)	0.010 (0.024)
	q10–q50				q50–q90			
Year 0	1.559	1.443	1.438	1.310	1.173	1.110	1.132	0.967
Year 1	1.443	1.438	1.310	1.349	1.110	1.132	0.967	0.918
Total change	−0.116 <sup>+</sup> (0.049)	−0.005 (0.048)	−0.129* (0.044)	0.039 (0.029)	−0.063 (0.046)	0.022 (0.048)	−0.165* (0.039)	−0.049 <sup>^</sup> (0.029)
Change on wage structure	−0.159* (0.049)	−0.029 (0.050)	−0.122* (0.045)	0.009 (0.034)	−0.106 <sup>+</sup> (0.048)	0.033 (0.048)	−0.171* (0.040)	−0.029 (0.027)
Change on characteristics	0.043 <sup>^</sup> (0.023)	0.025 (0.028)	−0.006 (0.021)	0.030 (0.024)	0.043 <sup>+</sup> (0.021)	−0.011 (0.021)	0.006 (0.016)	−0.020 (0.015)
N	9767	8112	9856	14 152	9767	8112	9856	14 152

*Notes:* The sample includes self-employed workers in the urban area only. Bootstrap standard errors in parentheses. Specification includes all controls used for the full model, including region, industry, and occupation fixed effects. \* $p < .01$ , <sup>+</sup> $p < .05$ , <sup>^</sup> $p < .1$ .

between 2000/2002 and 2003/2006 appear to have a small, positive and significant impact increasing wage inequality (0.005 Gini points).

Finally, the aggregate effects of the composition and returns to working in specific industries have had large but non-statistically significant effects on wage inequality. Looking at the individual industry components, not shown here, none of the estimated contributions were statistically significant during the 2003/2006–2007/2009 periods. A very similar figure is observed when looking at the aggregate impact of occupations on wage inequality. In this case, the change on the composition of the occupations in the labor force, mainly driven by a growth in the share of managerial and professional professions, have contributed to a greater wage inequality. However, a decline in the wage differentials across occupations offset such effect, even though such contribution is not statistically significant.

An additional factor that seems to have an important contribution to the decline on wage inequality, at least between 2003/2006 and 2007/2009, was the role of regional wage variation. Based on our estimates, during these years, the reduction on wage dispersion across region contributed with a reduction of  $-0.034$  Gini points, which was far larger than the effect of increasing concentration of workers in better paid regions.

#### *4.3. Beyond the Formal Labor Market: Self-Employed Workers*

In the previous section, we presented and analyzed the decomposition of the evolution of wage inequality within the wage/salary labor market. While wages in this segment of the labor market can be most directly affected by policies in the labor market, they represent only a fraction of the urban labor force (47%), although its share has increased by 4 percentage points during the period analyzed.<sup>25</sup> To provide a more complete view of trends in labor earnings inequality, rather than wage inequality, this section provides a brief overview of the changes in inequality for self-employed workers, who represent other 34% of the urban labor force, and the changes on overall labor income inequality.

The self-employed labor market has unique characteristics that differentiate it from the wage/salary labor market. On the one hand, earned income is lower on average, but its inequality is much larger compared to that among salaried workers (Gini of 0.54 vs. 0.48 in the formal market). In addition, while the salaried market can be directly affected by labor/wage changes via employment contracts, the self-employed market lacks contracts that would otherwise regulate wages and employment. In this sense, one might expect the evolution of labor income inequality in the self-employed to be less sensitive to wage economic policies that have driven the observed changes in inequality in the wage/salary labor market.

In Table 6, we present the decomposition of the Gini index and interquintile differences in wages for self-employed workers in urban areas, using the same specifications as those used in the previous sections. Different from salaried workers, between the first and second periods, wage inequality showed a significant, albeit small, decline in inequality, with a fall of 0.019 Gini points and a 0.18-log point reduction in the 90/10 wage gap. This was mainly explained by changes in the wage structure. In the salaried market, comparing the 2003–2006 to the 2007–2009 periods, a large decline in inequality was observed. In contrast, there is no progress on reducing inequality among the self-employed. Only when comparing Gini changes between 2007–2009 and 2010–2011 we see an important reduction in inequality of almost 0.058 Gini points, more than twice as large as the one seen in between the first two periods, and fully explained by changes in the market wage structure. Once again, looking at the last two periods in the data, we observed no improvements in terms of wage inequality.



The estimations regarding the interquintile gaps also tell a different story compared to the salaried market. In the salaried market, there were small, if any, improvements closing the wage gap in the lower part of the wage distribution (q10–q50) for all periods, while most of the inequality improvements were explained by a reduction in the upper section of the wage distribution (q50–q90), except for the last two periods. In the self-employed market, the two periods that experienced a significant decline in wage inequality were also characterized by the wage gap closing both in the upper and lower sections of the wage distribution. The economic structure changes, however, had a delayed impact on wage inequality, and its effects could not be observed until the later years (2011–2012). While no significant improvements to inequality were estimated in the last two periods, measured by both the Gini and 90/10 interquartile statistics, there was a small reduction on the 90/50 wage gap of 0.05 log points, a combination of both wage structure and characteristics changes in the self-employed labor market.

Considering that the salaried and self-employed labor market have experienced different inequality trends, and that the average wage gap between both sectors has also declined, it is important to analyze how all this changes have affected the overall labor income inequality in Urban areas.<sup>26</sup> In [Table 7](#), we present the decomposition of selected distribution statistics for labor earnings in urban areas. While we use the same specification as in previous models, we also include a variable indicating if a worker is employed or self-employed, which is provided in the table.

Based on these estimations, we observe changes in inequality that are similar to those experienced by the wage/salary labor market. Although there was a small decline in inequality between 2000/2002 and 2003/2006, the change in the Gini coefficient is not statistically significant. Similarly, we also observe a statistically significant decline in the Gini coefficient between 2003/2006 and 2011/2012, but no changes afterwards. Consistent with the previous results, the aggregate decomposition suggests that the changes in inequality were driven by changes in the wage structure. Turning into the role of the self-employed market, we observe that the relative growth of the salaried labor market (i.e., decline of the self-employed market size) from 2000/2002 to 2007/2009 played a role restricting the growth of inequality in the urban areas. In contrast, the changes in the wage structure associated to being self-employed, *ceteris paribus* other workers characteristics, contributed to an increase of wage inequality in the 2003/2006 to 2007/2009 period. Between 2007/2009 and 2011/2012, the changes in the wage structure that contributed to the decline of the employed/self-employed gap and the decline of earnings inequality (see [Table 7](#)) also contributed to a decline of wage inequality in the urban area.

Looking at the interquartile gaps, we observe that the changes at the top of the distribution are very similar to the ones we observed for the wage/salary workers ([Table 4](#)), with some indication that the wage structure associated to the self-employed labor market had a small contribution toward reducing wage inequality between 2007/2009 and 2011/2012. The most interesting results come from the decomposition at the lower segment of the distribution. In contrast with the results for the individual markets, we do not observe any significant changes in the lower wage gap (q10–q50) when comparing the first two periods of the data, but we do observe statistically significant changes in the wage gap between 2003/2006 and 2007/2009 driven by changes in the characteristics, and between 2007/2009 and 2011/2012 driven by changes in the wage structure.

## 5. Conclusions

Contrary to the trend in the developed world, Latin American countries have shown a sharp decline in wage inequality during the past decade (2000–2014). Bolivia has also

**Table 7.** Wage inequality decomposition for wage/salary workers and self-employed workers, selected statistics

	Gini				q10–q90			
	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2012/2014	2000/2002 2003/2006	2003/2006 2007/2009	2007/2009 2011/2012	2011/2012 2012/2014
Year 0	0.504	0.492	0.438	0.400	2.426	2.349	2.125	1.956
Year 1	0.492	0.438	0.400	0.400	2.349	2.125	1.956	1.929
Total change	–0.013 (0.011)	–0.054* (0.009)	–0.037* (0.007)	–0.001 (0.005)	–0.078 (0.057)	–0.223* (0.044)	–0.170* (0.032)	–0.026 (0.035)
Change on wage structure	–0.022* (0.008)	–0.052* (0.008)	–0.042* (0.006)	0.004 (0.005)	–0.104 <sup>+</sup> (0.048)	–0.150* (0.048)	–0.160* (0.033)	–0.007 (0.040)
Change on characteristics	0.010 <sup>+</sup> (0.004)	–0.003 (0.003)	0.005 <sup>^</sup> (0.003)	–0.004 <sup>+</sup> (0.002)	0.026 (0.032)	–0.073 <sup>+</sup> (0.034)	–0.010 (0.025)	–0.020 (0.027)
Wage structure	–0.007 (0.007)	0.027* (0.007)	–0.012 <sup>+</sup> (0.005)	0.006 (0.004)	–0.150 <sup>+</sup> (0.061)	0.124 <sup>+</sup> (0.050)	–0.075 <sup>+</sup> (0.037)	–0.000 (0.039)
Characteristics	–0.002 <sup>+</sup> (0.001)	–0.003* (0.001)	0.001 (0.001)	0.001 (0.001)	–0.025* (0.008)	–0.023* (0.008)	0.008 (0.006)	0.007 (0.005)
Self-employed								
	q10–q50				q50–q90			
	1.559	1.443	1.438	1.310	1.173	1.110	1.132	0.967
	1.443	1.438	1.310	1.349	1.110	1.132	0.967	0.918
Year 0	1.313	1.276	1.204	1.110	1.113	1.073	0.922	0.845
Year 1	1.276	1.204	1.110	1.067	1.073	0.922	0.845	0.863
Total change	–0.037 (0.041)	–0.072 <sup>+</sup> (0.033)	–0.093* (0.025)	–0.044 (0.027)	–0.040 (0.042)	–0.151* (0.036)	–0.077* (0.023)	0.018 (0.021)
Change on wage structure	–0.029 (0.039)	0.011 (0.043)	–0.072* (0.028)	–0.026 (0.035)	–0.075 <sup>+</sup> (0.032)	–0.161* (0.031)	–0.088* (0.022)	0.019 (0.018)
Change on characteristics	–0.008 (0.024)	–0.083 <sup>+</sup> (0.033)	–0.021 (0.020)	–0.018 (0.025)	0.035 (0.024)	0.011 (0.015)	0.011 (0.013)	–0.002 (0.011)
Wage structure	–0.129 <sup>+</sup> (0.053)	0.075 (0.046)	–0.047 (0.035)	0.004 (0.037)	–0.021 (0.031)	0.049 (0.031)	–0.028 <sup>^</sup> (0.016)	–0.004 (0.018)
Self-employed								
Characteristics	–0.020* (0.007)	–0.017* (0.006)	0.006 (0.004)	0.006 (0.004)	–0.004 (0.003)	–0.005 <sup>+</sup> (0.002)	0.002 (0.001)	0.001 (0.001)
Self-employed								
N	22 318	20 663	25 580	35 443	22 318	20 663	25 580	35 443

Notes: The sample includes wage/salary workers and self-employed workers in the urban area only. Specification includes all controls used for the full model, including region, industry, and occupation fixed effects. Bootstrap standard errors in parentheses <sup>^</sup> $p < .1$ , <sup>+</sup> $p < .05$ , \* $p < .01$ .

experienced this decline, especially in the second part of the past decade. Using the methodology of RIF regression decomposition, we found that after 2006, wages increased across the wage distribution, with the largest changes observable at lower quintiles. This may be related to legislation, such as increases in the minimum wage as well as anti-discrimination policies.

The analysis for wage inequality among employed and self-employed workers suggest that most of the earnings inequality declines have been driven by changes in the wage structure or return to characteristics of workers. Among other factors, we find that there has been a sharp reduction in returns on higher education at the top of the distribution, as well as increases for returns for low educated workers, which has contributed to the decline of wage inequality. Similarly, wages in occupations with traditionally highly paid jobs have consistently decreased, further contributing to the wage inequality decline. It is possible that the observed changes in inequality are related to increases of the minimum wage, which have multiplicative effects on public-sector wage rates due to salary structures. While these changes have contributed to the decline of wage inequality, improving the earnings of those with otherwise low incomes, the decline in returns on higher education might create incentives for educated workers to look for better job opportunities, leading to potential emigration (brain drain). A lesson from the decompositions is that most of the changes occurred during the second part of the decade in question (2005–2012). This implies that a combination of economic policies and favorable macroeconomic conditions have been successful in reducing wage inequality in urban areas in Bolivia, similar behavior as in most Latin American countries as presented by Székely and Mendoza (2015). This trend of improved wage inequality, however, seems to have halted in the last two years of the data. In this framework, it remains to be seen if these previously observed improvements are long lasting, or if we are observing the beginning of a cycle in the levels of inequality in Bolivia as Lopez-Calva, Lustig, and Ortiz-Juarez (2015) argue for the Latin American countries. Although improvements in the working conditions (wages) of the most vulnerable populations is an important step toward reducing income inequality, to the extent that these changes are not accompanied by equal gains in workers' productivity, the reductions in inequality might not be sustainable in the long run. Therefore, enhanced redistributive policies accompanied by long-term structural policies aimed to increase productivity and educational level should be implemented in order to maintain the trends, otherwise the country risks on a reversal of the trend and the gains in terms of reduction of inequality.

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No potential conflict of interest was reported by the authors.

### Notes

1. National Institute of Statistics (Instituto Nacional de Estadísticas). Accessed November 1, 2016. <http://www.ine.gob.bo/indice/EstadisticaSocial.aspx?codigo=30601>.
2. For further evidence, see Azevedo, Inchauste, and Sanfelice (2013) and Gasparini and Lustig (2011).

3. As seen in [Figure A1](#) in the appendix, total labor earnings account for more than 85% of total household income through the period of analysis. Labor income from the main activity accounts, in average, for about 80% of household income, which has shown a mild but increasing trend as source of household income.
4. Equally important for the analysis of labor earnings inequality in Bolivia is role of the self-employed workers. However, since the determinants of their income are different from those in the wage/salary sector (Muriel and Ferrufino 2014), we choose not to include them in the core of our analysis.
5. For a review of the economic reforms with emphasis on the changes in the labor market, see Muriel and Jemio (2010) and Muriel and Ferrufino (2014).
6. For a more comprehensive review of the labor market reforms in Bolivia, see Muriel and Jemio (2010) and Muriel and Ferrufino (2014).
7. Many state-owned companies went through a capitalization process during the government of Gonzalo Sanchez de Lozada (1993–1997). This process transferred the ownership of 50% of many state companies to private parties.
8. Between 2000 and 2005, the average annual growth rate in the economy was 2.7% based on data from the National Statistics Institute (INE).
9. The trends on wage inequality are also robust when alternative measures are used. In [Figure A2](#) in the appendix, we present the estimates of the Atkinson index using different sensitivity parameters. They show similar trends on inequality as the wage Gini coefficient.
10. In [Figure A2](#) in the appendix, we provide the estimates of the Left and Right Gini's, based on Jantzen and Volpert (2012), which captures inequality on the left and right side of the wage distribution. These estimations also suggest that the declines of inequality come from wage compression at the top of the distribution.
11. Until 2004, these surveys had been 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, the Instituto Nacional de Estadísticas (INE), has independently carried them out. 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. In 2010, no information was collected. Data are available at the INE webpage, [www.ine.gob.bo](http://www.ine.gob.bo). Surveys corresponding to 2013 and 2014 are early released data subject to change.
12. In Bolivia, according to the Labor law, individuals 15 years of age or older are allowed to work legally. In addition, while the retirement age has been officially reduced from 58 years of age in 2010, we maintain the threshold of 65 years as this was the official age of retirement for most of the period of analysis.
13. Wage and salaried workers represent approximately 47% of the employed population in the urban labor market, while self-employed workers represent almost 34%. The remaining 19% comprises workers who cannot be classified in either group, including family workers or apprentices, and household services.
14. In [Figure A3](#), we provide some statistics regarding the urbanization transition that Bolivia has experienced between 1999 and 2014, showing the increasing relevance of analyzing inequality in urban areas.
15. In [Figure A4](#) in the appendix, we provide the calculations of the wage Gini coefficient using the full sample, dropping the observations with zero reported earnings, and dropping top wages restriction. While the Gini estimates for our final sample shows a lower level of inequality, they all show the same trend across years, with the largest difference observed in 2006.
16. For a summary of the changes in the sampling frame of the Household surveys from 1999 to 2011, see Hernani-Limarino et al. (2015).
17. All statistics are estimated using the survey expansion factors as weights. In [Tables A1](#) and [A2](#) in the appendix provide the standard errors corrected by the sample design of the surveys. [Table A3](#) also provide summary statistics regarding the regional composition in our sample.
18. While Molina and Albó (2006) suggest the use of other variables such as auto-identification and language currently spoken for the identification of indigenous populations, first language learned is potentially the least affected by idiosyncratic shocks.
19. This set of variables includes age, age square, sex, ethnicity, education level, public- or private-sector employment, affiliation to labor unions, and dummy variables indicating industry and occupation classifications.
20. Details on the procedures used in the decomposition can be found in Firpo, Fortin, and Lemieux (2007, 2009).
21. 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).
22. The unconditional quantile regressions are estimated using the RIF regressions described above, which, for the case of quintiles, follow the strategy described by Firpo, Fortin, and Lemieux (2009).
23. During Evo Morales' government, legal reforms, such as the modification of the constitution in 2009 and the enactment of the Anti-discrimination law in 2010 (*Ley 045 Contra el Racismo y Toda Forma de Discriminación*) were achieved in order to promote the recognition and participation and protection of indigenous communities, including the modification of the constitution in 2009 (Schilling-Vacaflor 2011) and the enactment of the Anti-discrimination law (*Ley 045 Contra el Racismo y Toda Forma de Discriminación*).

24. It should be noticed that an important factor explaining the decline in wage inequality has been the fall in returns to higher education. If not for such decline in returns, the increasing growth in workers with higher education would have had a negative impact on wage inequality, a phenomenon known as the paradox of progress (see Bourguignon, Ferreira, and Lustig 2005).
25. In Figure A5 in the appendix, we provide the composition of the urban labor market, by wage/salary workers, and self-employed workers.
26. Based on own estimations, the average real monthly earning gap between wage/salary and self-employed workers declined from an average of 0.6 log points between 2000 and 2007, to an average of 0.4 log points between 2008 and 2014.

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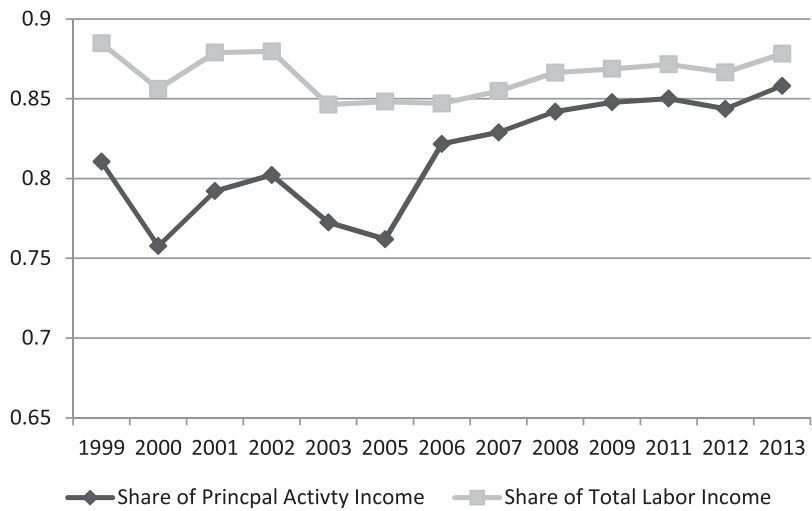
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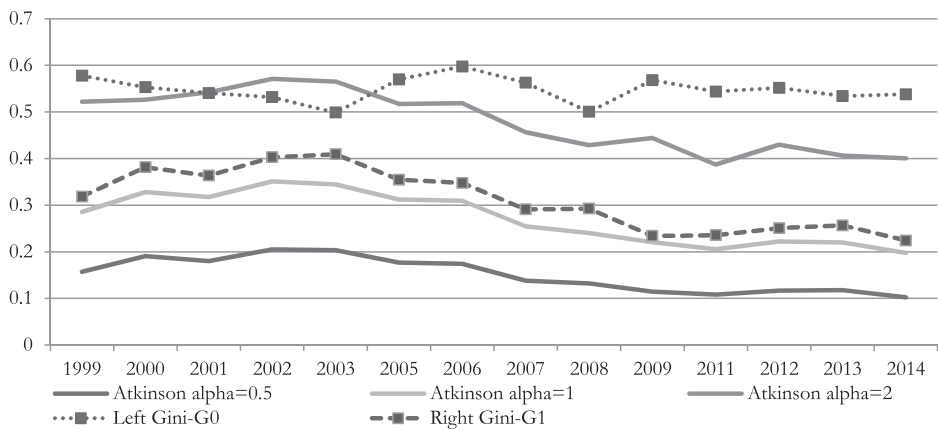
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**APPENDIX**



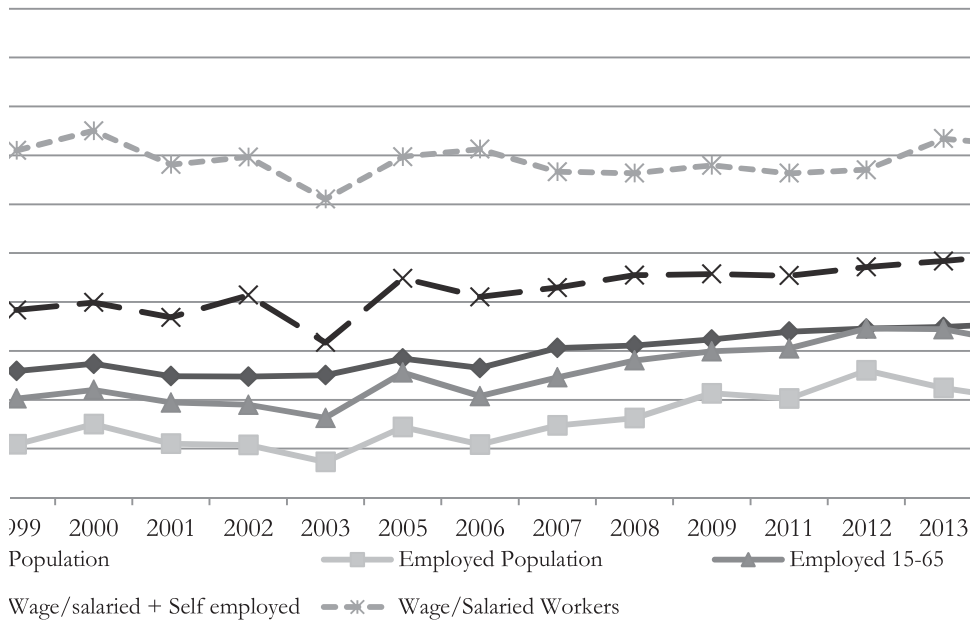
**Figure A1.** Labor income/principal activity labor income as share household income.  
*Source:* Author estimations based on Household Surveys. *Note:* All statistics are estimated using survey weights. Data correspond to averages in urban households.





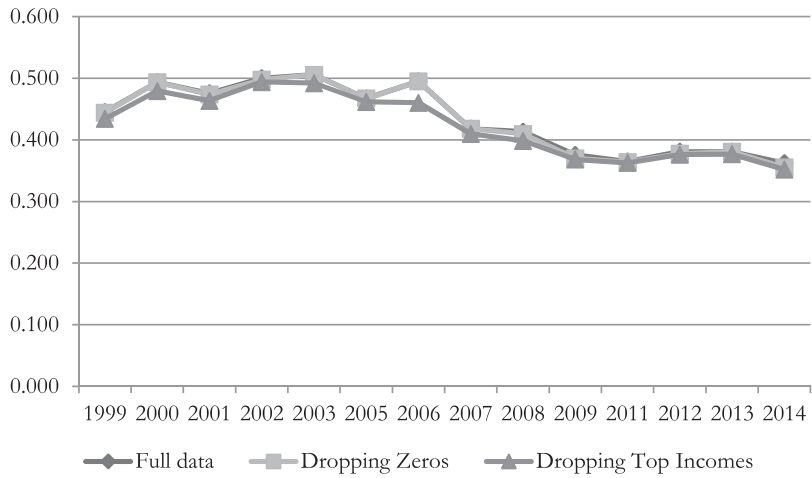
**Figure A2.** Wage inequality trends.

*Source:* Author estimations based on household surveys. *Note:* Wage Inequality indexes estimated for workers in the urban waged and salaried sector only, applying survey weights. Left Gini (G0) and Right Gini (G1) are estimated based on Jantzen and Volpert (2012).



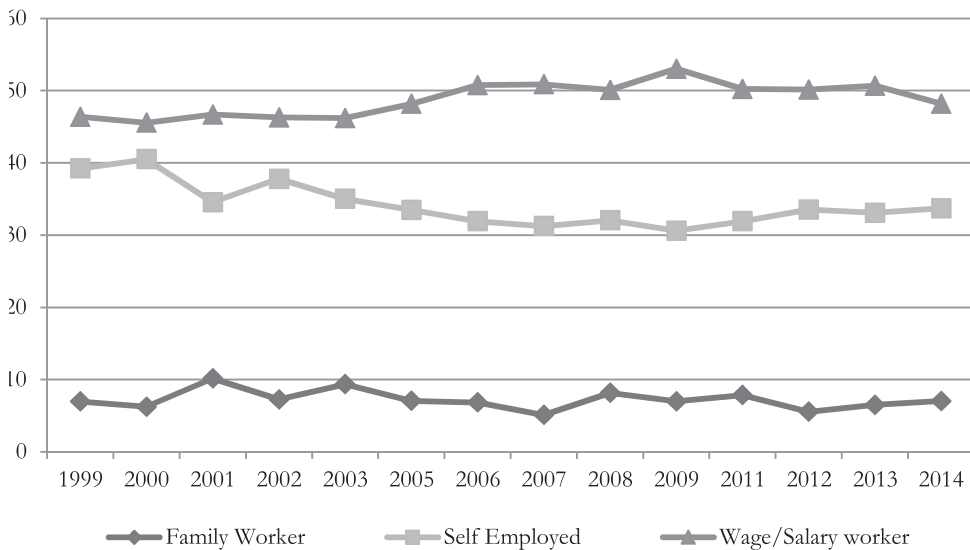
**Figure A3.** Urbanization trends in Bolivia, by population type.

*Source:* Author estimations based on Household Surveys. *Note:* All statistics are estimated using survey weights.



**Figure A4.** Inequality trends: Gini sensitivity to data restrictions.

*Source:* Author estimations based on Household Surveys. *Note:* All statistics are estimated using survey weights. Data correspond to the urban wage/salaried workers between 15 and 65 years of age. Gini for the full distribution is calculated using the Generalized Gini Index.



**Figure A5.** Trends on urban labor market structure.

*Source:* Author estimations based on Household Surveys. *Note:* All statistics are estimated using survey weights. Data correspond to the urban labor market, and workers between 15 and 65 years of age.

**Table A1.** Summary statistics: demographics

	2000–2002		2003–2006		2007–2009		2011–2012		2013–2014	
	Mean	St Error	Mean	St Error	Mean	St Error	Mean	St Error	Mean	St Error
Sex										
Men	68.6%	0.007	67.9%	0.0074	66.0%	0.0063	63.7%	0.0055	62.5%	0.0058
Women	31.4%	0.007	32.1%	0.0074	34.0%	0.0063	36.3%	0.0055	37.5%	0.0058
Ethnicity										
Non-indigenous	79.1%	0.010	82.8%	0.0099	86.7%	0.0075	86.0%	0.0069	86.2%	0.0059
Indigenous	20.9%	0.010	17.2%	0.0099	13.3%	0.0075	14.0%	0.0069	13.8%	0.0059
Age										
15–19	7.8%	0.006	8.9%	0.0053	7.7%	0.0044	7.0%	0.0035	6.8%	0.0033
20–29	36.2%	0.008	34.3%	0.0078	33.9%	0.0071	32.7%	0.0064	32.5%	0.0058
30–39	25.9%	0.008	26.9%	0.0081	28.2%	0.0076	28.4%	0.0061	28.6%	0.0051
40–49	20.1%	0.006	18.5%	0.0069	18.0%	0.0062	17.3%	0.0049	17.4%	0.0047
50–59	8.8%	0.005	9.8%	0.0050	10.1%	0.0050	11.8%	0.0039	11.8%	0.0036
60–65	1.3%	0.002	1.7%	0.0019	2.2%	0.0023	2.7%	0.0020	3.0%	0.0019
Education										
Primary education (1–6)	19.6%	0.0083	18.0%	0.0080	14.6%	0.0068	12.6%	0.0056	11.1%	0.0045
Secondary education (6–11)	24.9%	0.0091	23.4%	0.0084	20.3%	0.0074	18.8%	0.0058	23.5%	0.0054
High school finished	19.7%	0.0064	21.8%	0.0076	24.5%	0.0073	22.5%	0.0055	22.9%	0.0056
Some college	19.8%	0.0086	18.4%	0.0074	18.7%	0.0069	21.0%	0.0054	17.9%	0.0051
College or more	16.0%	0.0085	18.4%	0.0091	21.9%	0.0100	25.0%	0.0072	24.5%	0.0072
Unionization	21.2%	0.0080	18.4%	0.0080	19.4%	0.0079	20.2%	0.0067	16.8%	0.0062
Public sector	24.7%	0.0091	22.3%	0.0086	23.9%	0.0086	25.4%	0.0071	28.1%	0.0071

*Note:* Based on our own calculations using weighted averages for salaried workers in the urban sector, using survey expansion factors. Survey standard errors assuming survey independence across years.

Table A2. Summary statistics: labor market

	2000–2002		2003–2006		2007–2009		2011–2012		2013–2014	
	Mean	St Error	Mean	St Error	Mean	St Error	Mean	St Error	Mean	sd
Wage level										
Less than 1 Min wage	17.6%	0.0068	18.2%	0.0073	9.9%	0.0053	12.2%	0.0045	16.2%	0.0044
1–2 min wages	33.1%	0.0081	34.8%	0.0096	25.2%	0.0068	29.0%	0.0063	36.1%	0.0060
2–3 min wages	21.0%	0.0062	20.0%	0.0070	25.4%	0.0070	25.9%	0.0060	24.6%	0.0052
More than 3 min wages	28.4%	0.0094	27.0%	0.0107	39.5%	0.0094	32.9%	0.0073	23.1%	0.0062
Industry										
Agriculture-silviculture	3.6%	0.0033	3.1%	0.0039	2.5%	0.0036	2.9%	0.0031	2.2%	0.0023
Mining	2.1%	0.0026	1.8%	0.0030	2.2%	0.0035	2.6%	0.0037	2.9%	0.0037
Manufacture	17.7%	0.0078	17.6%	0.0077	15.5%	0.0068	14.4%	0.0053	14.2%	0.0057
Electricity, Gas and Water	1.3%	0.0021	1.0%	0.0017	0.7%	0.0012	1.2%	0.0014	0.9%	0.0010
Construction	11.2%	0.0080	11.8%	0.0067	12.6%	0.0068	12.0%	0.0056	12.1%	0.0045
Retail and repair	12.0%	0.0064	12.0%	0.0076	12.1%	0.0056	13.2%	0.0048	12.4%	0.0043
Food and hospitality	3.9%	0.0031	4.4%	0.0038	4.4%	0.0034	5.6%	0.0031	5.2%	0.0026
Transport	9.3%	0.0051	10.5%	0.0053	10.1%	0.0047	8.6%	0.0035	7.7%	0.0029
Financial services	2.1%	0.0028	1.5%	0.0020	2.3%	0.0023	2.5%	0.0019	3.3%	0.0020
Real State	5.6%	0.0042	5.8%	0.0044	5.4%	0.0035	6.0%	0.0030	6.2%	0.0027
Education	7.6%	0.0045	7.7%	0.0047	9.3%	0.0057	8.7%	0.0038	9.5%	0.0036
Social services and health	18.4%	0.0075	17.0%	0.0072	18.5%	0.0068	18.6%	0.0054	20.1%	0.0058
Other services	5.2%	0.0037	5.7%	0.0036	4.2%	0.0029	3.7%	0.0023	3.4%	0.0021
Occupation										
Management	3.2%	0.0029	3.5%	0.0036	2.5%	0.0023	3.5%	0.0022	4.3%	0.0024
Professionals	12.4%	0.0064	13.4%	0.0066	16.3%	0.0072	20.4%	0.0061	22.2%	0.0062
Technicians and support	13.7%	0.0065	13.2%	0.0059	14.6%	0.0055	11.4%	0.0041	12.9%	0.0038
Clerical workers	11.1%	0.0054	10.1%	0.0052	10.2%	0.0054	9.9%	0.0040	8.6%	0.0032
Services and retail	11.8%	0.0057	12.7%	0.0066	14.0%	0.0058	14.2%	0.0047	13.9%	0.0044
Mining, construction and manufacture	24.9%	0.0112	24.6%	0.0090	22.5%	0.0086	16.9%	0.0057	18.6%	0.0055
Machine operators/installation	10.6%	0.0054	10.6%	0.0054	9.2%	0.0044	8.5%	0.0044	8.5%	0.0043
Unqualified workers	12.2%	0.0053	11.9%	0.0062	10.7%	0.0053	15.1%	0.0054	11.0%	0.0042

*Note:* Based on our own calculations using weighted averages for salaried workers in the urban sector, using survey expansion factors. Survey standard errors assuming survey independence across years.

**Table A3.** Summary statistics: regions.

	2000–2002		2003–2006		2007–2009		2011–2012		2013–2014	
	Mean	St Error	Mean	St Error	Mean	St Error	Mean	St Error	Mean	Mean
Chuquisaca	3.8%	0.0059	3.5%	0.0058	3.8%	0.0073	4.3%	0.0078	4.2%	0.0068
La Paz	29.8%	0.0194	27.4%	0.0212	28.3%	0.0209	28.2%	0.0133	26.8%	0.0118
Cochabamba	17.0%	0.0153	15.0%	0.0156	16.3%	0.0169	16.7%	0.0131	15.5%	0.0146
Oruro	4.2%	0.0056	3.5%	0.0056	3.8%	0.0070	3.7%	0.0062	4.6%	0.0070
Potosi	4.0%	0.0052	3.8%	0.0059	3.3%	0.0068	3.3%	0.0061	3.8%	0.0070
Tarija	4.1%	0.0052	4.6%	0.0073	6.0%	0.0109	5.3%	0.0082	5.4%	0.0059
Santa Cruz	31.7%	0.0227	36.6%	0.0268	33.4%	0.0227	33.6%	0.0179	34.5%	0.0169
Beni	4.9%	0.0064	5.1%	0.0085	4.4%	0.0088	4.2%	0.0072	4.0%	0.0057
Pando	0.4%	0.0013	0.6%	0.0014	0.8%	0.0038	0.6%	0.0013	1.0%	0.0018

*Note:* Based on our own calculations using weighted averages for salaried workers in the urban sector, using survey expansion factors. Survey standard errors assuming survey independence across years.