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Abstract

This paper documents an inverse U-shape in the evolution of wage inequality in Latin America since 1995, with a sharp reduction starting in 2002. The Gini coefficient of wages increased from 42 to 44 between 1995 and 2002 and declined to 39 by 2015. Between 2002 and 2015, the 90/10 log hourly earnings ratio decreased by 26 percent. The decline since 2002 was characterized by rising wages across the board, but especially among those at the bottom of the wage distribution in each country. Triggered by a rapid expansion of educational attainment, the wages of college and high school graduates fell relative to those with primary education. The premium for labor market experience also fell significantly. But the compression of wages was not entirely driven by changes in the wage structure across skill groups. Two-thirds of the decline in the variance of wages took place within skill groups. Changes in the sectoral, occupational, and formal-informal composition of jobs matter for the process of reduction in inequality, but do not fully account for the fall in within-skill variance. Evidence using longitudinal matched employer-employee administrative data suggests that an important driver was falling wage dispersion across firms.[1]

JEL classifications: F16, F41, J31

Keywords: Inequality, Labor Markets, Firm Dynamics, Development, Schooling and Experience Premiums, Informality

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1. Introduction

Triggered by the so-called commodity super cycle, Latin America experienced vigorous growth during the 2000s coupled with falling household income inequality (Alvaredo and Gasparini 2015; Lakner and Milanovic 2013). More than redistributive policies, the main force behind this inequality reduction was falling wage dispersion (López-Calva and Lustig 2010; Azevedo, Inchauste, and Sanfelice 2011; Rodríguez-Castelán et al. 2016). This is in stark contrast with increasing wage inequality in developed (Acemoglu and Autor 2011; Atkinson 2008) and other developing countries, including China (Ge and Yang 2014), India (Lee and Wie 2017), and Indonesia (Lee and Wie 2015). These differences raise two important questions. First, what are the main patterns behind the reduction in wage inequality in Latin America? Second, what are the forces behind these patterns? This paper breaks new ground on these questions using household surveys and matched employer-employee data.

This paper provides systematic evidence of the evolution of wage inequality in Latin America between 1995 and 2015, emphasizing the main stylized facts with which any potential story about inequality reduction in the region should be consistent.[2] It first documents the main wage inequality trends, highlighting differences across countries. To this end, it uses harmonized household surveys for 16 countries during 1995–2015 (covering the formal and informal workforce). Using these data, this paper disentangles the evolution of wages at the bottom and top of the wage distribution in each country and analyzes the changes in relative wages across skill groups. It then decomposes the evolution of wage inequality into forces operating between demographic and skill groups and within them. In this vein, it examines whether changes in wage inequality occurred within sectors-occupations or were associated with compositional changes, and assesses the potential contribution of labor formalization to changes in inequality. In line with recent studies, it emphasizes the role of firms (Card, Heining, and Kline 2013; Alvarez et al. 2018; Song et al. 2018). In particular, it uses detailed longitudinal matched employer-employee administrative data covering the formal sector in Brazil, Costa Rica, and Ecuador to identify the contribution to changes in inequality of changes in wage dispersion among workers, changes in pay across firms within sectors, and their interactions.

The paper builds on Messina and Silva (2018), which summarizes the main findings of a large research project on wage inequality in Latin America. It reports on these analyses and complement them in four important ways. First, the paper assesses trends in (overall,

[2]Unless otherwise noted, the analyses focus on the evolution of hourly earnings from labor of employees and self-employed workers. Hence, employers and unpaid family workers are excluded. This paper uses earnings and wages interchangeably to refer to this measure of remuneration.

between-group, and within-group) wage inequality, using harmonized information on wages across household surveys. For comparability, all trends depicted use the same sample of countries and years. Second, the paper provides new evidence on the importance of changes in wage inequality between and within sector-occupation-formality status, using the harmonized household data. Third, it extends the analysis on the role of firms in inequality trends, using longitudinal matched employer-employee administrative data from the formal sector in Brazil, Costa Rica, and Ecuador. Fourth, it provides an assessment of what we know and do not yet know about the potential drivers of the change in wage structure in Latin America, highlighting the most promising avenues for further research.

Our analysis yields three main empirical results. First, it finds that wage inequality started falling in 2002 in all countries in the region in which wages can be consistently measured over time, except Costa Rica. Despite the common trends, the wage inequality dynamics varied markedly across two groups of countries. Countries that benefited from the commodity boom in South America experienced stronger growth and much deeper reduction in inequality during the 2000s. Wages grew across the board, but growth was monotonically decreasing across each countries' wage distribution. In virtually every country, wage growth was much faster at the bottom 10th percentile than at the median and 90th percentile. Net commodity importers in Central American economies and Mexico displayed more modest reductions. They also experienced a compression in the lower and upper tails of each countries' wage distributions, but the compression at the top resulted from a combination of slow growth of median wages and virtual stagnation of real hourly wages among earners in the 90th percentile.

Second, the paper shows that these dynamics are associated with declining skill premiums and a reduction in within-group inequality during the 2000s. The college-to-primary earnings premium declined in all countries. By contrast, education premiums increased slightly during the 1990s (Galiani and Sanguinetti 2003; Pavcnik et al. 2004; Robertson 2004).[3] It also finds a secular decline in the experience premium since 1995, likely contributing to the inequality decline.[4] Although the reported changes in the skill premium are important, the analysis shows that two-thirds of the decline in inequality during 2002–15 is explained by changes in the wage structure within skill groups. Residual (within schooling, age, and gender cells) changes in wage inequality trace changes in total inequality remarkably well and are only

[3]The importance of the evolution of the skill premium has been emphasized in the literature. See López-Calva and Lustig (2010), Tavares and Menezes-Filho (2011), Azevedo et al. (2013), Rodríguez-Castelán et al. (2016), Galiani et al. (2017), and Fernández and Messina (2018).

[4]Campos-Vázquez, López-Calva, and Lustig (2016) document the decline in the experience premium among college workers in Mexico. Firpo, Ferreira, and Messina (2017) find that the decline in the experience premium was a key factor behind the decline in wage inequality in Brazil.

partially explained by changes in the composition of employment across sectors, occupations, and the formal or informal status of the worker.

Third, the study provides compelling evidence that the evolution of wage compression across firms is an important driver of wage inequality dynamics among workers in the formal sector. Using matched employer-employee data from Brazil, Costa Rica, and Ecuador, it decomposes the evolution of the wage variance into four components: changes across workers, changes across firms, changes in the assortativity between workers and firms, and a residual. The results show a prominent role of changes in the dispersion of wages across firms.[5] In Costa Rica, where inequality increased, the firm fixed-effects component grew the most. In Brazil and Ecuador, where inequality fell, the firm fixed-effects component fell the most.[6] Moreover, in Brazil and Ecuador, inter-firm differences in pay for similar workers fell, contributing (more than intra-firm dynamics) to less inequality. The important fall in between-firm wage inequality in Brazil and Ecuador is in sharp contrast with results for developed economies where, just like in Costa Rica, between-plant wage inequality has grown over time. Overall, these results highlight the importance of considering firm heterogeneity when examining the drivers of wage inequality in the region.

How could wage inequality decline in Latin America when global forces, in particular skill-biased technical change and job polarization, are increasing the dispersion of wages elsewhere (Autor, Katz and Kearney 2008; Goos, Manning, and Salomons 2009)? This paper assesses changes in employment and wages across detailed occupations in Brazil, Chile, Mexico, and Peru and finds little evidence of job polarization, perhaps with the exception of Chile. Wages expanded rapidly in low-paying occupations relative to high-paying occupations, while technological advances that complement skill intensive occupations predict the opposite. There was no hollowing out in the wage distribution, because occupations with middle and high skill content expanded slowly and at a similar rate, while occupations with low skill content declined much faster. Evidence from other emerging countries also shows little sign of polarization (Maloney and Molina 2016). Thus, the absence of skill-biased technical change and job polarization has facilitated the decline of wage inequality in the region and raised the question of what other factors could have contributed to this trend, including changes in labor supply, commodity boom, trade shocks, formalization, and increasing minimum wages, as discussed in the last section of this paper.

[5]The analysis follows Abowd, Kramarz, and Margolis (1999) and Card, Heining, and Kline (2013).

[6]For Brazil, the analysis confirms for the overall formal sector workforce the findings of Alvarez et al. (2018), which focuses on prime-age males in this sector.

The rest of the paper is organized as follows. Section 2 documents trends in wage inequality during 1995–2015. Section 3 describes the evolution of the schooling and experience premiums in the region and the linked changes in labor supply. Section 4 discusses the role of technological change and polarization in relative wages and employment. Section 5 decomposes the changes in wage inequality into between- and within-skill group components and between- and within-sector occupations. Section 6 examines the role of informality in the evolution of inequality. Sector 7 explores the role of firm heterogeneity in the observed trends, decomposing levels and changes in the wage variance into worker and firm components and between- and within-firm components among formal workers. Section 8 discusses possible drivers of the observed trends. Section 9 concludes.

2. Wage Inequality: New Trends in the New Millennium

This section presents the evolution of wage inequality in Latin America during 1995–2015. It measures wage inequality and characterizes its evolution using household data for 16 countries harmonized by the Socioeconomic Database for Latin America and the Caribbean (SEDLAC), World Bank and the Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS). The earnings measure this paper uses, unless noted otherwise, is hourly earnings in the main job. This measure was obtained by harmonizing the earnings and hours of work information from the different household surveys.[7] The appendix S1.1 provides the details. The sample includes all workers 16 to 65 years-old who are employees or self-employed. Hence, unpaid family workers and employers are excluded from the sample. Sampling weights are used for all the reported statistics. Regional averages are unweighted.[8] The data include more than 14,908,680 observations and represent 87.54 percent of the region's working-age population in 2015.

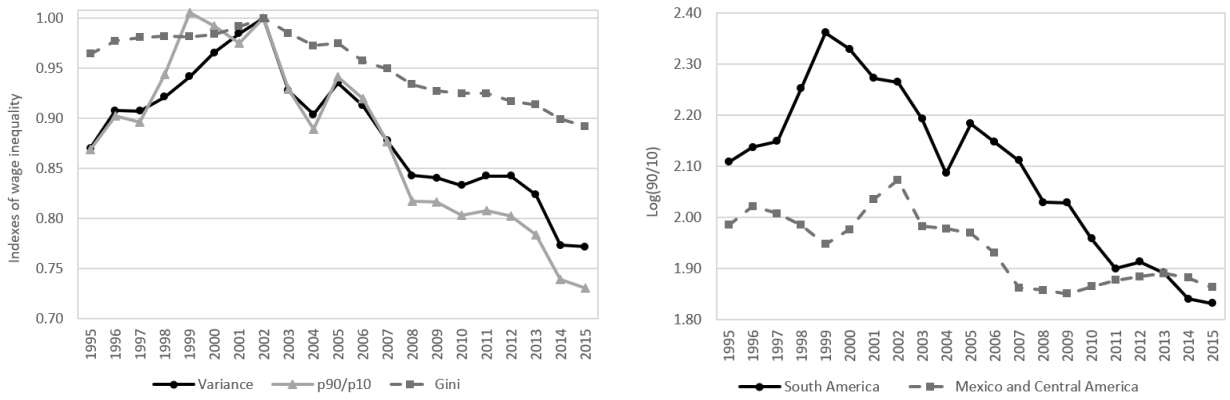
Figure 1 depicts the evolution of wage inequality since 1995. Wage dispersion had a very

[7]Earnings are take-home pay, after social security taxes have been paid. They include bonuses that workers receive on a regular basis (monthly or more frequently), but exclude bonuses paid less frequently than monthly. Hourly wages are total labor income from the main activity divided by hours of work in that activity. Nominal hourly wages are converted into real terms using national consumer price index deflators and expressed in dollars using 2005 purchasing power parity. The 1st and 99th percentiles of real hourly wages in each country-year were trimmed.

[8]Regional averages refer to Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay, the countries for which comparable series of wages covering 1995–2015 were available. To avoid averaging across a different number of countries over years, the series were interpolated when a data point was missing. See appendix S1.1 for details. The main text reports unweighted regional averages and appendix S3 reports regional results weighted by population.

distinct evolution before and after 2002 (figure 1a). Between 1995 and 2002, wage inequality increased, but the trend was not common across countries. Wage inequality declined in Brazil, Chile, and Nicaragua; remained relatively stable in Peru, Mexico, and Paraguay; and rose vigorously in Argentina, Bolivia, Costa Rica, Honduras, Panama, El Salvador, and Uruguay.[9] However, the regime shift in 2002 constituted a region-wide phenomenon. With the sole exception of Costa Rica, inequality declined over 2002–15 in all countries in the region where household survey data allow tracing individual wages in a consistent manner over time, independently of the inequality metric considered.[10]

Figure 1: Wage Inequality Trends in Latin America



(a) LAC (b) South America vs. CAM

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Index base: 2002=1. The regional aggregates are unweighted averages of each inequality measure (Gini, p90/p10, and variance of log wages) from 13 countries (Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay). To analyze the same set of countries every year, interpolation was applied when country data were not available for a given year. Wages are defined as real hourly income (using 2005 purchasing power parity conversion rates) in the main occupation. The sample was restricted to individuals ages 18 to 65 years who were employees or self-employed. The 1st and 99th percentiles of the country-year wage distributions were trimmed. South America includes Argentina, Bolivia, Brazil, Chile, Paraguay, Peru, and Uruguay; CAM includes Costa Rica, Honduras, Mexico, Nicaragua, Panama, and El Salvador. CAM = Central America and Mexico; LAC = Latin America and the Caribbean.

The decline in wage inequality was substantial and robust to the choice of index. According to the Gini coefficient, earnings inequality declined by 5 points (from 44 to 39) between 2002 and 2015. This represents a total reduction of 11 percent. The reductions in the variance of earnings (-23 percent) and the log 90/10 differential (-26 percent) were even more significant. Despite the commonalities in the decline, the magnitudes of the reduction were heterogeneous across two subgroups of countries. Figure 1, panel b, shows that the decline in wage inequality was mild in Central America and Mexico (a 18 percent reduction in the wage differential between the 90th and 10th percentiles over 2002–15). The global financial crisis that hit the

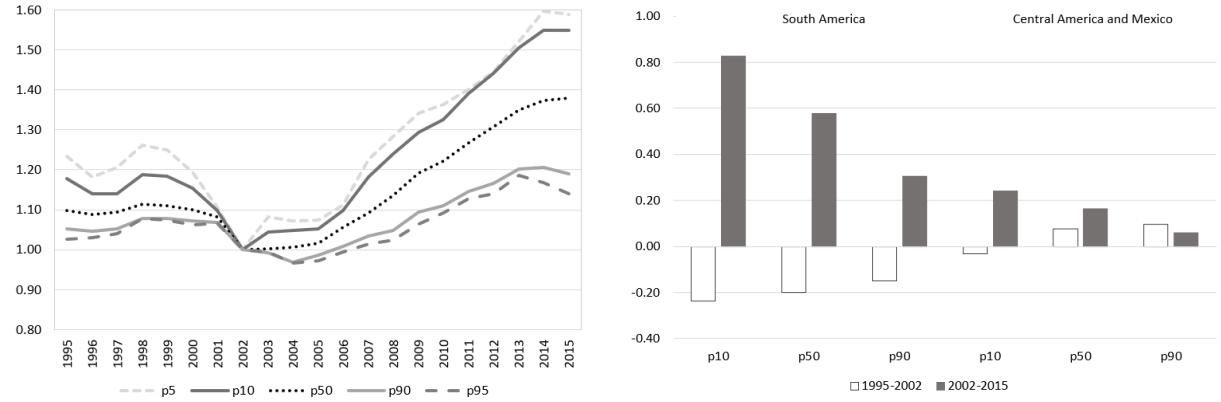
[9]The presentation in the main text focuses on regional averages. See appendix S2 for detailed country results.

[10]Figure 1 presents simple averages (unweighted) for Latin America. The same figure using weighted averages (by population) is presented in appendix S3.

United States affected inequality in this subregion, with a slight increase between 2009 and 2011 and a decline again thereafter. In South America, the decline in the 90/10 differential was much stronger and started in 1999. Overall, inequality fell by almost 34 percent between 2002 and 2015 in this subgroup of countries.

Inequality declined because real wages at the bottom of the wage distribution grew faster than those at the top. Figure 2, panel a, plots the unweighted regional average evolution of the 5th, 10th, 50th, 90th, and 95th percentiles of real hourly wages in each country during 1995–2015. The index numbers are centered at 2002, to highlight the contrasting trends between 1995-2002 and 2002-15. During 1995-2002, all wages declined, but the decline was more pronounced at the bottom than at the top of the wage distribution. During 2002-15, there was a monotone compression of the distribution of wages, with the wages of the 5th percentile earners growing at the fastest pace, and the wages of workers at the 95th percentile growing at the lowest pace. Real wages of the bottom (5th) 10th percentile earners grew by a remarkable (59) 55 percent between 2002 and 2015, while the wages at the (95th) 90th percentile grew by (14) 19 percent. Meanwhile, median real wages grew by 38 percent.

Figure 2: Wage Growth by Percentile in Latin America, 1995–2015



(a) Index (2002=100) of real hourly wages

(b) Growth rate of real hourly wages by subregion

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Index base: 2002=1. Regional averages are unweighted, and display the average evolution of the 5th, 10th, 50th, 90th, and 95th percentiles of real hourly wages in each country during 1995–2015. See note of Figure 1 for sample details and variable definitions.

There was an important contrast in the evolution of wages in countries in South America versus Central America and Mexico during 2002-15 (figure 2, panel b). In South America, all wages grew, and the decline in inequality was driven by much faster growth at the bottom (82 percent growth in the bottom 10th percentile) than at the top (31 percent growth in the 90th percentile). In Central America and Mexico, the reduction in inequality was marked by moderate growth of real wages at the bottom (24 percent in the 10th percentile) and a virtual

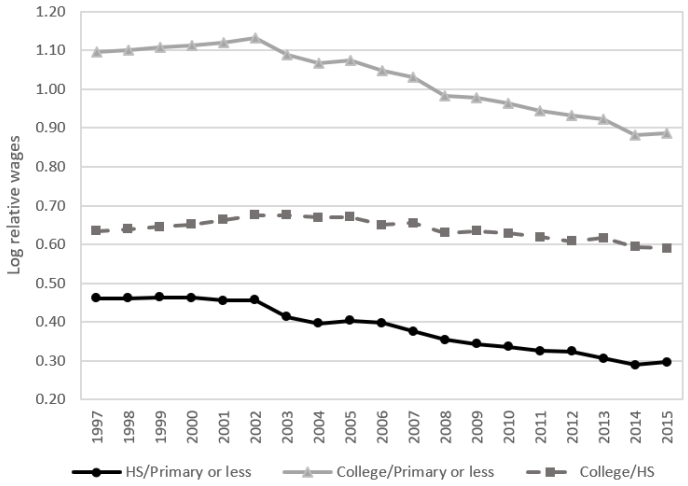
stagnation of real wages at the top (6 percent growth in the 90th percentile).

3. Declining Schooling and Experience Premiums and Changes in Labor Supply

Education and experience are key factors in the determination of earnings. Hence, changes in the schooling and experience premiums often move hand in hand with inequality. To obtain a better understanding of the evolution of inequality between skill groups, that is, across groups with different levels of education and experience, this paper analyzes the evolution of composition-adjusted schooling and experience premiums in the region. The composition adjustment is constructed in three steps. First, mean (predicted) log real wages are computed for 40 skill-demographic cells resulting from the interaction of five education categories, four potential experience categories defined in 10-year intervals (0-9, 10-19, 20-29, 30 or more), and gender. Second, the wages of broader education or experience groups are reconstructed using fixed-weighted averages of the cell means that compose each group, where the weights are determined by the average employment share of each cell in the period.[11] Third, the wage gaps are constructed by differentiating the predicted log hourly real wages across groups. Thus, the skill-demographic composition of the groups is kept constant over time, isolating changes in the premiums.

[11]Results may vary depending on the weight chosen. A similar analysis was conducted using employment shares in the first and last year of the data, respectively, as alternative weights. The results, available upon request, are virtually identical to those reported in the text.

Figure 3: Evolution of Composition-Adjusted Schooling Premiums



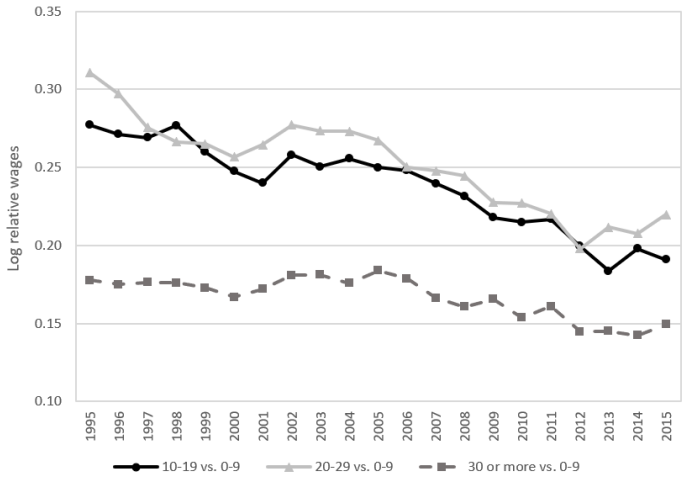
Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Composition-adjusted wage gaps are constructed in three steps. First, mean (predicted) log real purchasing power parity-adjusted hourly wages are computed for 40 skill-demographic cells resulting from the interaction of five education categories (primary completed or less, high school dropouts, high school graduates, college dropouts, and college graduates or more), four potential experience categories defined in 10-year intervals (0-9, 10-19, 20-29, and 30 or more), and gender. Second, the wages of broader education groups are reconstructed using fixed-weighted averages of the cell means that compose each group, where the weights are the average employment share of each cell in the period. Third, the wage gaps are constructed by differentiating the predicted log hourly wages across groups. See footnote of Figure 1 sample details and variable definitions.

The evolution of the schooling premium traces closely the observed changes in wage inequality, with a mild rise during 1995–2002 and a sharp decline thereafter (figure 3). Workers with primary education or less experienced a reduction of 0.25 log points (22 percent) in their wage gap with respect to college graduates in 2002–15, and a reduction of 16 log points (15 percent) in the gap with respect to high school graduates. The relative premium for college education with respect to high school completion declined by just 13 percent. This suggests that it was the rapid rise of wages at the bottom, for those workers who had at most completed primary education, that drove the decline in the education premium. These changes took place across the board in South America, Mexico, and Central America (see appendix S2, table S2.3). After 2002, the premium for high school and college graduates declined with respect to primary education or less in virtually every country. As was the case for the inequality trends, the only regional exception was Costa Rica, which experienced an increase of 16 percent in the college premium with respect to primary education.

Adjusting for changes in the composition of employment, the premium for workers with high levels of experience declined steadily throughout the period (figure 4). In particular, the premium for 20-29 years of potential experience with respect to 0-9 years of labor market experience declined by nine percentage points over 1995–2015, from an average of 31 percent

in 1995 to 22 percent in 2015. By contrast, the wages of workers with moderate levels of experience, 10-19 years, remained relatively stable with respect to those of new entrants. Appendix S2, Table S2.4, shows that this trend was not driven by a single country or groups of countries, although the 20-29/0-9 experience wage gap stagnated between 1995 and 2015 in Costa Rica and El Salvador and increased moderately in Honduras and Paraguay. Across regional subgroups, the decline in the experience premium was more pronounced in South America than in Mexico and Central America.

Figure 4: Evolution of Composition-Adjusted Experience Premiums

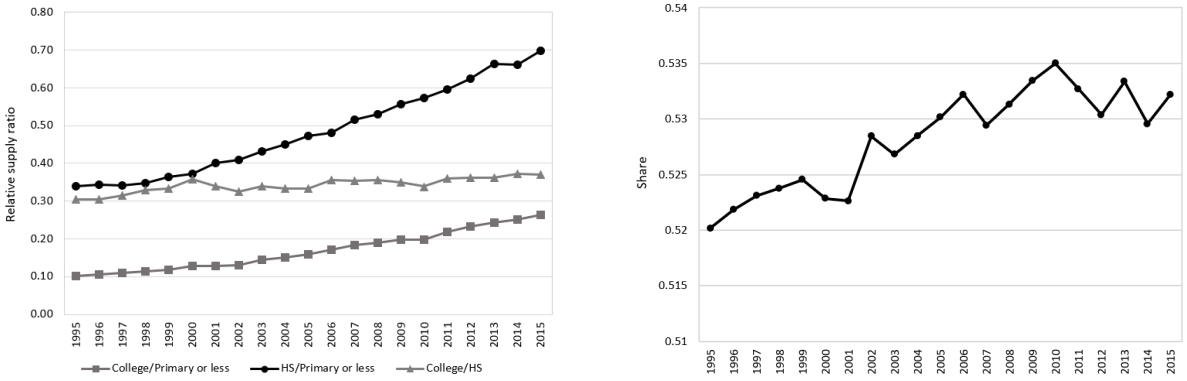


Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Composition-adjusted wage gaps are constructed in three steps. First, mean (predicted) log real purchasing power parity-adjusted hourly wages are computed for 40 skill-demographic cells resulting from the interaction of five education categories (primary completed or less, high school dropouts, high school graduates, college dropouts, and college graduates or more), four potential experience categories defined in 10-year intervals (0-9, 10-19, 20-29, and 30 or more), and gender. Second, the wages of broader education groups are reconstructed using fixed-weighted averages of the cell means that compose each group, where the weights are the average employment share of each cell in the period. Third, the wage gaps are constructed by differentiating the predicted log hourly wages across groups. See footnote of Figure 1 for sample details and variable definitions.

In the canonical model of the labor market, labor supply trends have a key role in changes in the schooling and experience premiums. An extensive literature assesses the role of labor supply in changes in the schooling premium in the United States (Katz and Murphy 1992; Autor, Katz, and Kearney 2008) and its interaction with different levels of experience (Card and Lemieux 2001). The consensus for the United States is that demand for and supply of skills have increased over the past decades. However, the increase in supply has not been enough to catch up with the rapidly rising demand for skills, and the skill premium has soared. In the words of Goldin and Katz (2008), education lost the race with technology. The story in Latin America was different, at least during the 2000s when the skill premium was falling. Increases in the relative supply of highly educated (or experienced) workers may result in a reduction of the schooling (experience) premium if the increase in workers outweighs changes

in demand.

Figure 5: Changes in Labor Supply, 1995–2015



(a) Evolution of different levels of education (b) Share of workers with 20+ years of experience

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Regional averages are unweighted. Panel a shows the relative supply in the working age (18-65) population, while panel b shows the ratio of high experience workers (more than 20 years) with respect to all employed working-age (18-65) individuals. All education categories follow country-specific classifications for university degrees, secondary education, and primary education, as defined in each household survey. The college-educated labor force comprises workers who completed a university degree or higher. "HS" denotes completed secondary education and incomplete college education. "Primary or less" includes no formal education, incomplete primary, complete primary, and incomplete secondary education. Experience refers to potential experience, measured as age-years of education-6. See note of Figure 1 for sample of countries included in the regional averages.

Figure 5, panel a, plots the evolution of the supply of labor by level of education. In 1995, the region had one college graduate in the working-age population ages 16 to 65 for every 10 workers with primary education or less. By 2015, this ratio had increased to 0.26. The relative supply of high school graduates with respect to primary or less education more than doubled during the period, from 0.34 to 0.70. The steady increase in the educational attainment of the workforce was a possible contributor to the decline in the schooling premium. However, relative supply trends show no acceleration after 2002, the period during which inequality began to decrease. Instead, educational attainment increased fairly steadily during the past 20 years. Thus, changes in supply may not be enough to explain the evolution of the schooling premium. Confirming this intuition, Galiani et al. (2017) and Fernández and Messina (2018) evaluate the role of labor supply trends in time-series models of the college and high school wage premiums across Latin American countries. They conclude that educational upgrading had an important role in the evolution of between-group inequality, but demand factors cannot be disregarded. The relative demand for college educated workers with respect to unskilled workers followed a hump-shaped pattern, rising in the 1990s and falling after 2002.

Aggregate experience trends indicate that population aging has more than compensated for rising educational attainment. Potential labor market experience increases when the population ages. However, increasing educational attainment implies that younger cohorts spend

more time in school, delaying their entry into the labor market. Overall, population aging has more than offset the effects of delayed entry into the labor market, and the share of workers with 20 or more years of experience increased by about 1.25 percentage points over the period. However, these aggregate trends hide substantial heterogeneity in two dimensions. The first dimension is across countries. Potential experience rose in Brazil, Chile, Costa Rica, Mexico, Panama, and Peru. In the rest of the countries, it remained constant or mildly declined. The second dimension is across schooling groups. In those countries, such as Argentina and Chile, where the expansion of secondary education took place earlier, it was primarily high school graduates who were aging. In Brazil and other countries that increased access to secondary education later, changes in the experience mix are more noticeable among the least educated. Fernández and Messina (2018) show that changes in the relative labor supply of experienced workers have more bearing in explaining the experience premium among less educated workers than among highly skilled individuals in Argentina, Brazil, and Chile.

4. Lack of Polarization in Latin America

The canonical model of the labor market, with two skill groups and factor-augmenting technology, has been quite successful in explaining the rising skill premium in the United States during the 1980s and 1990s (see Katz and Murphy 1992; Autor, Katz, and Krueger 1998). However, changes in the structure of occupations in the United States were only monotonically increasing in skill content during the 1980s (Acemoglu and Autor 2011). In the 1990s, the changes in the employment shares show signs of polarization. Relative employment growth was rapidly rising in the top occupations in terms of skill content, but also in the bottom, where jobs are intensive in manual, non-routine tasks. Meanwhile, the occupations in the middle of the skill distribution lost relative weight. Goos, Manning, and Salomons (2009, 2011) show that these trends are not unique to the United States. High-paying and low-paying occupations expanded relative to middle-wage occupations in the 1990s and 2000s in 16 OECD countries.

Computers and information and communications technologies have certainly reached the most dynamic firms in developing countries (World Bank 2016). However, the relative abundance of low skill labor and different barriers to the diffusion of technology can slow down the process of technological change (Messina 2017). Are there signs of job polarization in Latin America?

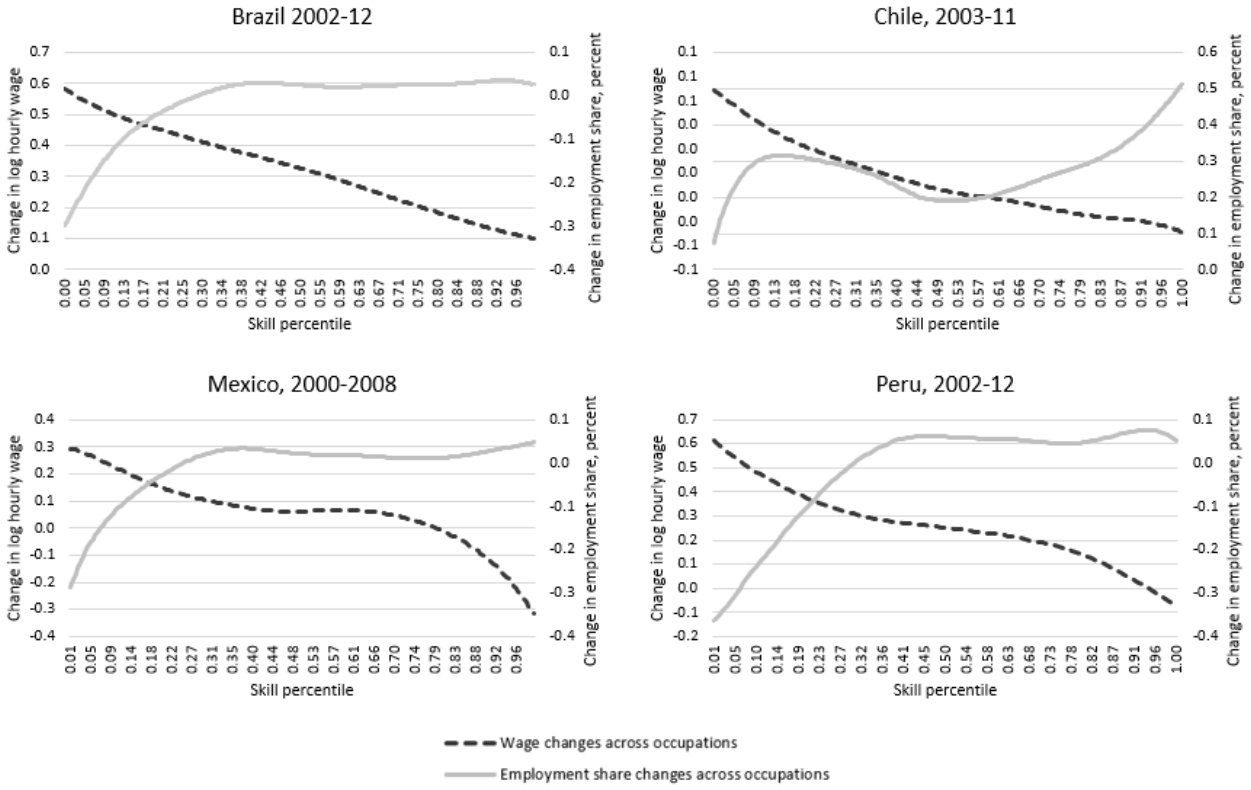
An important challenge for the study of occupation polarization in the region is that most household surveys change the classification of occupations over time, limiting the possibility to make detailed comparisons over long periods. Figure 6 shows changes in the employment

and wages of four-digit-level occupations in Brazil, Chile, Mexico, and Peru—four countries that have household survey data with a homogeneous occupation classification during the 2000s (288 occupations in Brazil, 210 in Chile, 184 in Mexico, and 113 in Peru). Each panel shows the changes (in percentage) in employment over time for detailed occupations that are ranked by skill percentile in the base year.[12] Since the sum of the shares must equal one in the baseline and end years, the total change in the shares depicted is zero. The figure also shows the log changes in the wages of each skill percentile.

With the exception of Chile, figure 6 shows no sign of job polarization. In Chile, employment growth was concentrated among high-skill and, to a lesser extent, low-skill occupations, while there was a contraction in employment in the middle of the distribution. The other three countries had modest growth of similar magnitude among occupations in the middle- to high-wage range. Only occupations below the 30th percentile in the skill distribution display employment losses. If anything, there are mild signs of skill-biased technical change in the changes in occupational structure. However, compared with the United States during the 1980s and 1990s, growth among high-skill occupations in the four countries was modest. Using census data, Maloney and Molina (2016) study changes in occupations in 21 developing countries, including Brazil, the Dominican Republic, Ecuador, El Salvador, Mexico, Nicaragua, Panama, and Peru. Their findings are consistent with those observed in the household surveys. They report no significant decline in occupations that are easily codifiable, such as operators and assemblers. Moreover, elementary occupations appeared to be in decline, and high-skilled occupations such as professionals and technicians exhibited small positive employment growth.

[12]Skill content here is approximated by average wages in the base year. The figure looks very similar if instead occupations are ranked by the average years of education in the base year; see Messina and Silva (2018).

Figure 6: Evolution of Employment and Wages by Occupation in Selected Countries



Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: The figure presents the changes in the total employment shares and log hourly wages accounted by each detailed occupation. Occupations are ranked in ascending skill level on the x-axis, which is approximated by the mean hourly wage of workers in each occupation in the base year.

There is a clear contrast between changes in employment and changes in log hourly wages by skill percentile. While employment moved away from low-paying occupations, wages in the bottom quartile of each country specific skill distribution grew fast in the four countries. The patterns are consistent with the rapid changes in labor supply documented above. In a context of rapid skill upgrading, the relative importance of low-paying jobs declined, while wages at the bottom of the skill distribution grew rapidly.

5. Wage Inequality among Workers with Similar Skills

This section presents a sequence of decompositions of the variance of log wages that quantify the relative importance of the different components of wage inequality, using household survey data for all the countries in our sample. The previous sections focused on wage inequality between workers with different levels of education and experience; this section quantifies the

contribution of changes in the dispersion of wages across and within skill groups to the fall in wage inequality. This section documents two stylized facts. First, much of overall wage inequality and its reduction occurred within rather than between skill groups. Second, using information on each worker's employment characteristics, it finds that a large share of wage inequality within skill groups is driven by wage inequality among workers in the same occupation and sector of employment.

This paper measures the within-skills component of wage inequality by estimating a standard Mincerian regression with skill variables and all their possible interactions for each country separately. Specifically, the estimated regression is

$$\log w_{it} = z'_{it}\vartheta_t + \varepsilon_{it} \tag{1}$$

where w_{it} is hourly wages; z_{it} is a vector of workers' socio-demographic characteristics, including all possible interactions between education (five categories), experience (five-year bins), and gender; ϑ_t is a vector of returns to these characteristics; and ε_{it} is a residual.

The empirical specification (1) allows us to decompose the overall variance of log wages into the contributions of skills and the orthogonal residual component, referred to as within-skill group wage inequality. Due to the linearity of this decomposition, it also holds for changes in the variance. The results for the regional averages in the overall variance of the log hourly wages and their within and between components are presented in table 1.[13] Columns 1, 2, and 3 show the share of each decomposition element in total wage variance in 1995, 2002, and 2015, respectively. Columns 4 and 5 show the growth in the share of each decomposition component for each subperiod. The within-skill groups component accounts for a large proportion of the total variance in each year, and for more than two-thirds of the changes: 76 percent of the variance increase during 1995-2002, and 66 percent of the decline during 2002-15.

The previous decomposition focused on changes in wage dispersion across workers, abstracting from where they worked. In what follows, this paper documents the role of changes within and between sector-occupation pay differentials. Extending equation (1) to include differences in wages across sectors and occupations yields

$$\log w_{it} = z'_{it}\vartheta_t + \alpha_{S(i,t)} + \varepsilon_{it} \tag{2}$$

[13] Appendix S2, Table S2.7, reports the results for this variance decomposition for each country individually.

Table 1: Total and Within-Skill-Groups Wage Variance in Latin America, 1995–2015

	Contribution of the component to the level of wage inequality			Contribution of the change in the component to the change in wage inequality	
	(1) 1995	(2) 2002	(3) 2015	(2)-(1) 1995-2002	(3)-(2) 2002–15
Between-skill-groups component	29 (0.155)	28 (0.212)	25 (0.146)	24 (0.056)	34 (-0.066)
Within-skill-groups component	71 (0.379)	72 (0.557)	75 (0.429)	76 (0.178)	66 (-0.127)
Total wage variance	100 (0.534)	100 (0.768)	100 (0.575)	100 (0.234)	100 (-0.193)

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Total wage variance is the variance of the log hourly wage in the household surveys data set. Within-skill-groups variance is the variance of the residuals from a regression of log hourly wage on a vector of workers' socio-demographic characteristics, including all possible interactions between education (five categories), experience (five-year bins), and gender. Cells contain the contribution of each component to the level or change in variance (shown in parentheses) and the corresponding share their represent. When a given year was not available for a particular country, the closest year available was used. See appendix S1.1 for details on this "circa" concept

where $S(i,t)$ denotes the sector and occupation of worker i in year t. Following equation (2), this paper decomposes the variance of hourly wages each year into the variance across sector-occupation cells, the variance across education-gender-experience cells, the covariance between these two terms, and a residual. As before, the differences over time are simply the differences of each component. To proceed with the decomposition, the occupations and sector classifications were harmonized into seventeen industries and nine occupations.[14]

The results are summarized in table 2, panel a, for Latin America, and table S2.8 in appendix S2 for each country individually. In table 2, columns 1, 2, and 3 report the results for each year individually, and columns 4 and 5 decompose the changes in inequality over time. The within-component (the residual) accounts for most of the total wage variance. Specifically, it accounts for 58, 61, and 66 percent of the inequality levels in 1995, 2002, and 2015, respectively. However, changes in the variance across sector-occupation cells play a large role during the expansion of inequality in 1995-2002, explaining 53 percent of the increase. Instead, during 2002-2015, the role of sector-occupations is more muted, accounting for 31 percent of the decline in dispersion. The within component continues to dominate the observed changes during 2002-2015, contributing to 45 percent of the decline in the variance.

[14]The 17 industries considered were agriculture, hunting, and forestry; fishing; mining and quarrying; manufacturing; electricity, gas, and water supply; construction; wholesale and retail trade; hotels and restaurants; transport, storage, and communication; financial intermediation; real estate, renting, and business activities; public administration and defense; education; health and social work; other community, social and personal service activities; activities of private households as employers; and extraterritorial organizations. The nine occupations considered were professionals or technicians; directors and managers; administrative employees and employees in middle-level jobs; merchants or sellers; employees in the service sector; agricultural employees; laborers in non-agricultural jobs and drivers; armed forces; and other.

Table 2: Variance Decomposition in Sector-Occupations (Sector-Occupation-Formal Status) and Skills

	Contribution of the component to the level of wage inequality			Contribution of the change in the component to the change in wage inequality	
	(1) 1995	(2) 2002	(3) 2015	(4) 1995-2002	(5) 2002-15
a. Decomposition: Sector-Occupation					
Total Variance	100 (0.584)	100 (0.604)	100 (0.450)	100 (0.020)	100 (-0.154)
Variance in sector-occupation	17 (0.103)	19 (0.114)	15 (0.067)	53 (0.010)	31 (-0.047)
Variance in skill-groups	15 (0.187)	11 (0.068)	10 (0.046)	-96 (0.019)	14 (-0.022)
2*Cov(sector-occupation, skill-groups)	10 (0.057)	9 (0.057)	9 (0.041)	0 (0.000)	10 (-0.016)
Residual	58 (0.338)	61 (0.366)	66 (0.296)	143 (0.028)	45 (-0.070)
b. Decomposition: Sector-Occupation-Formal Status					
Total Variance	-	100 (0.604)	100 (0.450)	-	100 (-0.154)
Variance in sector-occupation-formal status	-	25 (0.153)	22 (0.099)	-	35 (-0.054)
Variance in skill-gropus	-	10 (0.060)	8 (0.038)	-	15 (-0.022)
2*Cov(sector-occupation-formal status, skill-groups)	-	9 (0.055)	10 (0.042)	-	8 (-0.013)
Residual	-	56 (0.337)	55 (0.271)	-	42 (-0.065)

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Table above is based on available information from Argentina, Bolivia, Brazil, Costa Rica, Mexico, Nicaragua, Peru and El Salvador. Total wage variance is the variance of the log hourly wage in the household surveys data set. Variance in skill-groups is the variance of the log real hourly wage that is explained by a full set of gender, education, and experience dummies, and their interaction. The variance in sector-occupation is the variance of the log real hourly wage that is explained by a full set of sector-occupation dummies. Similarly, the variance in sector-occupation-formal status is the variance of the log real hourly wage that is explained by a full set of sector-occupation-formal status dummies. Variable definitions are provided in appendix S1. Cells contain the share of the total variance explained by each decomposition element (shown in percent). The total variance explained by each decomposition element is given in parentheses.

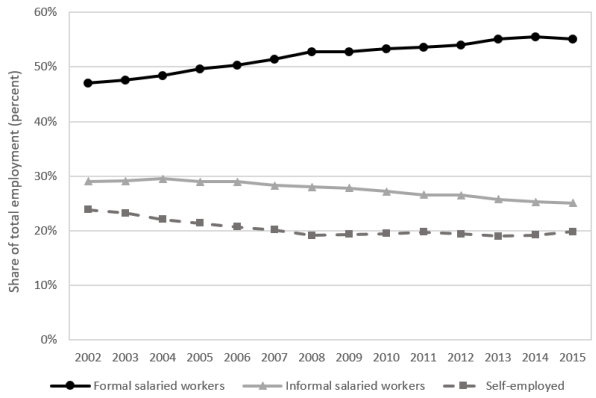
6. Wage Inequality among the Formal and Informal Workforce

Historically, Latin America and other low- and middle-income regions have been characterized by high levels of informality (Perry et al. 2007). In 2015, 45 percent of total employment in Latin America was informal (figure 7, panel a).[15] However, the 2000s were a period of important growth in the number of formal jobs. Between 2002 and 2015, the share of formal employees in total employment increased from 47 to 55 percent. This resulted from a reduction in the share of self-employment, from 24 to 20 percent, and in the share of informal

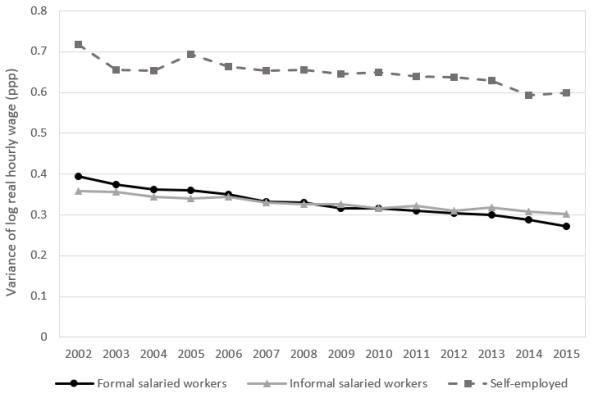
[15]The first part of this section uses harmonized household survey data across countries in Latin America. Workers are formal employees in the household survey if they indicated that they have access to a pension through their job. This paper alludes to informal workers when it refers to two groups of workers: self-employed and wage workers without access to a pension (informal employees). The information to differentiate between formal and informal employees is only consistently available for a handful of countries during 1995-2002. Hence, the analysis in this section is carried out only for 2002-2015. The countries included in this section are Argentina, Bolivia, Brazil, Chile, Costa Rica, Mexico, Nicaragua, Peru, Paraguay and El Salvador.

employees, from 29 to 25 percent (figure 7, panel a).[16] In contrast, between 1995 and 2002 the share of self-employed workers remained stable.[17]

Figure 7: Evolution of Employment Shares and Variance of Earnings among Formal Employees, Informal Employees, and Self-Employed Workers



(a) Employment share, 2002-2015



(b) Variance of earnings, 2002-2015

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: A worker is a formal employee in the household survey if he-she indicated that he-she has access to a pension through his-her job. Informal employees are wage workers without access to a pension. The countries included in the regional averages are Argentina, Bolivia, Brazil, Chile, Costa Rica, Mexico, Nicaragua, Peru, Paraguay and El Salvador. See footnote of Figure 1 for sample details and variable definitions.

Changes in the distribution of wages associated with this formalization process may have reduced inequality through two channels: changes in the composition of employment and formal-informal wage gaps. First, changes in the shares of formal and informal employment may mechanically contribute to changes in inequality if there are significant differences in inequality levels across sectors. Figure 7, panel b, shows that the variance of earnings declines at a similar rate among formal, informal, and self-employed workers. However, the variance of earnings among self-employed workers is much higher than among formal or informal employees, a feature that does not change throughout the period.[18] Because the variance of labor earnings is much higher among the self-employed and their share in total employment declined, composition effects may have contributed to the reduction in inequality.[19]

Yet, these differences in inequality across formal-informal sectors may simply reflect differences in the types of workers (for example, their human capital) engaged in each sector, or in

[16]Between 2002 and 2015, informal employment declined in all countries under analysis, albeit at different speeds. See table S2.9 in the appendix S2 for country-level results.

[17]Results available upon request.

[18]Results using the log 90/10 differential and Gini of earnings for the three groups of workers provide a very similar picture. See figure S3.3 in the appendix S3.

[19]These patterns are common across countries. See tables S2.9 and S2.10 in the appendix S2.

the types of industries that employ formal and informal workers. Hence, this paper extends the analysis described in equation (2), adding formality status as a partitioning variable to decompose movements in the overall variance of earnings between 2002 and 2015 into four components: (i) changes across industry-occupation-formal status groups, (ii) changes across education-gender-experience groups, (iii) changes in the assortativity between education-gender-experience and industry-occupation-formal status groups, and (iv) a residual. In this setting, the composition effects associated with changes in formality status (component i) are purged from changes in inequality across observable worker characteristics (component ii) and changes in inequality due to sorting of workers' observables and industry-occupation-formality status groups (component iii).

The results are summarized in table 2, panel b. Changes in inequality across industry-occupation-formal status cell are associated with a reduction of -0.054 points in the variance of wages, which amounts to 35 percent of the observed decline (-0.154). This contribution to the change in the observed variance is 4 percentage points larger than when formal status is excluded from the decomposition (table 2, panel a), suggesting that composition changes associated with employment formalization may have played a small role. Residual changes in the variance remain the most important factor in the evolution of inequality, explaining 42 percent of the observed changes.[20]

Second, changes in informality may be associated with changes in inequality through the evolution of the wage gap between formal and informal workers. Table 3 presents the wage gaps of informal employees and self-employed workers relative to formal employees pooling data from 2002 and 2015. Column 1 presents unadjusted wage gaps, column 2 presents gaps controlling for the interaction of gender, education, and experience indicator variables, and column 3 adds to the control set sector and occupation dummies. The regression contains an indicator dummy for 2015 and the interaction of this dummy with indicator variables for informal employees and self-employed workers. These interaction terms reflect the changes in the gap between 2002 and 2015.

In 2002, the informality wage penalty was substantial: unadjusted average real wages of informal employees were -.582 log points (-44 percent) lower than average real wages of formal employees, and self-employed workers had a penalty of -.795 log points (-54 percent). Controlling for observable worker characteristics and sector-occupations (column 3) reduced these penalties, but they remain high, at -.339 (-.434) log points for informal employees (self-

[20]These patterns are common across countries, with the exception of Costa Rica, where inequality increased. See table S2.1 in appendix S2.

Table 3: Wage Gaps across Formal and Informal Workers, 2002-2015

	Unadjusted	Adjusted	
	(1)	(2)	(3)
Informal employee	-0.582***	-0.380***	-0.339***
	(0.00438)	(0.00414)	(0.00408)
Self-employed	-0.795***	-0.588***	-0.434***
	(0.00457)	(0.00436)	(0.00441)
2015	-0.0840***	-0.152***	-0.146***
	(0.00348)	(0.00325)	(0.00314)
2015*Informal employee	0.0465***	0.0727***	0.106***
	(0.00520)	(0.00484)	(0.00464)
2015*Self-employed	0.0973***	0.0930***	0.115***
	(0.00544)	(0.00506)	(0.00488)
Individual characteristics	No	Yes	Yes
Sector-occupation dummies	No	No	Yes
Country fixed effects	Yes	Yes	Yes
Observations	620,397	619,562	619,560
R-squared	0.219	0.327	0.396

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Each column reports regression results of the effect of the listed variable on log wages. Individual characteristics include the interactions of worker's gender, five education categories (primary completed or less, high school dropouts, high school graduates, college dropouts, and college graduates or more), and five-year intervals of experience. Appendix S1.1 provides a list of the sectors and occupations. Countries included coincide with those in figure 7 with the exception of Chile and Paraguay, where harmonized information on occupations is not available, and therefore, results for column 3 cannot be computed. Results in columns 1 and 2 are qualitatively similar when including these countries and available from the authors upon request. Country weights are used, but they were re-scaled so that each country has the same weight in the regression. Robust standard errors in parenthesis: ***p<0.01, **p<0.05, *p<0.1.

employed).[21] The interaction terms in the regression suggest that these gaps declined between 2002 and 2015, possibly contributing to the decline in inequality. According to column 3, the informal (self-employed) wage gap declined by approximately 11 (12) log points. Amarante and Arim (2015) study wage structure effects associated with changes in formality status across the distribution of wages in five Latin American countries during the 2000s in a sample that concentrates on wage employees (excluding the self-employed workers). They conclude that changes in the formal wage premium across the distribution of wages in each country had a small contribution to the decline in inequality.

[21]The presence of a formality premium was further corroborated using short panels from Argentina, Brazil, and Mexico from years 2002 to 2015. Movers from informal wage employment to formal wage employment within a 12-month window obtain average wage gains of 0.173 (Argentina), 0.142 (Brazil), and 0.076 (Mexico) with respect to stayers, after partialling out worker and year fixed effects. The corresponding wage gains for workers moving to formal employment from self-employment are almost double: 0.300 (Argentina), 0.126 (Brazil), and 0.185 (Mexico). Detailed tables are available upon request.

The results in table 2, panel b, suggest that the changes in the skill and gender composition in the sector-occupation-formality status cells did not play a large role in the observed changes in inequality between 2002 and 2015. This is somewhat puzzling, because in a period of rapid formalization, those who exit informality and enter the formal sector are likely to be very different from those who do not change formal/informal status (McCaig and Pavcnik 2015). To provide a better understanding of who became formal, this paper analyzes this issue in more detail for Argentina, Brazil, and Mexico, whose labor force surveys contain a rotating panel that tracks individuals over a period of up to 12 months. Using these rotating panels, this paper builds annual transitions from informality and self-employment to the formal sector during the 2000s (see appendix S1.2 for details on the construction of the data and years covered) and examined differences in workers' observable characteristics. As documented by McCaig and Pavcnik (2015) for Vietnam, workers who switch to the formal sector from informal employment or self-employment are more likely to be male, younger, and more educated than stayers (appendix S4, table S4.1). In other words, they tend to have observable characteristics that are more similar to those observed among workers who are already formal.

What are the implications of workers' transitions for inequality? To shed some light on this question, this paper builds on the work of Maurizio (2015) and compute the average yearly transitions to the formal sector from informal wage employment and self-employment, by wage quartile of the origin and destination sectors (table 4). The first interesting fact this paper notes is that the majority of workers who formalized during the 2000s were previously informal employees, rather than out of labor force, unemployed or self-employed. Among those who became formal, 77 percent were previously informal employees in Argentina, 66 percent in Brazil, and 58 percent in Mexico. Considering the distribution of wages at the origin, the informal employees who became formal are concentrated in the highest quartiles of their original wage distribution in the three countries, possibly contributing to the fall in wage inequality among informal employees. However, the observed transitions to formality among lower-wage informal employees are nonnegligible (around 40 percent of all those who moved were below the median informal employee wage). Considering the distribution of wages in the destination sector, the majority of informal employees who formalized in Argentina and Brazil ended up below the median wage of the formal sector, with a high concentration in the first quartile, possibly contributing to a widening of the wage distribution of formal employees. Only 8 (11) percent of those who transitioned to the formal sector from informal employment ended up in the top quartile of the formal wage distribution in Argentina (Brazil). By contrast, the transitions in Mexico (where the formal sector grew much less) are more evenly spread according to the origin or destination wage distributions.

There are two reasons why the contribution of movements from self-employment to formal wage employment probably played a small role in the observed changes in inequality in the three countries. First, the self-employed who became formal are much rarer. In Argentina and Mexico, they represent 17 and 6 percent of the total transitions, respectively, and in Brazil they reached 26 percent. Second, the movers from self-employment to formal employment are more uniformly distributed in terms of the origin and destination wage distributions, perhaps with the exception of Mexico where a strong positive selection with respect to the origin wage distribution was observed.

Table 4: Distribution of Formal Employment and Workers Who Transition to Formality, by Wage Quartile (percent)

Wage quartile	Informal employees who became formal employees		Self-employed who became formal employees	
	Informal employees' wage distribution	Formal employees' wage distribution	Self-employed wage distribution	Formal employees' wage distribution
		a. Argentina		
1	17.4	46.5	21.9	39.3
2	24.8	26.7	34.0	23.8
3	27.9	18.5	18.8	16.8
4	29.9	8.3	25.3	20.2
Share in new formal	77.1		16.6	
		b. Brazil		
1	20.5	42.5	22.4	29.9
2	25.0	27.0	23.9	22.0
3	25.9	19.8	24.7	24.1
4	28.6	10.7	29.1	24.0
Share in new formal	66.4		25.7	
		c. Mexico		
1	16.3	31.2	11.5	23.5
2	24.6	26.3	12.0	23.6
3	27.9	22.1	29.2	24.2
4	31.3	20.4	47.3	28.6
Share in new formal	58.1		6.5	

Source: Authors' calculations based on data from the 12-months Survey Panels from Labor Force Surveys.
Note: The table reports average yearly transitions to the formal sector from informal wage employment (columns 2 and 3) and self-employment (columns 4 and 5). Columns 2 and 4 classify movers according to their quartile in the wage distribution of origin: informal employees in column 2 and self-employed in column 4. Columns 3 and 5 classify movers according to their quartile in the wage distribution of destination (i.e., the wage distribution of formal workers). The "share in new formal" is defined as the share of those who formalize who were originally informal employees and who were originally self-employed. The sum does not add to 100 percent, as some unemployed and workers out of the labor force at the beginning of the panel also formalized during the 12-month window considered. See appendix S1.2 for details on the construction of the panel data sets.

7. Role of Firm Heterogeneity

This section investigates the role of firms in the reduction of wage inequality. Equally skilled workers, even if working in the same occupation and sector, may differ in a key dimension:

they may work for different firms. The "firm component" of wage differentials has been shown to be large for developed countries (see Abowd, Kramarz, and Margolis 1999; Goux and Maurin 1999; Abowd, Creecy, and Kramarz 2002; Gruetter and Lalive 2009).[22] Due to data constraints, the evidence is more limited in developing countries, but to the extent that firms differ in attributes such as entrepreneurial skill and management practices, these differences are expected to exist.[23] Although these factors are more structural, demand shifters, such as trade shocks, can affect the productivity (and employment) distribution within a sector and the pass-through from firm characteristics to pay. Thus, the firm component is not static, and changes in this component could affect growth in wage inequality. This section focuses on the role of changes in inter-firm pay differences in generating changes in wage inequality. More specifically, it tackles two questions. First, did inter-firm wage differentials fall over time in those countries where inequality fell? Second, if so, what was the contribution of this fall to the reduction in cross-sectional wage inequality?

The previous sections of this paper rely on individual-level data from household surveys, which are likely representative of the formal and informal workforce. However, these surveys do not identify the employing firm of each worker and do not allow us to follow individual workers over time (except for short periods of time in some countries). This section answers the questions above using longitudinal matched employer-employee data from Brazil, Costa Rica, and Ecuador. These data sets are based on social security administrative records. Thus data coverage is restricted to formal workers. As discussed in the previous section, formal workers accounted for around 55 percent of total employment in Latin America in 2015.

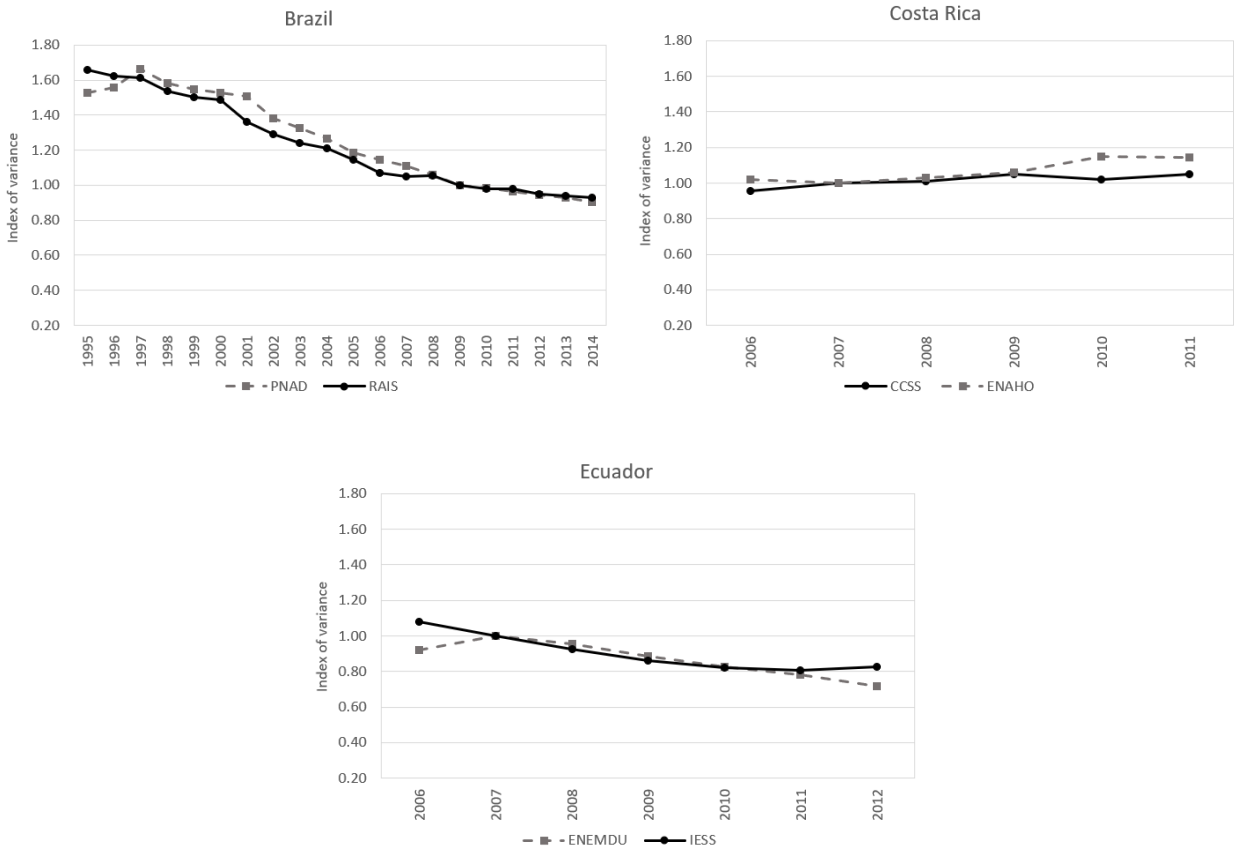
Appendix S1.3 describes these administrative data sets. Administrative data cover all workers registered (by their firms or voluntarily) in social security, which provides them access to the benefits and labor protections afforded by the legal employment system. Hence, the definition of formality does not match one to one the one used in the household surveys, which refers to workers indicating that they have access to a pension through their job. Although this implies small differences in coverage and average wages (see Appendix table S1.3),[24] wage inequality trends are similar across the two data sources in the common time periods, once

[22]However, due to limitations in their data, these papers were unable to account fully for selection of workers into firms based on unobservables. Using data for manufacturing in Germany, Card, Heining, and Kline (2013) overcome this limitation and, applying the Abowd, Kramarz, and Margolis (1999) framework, find that the variance of firm fixed effects accounts for around 20 percent of the total variance of wages. The main component is worker effects, which accounts for 45 to 50 percent. The covariance of worker/firm fixed effects accounts for around 15 percent, with the remaining variance being accounted by time trends, age, skills, and the residual.

[23]See Alvarez et al. (2018) for evidence focusing on male workers from Brazil's manufacturing sector.

[24]See also wage kernels comparing the two sources in Appendix S5.

Figure 8: Wage Inequality Trends in the Formal Workforce in Household Surveys and Administrative Data for the Formal Sector



Sources: Authors' calculations based on household surveys described in footnote of Figure 1 and Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador; and on Household surveys: Pesquisa Nacional por Amostra de Domicílios (PNAD) in Brazil, Encuesta Nacional de Hogares (ENAHO) in Costa Rica and Encuesta de Empleo, Desempleo y Subempleo (ENEMDU) in Ecuador.
Note: Statistics were computed for formal sector workers. The 1st and 99th percentiles of the country-year wage distributions in each data set were trimmed. See Appendix S1.3 for data details.

household surveys data are restrict to formal sector workers (see figure 8).[25]

This paper decomposes wage inequality into firm and worker components using the additive

[25]In addition to the focus on formality and the definition of formality, these two types of data differ in several ways. First, whereas household surveys collect information on a sample of workers, administrative data cover the universe of formal workers. Second, in household surveys earnings are reported by the respondent in response to the question: "what are your monthly wages for the job worked last week?" In the administrative data sets, earnings are reported by firms and used by the government to compute social security benefits. This may imply that administrative data depict earnings in the formal sector with less measurement error (see Mayer and Mittag 2015). In both types of data, wages are typically reported as monthly take-home pay, after social security taxes have been paid. They include bonuses that workers receive on a regular basis (monthly or more frequently), but exclude bonuses paid less frequently than monthly. Because working hours are typically contractual hours in the administrative data, the wage measure used in this section is monthly wages.

worker and firm fixed-effects model first proposed by Abowd, Kramarz, and Margolis (1999), henceforth, AKM. The model is used to disentangle the contributions of unobserved worker and firm heterogeneity to changes in wage inequality. Given our focus on changes over time in the importance of each of these components of wage inequality, it follows Card, Heining, and Kline (2013) and Alvarez et al. (2018) and estimate the model separately by subperiod.[26] It focuses on log monthly wages at jobs held in the private sector. The estimated model is

$$w_{it} = \alpha_i + \varphi_{j(i,t)} + \varepsilon_{it} \tag{3}$$

where α_i is the worker component; $\varphi_{j(i,t)}$ is the firm component; and ε_{it} is the error component.[27] Based on equation (3), this paper decomposes the variance of wages within each subperiod into the variance of the worker component, the variance of the firm component, the covariance between the worker and firm components, and the variance of the residual. Following AKM and Card, Heining, and Kilne (2013), the variance in the worker effect is interpreted as wage inequality generated by a combination of workers' skills and other characteristics that are rewarded equally across employers, whereas the variance in firm effects is interpreted as wage inequality generated by the differences in the premiums paid by each firm to all its employees.

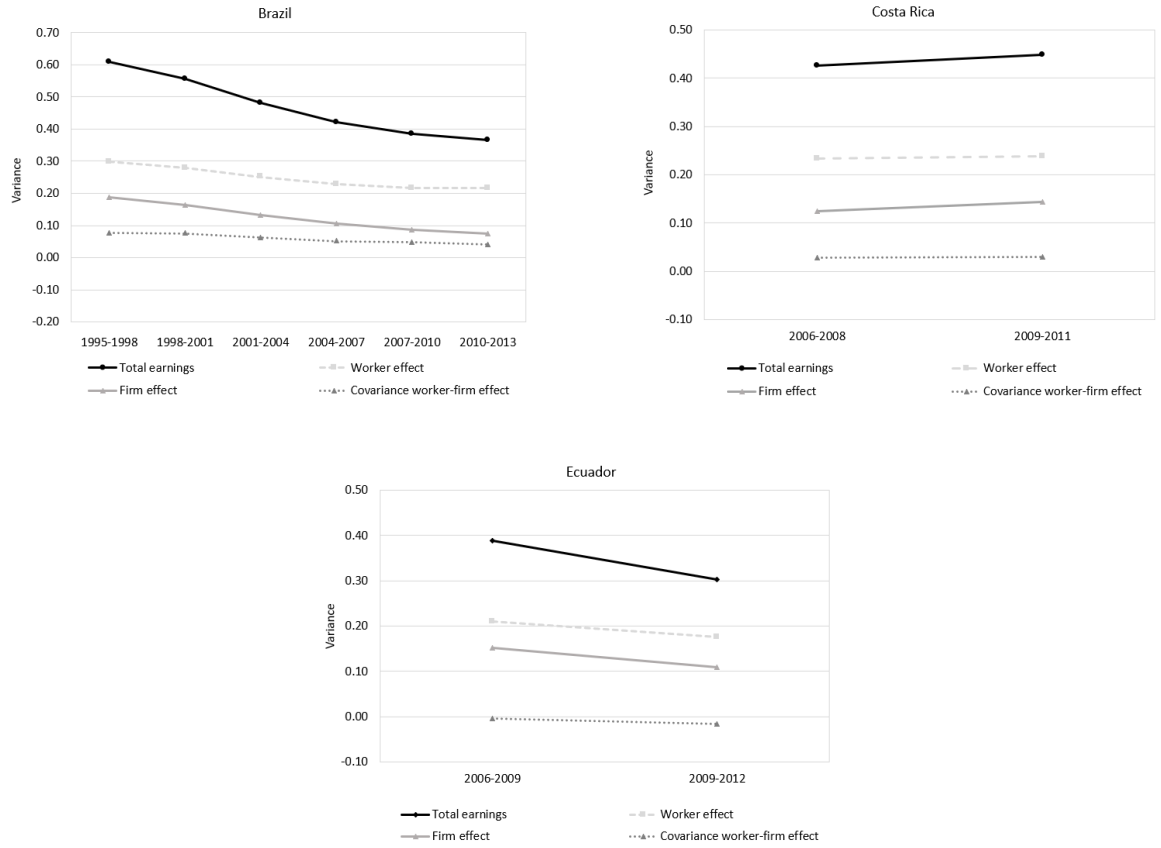
Figure 9 presents the decompositions for each of the subperiods for Brazil, Costa Rica, and Ecuador. Table S2.12 in appendix S2.2 presents more details. Two important results emerge. First, in all three countries worker heterogeneity is the single most important determinant of wage inequality. Focusing on the last subperiod, it accounts for 59, 53, and 58 percent of the total variance in Brazil, Costa Rica, and Ecuador, respectively. Second, whereas the contribution of worker effects and the covariance remain fairly constant over time, the variance of firm effects changes substantially. More specifically, in Brazil and Ecuador, where wage inequality fell, the contribution of firm effects fell significantly, and in Costa Rica, where inequality rose, the contribution of firm effects increased.

This paper documents that much of the reduction in wage inequality in Brazil and Ecuador

[26] Subperiods of four (three) years are considered in Brazil and Ecuador (Costa Rica), this paper tested the robustness of the findings to longer subperiods, as in Alvarez et al. (2018). Results indicate a larger variance of the residual, which is offset by worker effects explaining a few percentage points less of the overall variation in wages. The share contributed by firms remains roughly the same. Results available upon request.

[27] As in Alvarez et al. (2018), our specification does not include an index of time-varying observable characteristics of workers, as data are not available for all the countries. This exclusion avoids identifying the time-varying effects of changes within workers and firms during the limited time frame of each subperiod. For brevity, the analysis also excludes year effects, the covariance between worker and year, and firm and year effects. The results are available from the authors. They show that, as in Alvarez et al. (2018), these terms play an insignificant role in the variation of overall wage inequality.

Figure 9: Variance Decomposition Using the AKM Model



Source: Authors' calculations based on Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador.
Notes: Statistics were computed for formal private sector workers. Variance decomposition following equation 3. The 1st and 99th percentiles of the country-year hourly wage distributions in each data set were trimmed.

was associated with a reduction in the share of the variance of firm fixed effects in total variance (as opposed to a fall in the variance of worker fixed effects, residual, or covariance between worker and firm effects). The important fall in between-firm wage inequality is in sharp contrast with the results for developed countries, where wage inequality and between-plant wage inequality have grown over time (see Card, Heining, and Kline (2013); Cardoso (1999); and Song et al. (2018) for evidence on Germany, Portugal, and the United States, respectively). In the next section, this paper discusses some factors that may have made firms offer more equal pay over time in these two countries.

How did intra-firm wage differences evolve as inter-firm wage differences changed? Wage gaps across workers can become smaller over time because different departments in firms start paying more similar wages. The importance of intra-firm wage differences and their contribution to changes in wage inequality are not directly disentangled in the AKM models. To tackle this question, this paper examines the role played by the variability in earnings

between and within firms in each country, by considering that in year t, the wage of worker i employed by firm j equals the economywide average wage plus the deviations between the average wage of the worker's firm and the economy (employer deviation), and the deviation between the worker's wage and the average wage of the worker's firm (worker deviation). More formally, as in Song et al. (2018) and Alvarez et al. (2018) for the United States and manufacturing firms in Brazil, respectively, this paper identifies

$$w_{ijt} = \bar{w}_t + (\bar{w}_{jt} - \bar{w}_t) + (w_{ijt} - \bar{w}_{jt}), \tag{4}$$

and take variances on both sides of the equation, obtaining

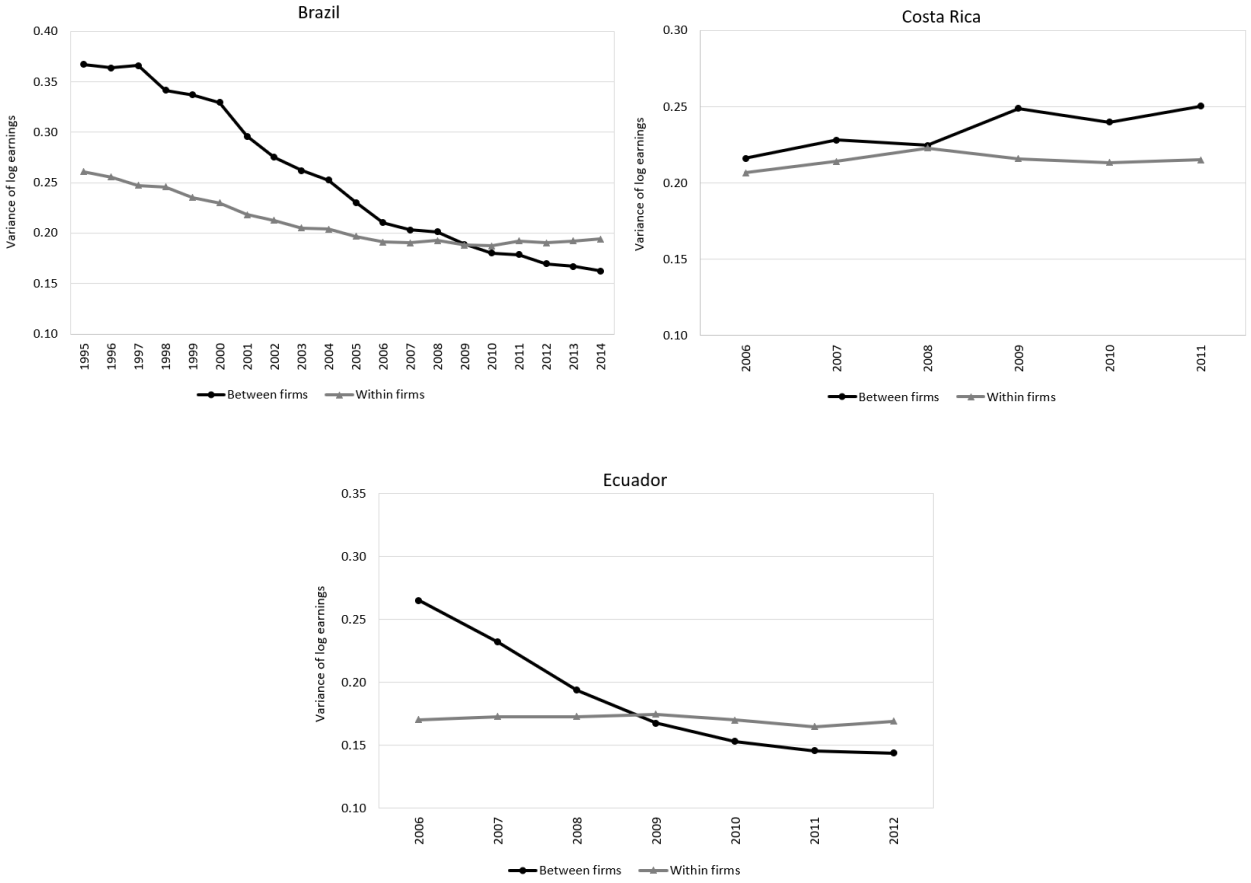
$$\begin{aligned} var(w_{ijt} - \bar{w}_t) &= var(\bar{w}_{jt} - \bar{w}_t) + var(w_{ijt} - \bar{w}_{jt}) + 2cov(\bar{w}_{jt} - \bar{w}_t, w_{ijt} - \bar{w}_{jt}) \\ &= var(\bar{w}_{jt}) + var(\bar{w_{ijt}}|i \in j) \end{aligned} \tag{5}$$

The results are summarized in figure 10.[28] The figure plots the evolution of the between and within components of the variance of log earnings for Brazil (panel a), Costa Rica (panel b), and Ecuador (panel c). The between-firm component fell sharply in Brazil and Ecuador and increased in Costa Rica. The variance of wages between firms explains a large share of the changes in the total variance of wages. Specifically, 75 percent of the decrease in wage inequality was associated with a reduction in inter-firm wage differentials in Brazil, and 99 percent in Ecuador. In Costa Rica, 80 percent of the increase in the variance of wages is explained by inter-firm differences in pay.[29]

[28]Table S2.13 in appendix S2 presents the detailed results.

[29]These results also hold within sector-occupations in Brazil, the only administrative data set used in the section that contains information on occupations. Decomposing the variance within-sector-occupations into between- and within-firm components (as in Helpman et al. 2017, who carry out a similar analysis for 1986–95), this paper finds that the decline of wage inequality is largely accounted for by a fall in between-firm wage dispersion. The results are available from the authors upon request.

Figure 10: Variance Decomposition of Between- and Within-Firm Wage Inequality



Sources: Authors' calculations based on Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador.
Note: Statistics were computed for formal private sector workers. Variance decomposition following equation 5. The 1st and 99th percentiles of the country-year hourly wage distributions in each data set were trimmed. See appendix S1.3 for data details.

8. Discussion: What Factors May Be behind the Reduction in Wage Inequality in Latin America?

This paper documents the vigorous reduction in wage inequality in Latin America between 2002 and 2015. These trends are in sharp contrast with increasing wage inequality in developed countries, a phenomenon that has stimulated a buoyant literature. This literature emphasizes the role of education (Katz and Murphy 1992; Goldin and Katz 2010), technological change (Autor, Katz, and Krueger 1998; Acemoglu and Autor 2011; Krueger 2012; Autor and Dorn 2013), trade (Feenstra and Hanson 1999; Autor, Dorn, and Hanson 2013; Autor et al. 2014; Pierce and Schott 2016), institutions (DiNardo, Fortin, and Lemieux 1995; Lee 1999; Autor, Manning, and Smith 2016), and more recently firm heterogeneity (Card, Henning, and Kline 2013; Song et al. 2018). How could inequality decline in Latin America when

global forces, in particular skill-biased technical change and job polarization, are increasing the dispersion of wages elsewhere? The previous sections documented several facts that make us reflect on the specific role of these forces in Latin America and raise questions that may be worth exploring further in future research.

Education premium, experience premium, and labor supply. Section 3 documents that declines in the schooling and experience premiums during the 2000s coincided with the inequality decline. These trends certainly contributed to the reduction in inequality (López-Calva and Lustig 2010; Azevedo et al. 2013), although their relative importance remains to be fully established.[30] The labor supply expansion contributed to reducing these premiums. The relative supply of skills has expanded steadily as the population has aged but, above all, as workers have become more educated since the 1980s. The skill premium declined for those groups whose supply grew fastest (Galiani et al. 2017; Fernández and Messina 2018). Moreover, as documented in section 4, sharply rising wages were accompanied by falling employment among unskilled occupations during the 2000s. Without changes in the relative supply of skills, these patterns at the bottom of the wage distribution are difficult to reconcile.

Better access to schooling and population aging help explain the downward trajectory of the education and experience premiums during the 2000s, but they are certainly not the sole factors behind the reduction in inequality. For starters, changes in the supply of skills do not fully explain the dynamics of the education and experience premiums over the past two decades. The expansion of education started in the 1980s, and since then the relative supply of skills has followed a steady upward trend, with no sign of acceleration in the 2000s (Messina and Silva 2018). Thus, the education upgrade cannot account for the rising college premium in the 1990s documented in section 3 (Gasparini et al. 2017; Fernández and Messina, 2018). As for the experience premium, the detailed analysis in Fernández and Messina (2018) shows that changes in labor supply explain between a third and half of the observed decline in the experience premium in Argentina, Brazil, and Chile.

Moreover, changes in education and experience cannot explain the falling within-group inequality documented in section 5. The 2000s witnessed a substantial compression of wages across workers with similar skills (within skill groups). Falling within-group inequality could result from a compression in the distribution of unobserved skills, a feature consistent with a documented decline in the inequality of education during the 2000s (Cruces, García-Domenech,

[30]Detailed decompositions for Brazil suggest that the contribution of the experience premium may outweigh that of the schooling premium (Ferreira, Firpo, and Messina 2017). The overall effect of education on the reduction in inequality was further attenuated by pure compositional effects, which are still inequality increasing in Latin America (Tornarolli et al. 2014; Ferreira, Firpo, and Messina 2017).

and Gasparini 2012), if unobserved skills are positively associated with education and experience. Moreover, if a positive correlation between unobserved and observed skills is present, the premiums associated with those unobserved skills could have followed a similar trend as the returns to schooling and experience (Acemoglu 1999), contributing to the change in inequality in the 2000s. Exploring the importance of unobserved skills constitutes an important avenue for further research.

Commodity boom. Section 2 shows that countries that benefited from the commodity boom in South America experienced stronger growth and much deeper reduction in inequality during the 2000s compared with the net commodity importers in Central America and Mexico. These developments motivate the question of what was the role of the commodity boom in the reduction in inequality in the 2000s? Evidence from Brazil shows that booming demand for commodities led to broad-based wage gains in commodity-rich regions (Costa, Garred, and Pessoa 2016) and sectors (Adao 2015). This type of mechanism reduced between-region and between-sector wage inequality, as winning sectors and regions in Brazil had lower initial average wages. But the evidence on the effects of within-region wage inequality is more mixed. Costa, Garred, and Pessoa (2016) find limited impact in a model that considers one dimension of worker heterogeneity (skilled versus unskilled) and assumes that skill intensity does not vary across industries. Relaxing these assumptions, Adao (2015) finds that variations in world commodity prices explain between 5 and 10 percent of the decline in log wage variance in Brazil between 1991 and 2010. Yet, this study abstracts from firm heterogeneity. Benguria, Saffie, and Urzúa (2018) incorporate this dimension. In their model, higher commodity prices increase (aggregate domestic) demand (benefiting non-exporters) and increase wages (especially unskilled). Higher wages drive reallocation of workers from manufacturing into services, while higher domestic income drives reallocation from exporting to non-exporting firms within manufacturing. This model emphasizes that both types of reallocation would reduce the skill premium.

Could the commodity boom also affect within-industry wage inequality? In a model with heterogeneous plants and quality differentiation, Verhoogen (2008) shows that, in response to the depreciation of Mexico's real exchange rate, more-productive plants increased exports, upgraded quality, and raised wages relative to less-productive plants within the same industry. This process increased within-industry wage dispersion in the Mexican manufacturing sector. Through this type of mechanism, the commodity boom (which was associated with large real exchange rate appreciations in South America) could reduce within-industry wage inequality, as well as the overall skill premium.[31] This would be consistent with the reduction

[31]There is great heterogeneity in export participation across firms. Only a minority of firms export,

in differences in pay across firms in Brazil and Ecuador, as documented in section 7.

To sum up, the commodity boom played a role, but the exact magnitude of its effect in each country remains open to debate. Moreover, most evidence is limited to Brazil, where the share of the workforce employed in the commodity sector is higher than in other countries in South America. Evidence from other countries would be highly valuable.

Trade. Over the past four decades, countries in Latin America have implemented dramatic trade liberalizations. The literature has studied extensively the effects on the economywide skill premium, including those of Mexico's accession to the General Agreement on Tariffs and Trade (GATT), and Chile's (in the 1970s), Colombia's (in the 1980s), Argentina and Brazil's (in the early 1990s) trade liberalizations (see Goldberg and Pavcnik (2007, 2016) and Pavcnik (2017) for surveys). The standard version of the Heckscher-Ohlin model predicts that trade liberalization reduces wage inequality when a typical country in Latin America integrates with a country such as the United States. This occurs because trade shifts production toward unskilled labor-intensive industries, raising the relative demand for, and therefore wages of, unskilled labor. Yet, this prediction is reversed, for instance, when more protected sectors prior to the trade liberalization were the relatively unskilled labor-intensive sectors (Revenga 1997; Robertson 2004), tariff reductions are concentrated on unskilled labor-intensive sectors (Attanasio, Goldberg, and Pavcnik 2004), or trade liberalization takes place simultaneously with other more unskilled labor abundant countries (Davis 1996). In line with these ambiguous predictions, and focusing on short-run effects, trade liberalizations in Latin America in the 1980s and 1990s reduced the overall skill premium in some countries (see, for example, Gonzaga, Menezes-Filho, and Terra (2006), Ferreira, Leite, and Wai-Poi (2010), and Menezes-Filho and Muendler (2011) for evidence on Brazil), while they increased it in others (see, for example, Galiani and Sanguinetti (2003) for evidence on Argentina; Attanasio, Goldberg, and Pavcnik (2004) for evidence on Colombia; Revenga (1997) and Robertson (2004) for evidence on Mexico; and Goldberg and Pavcnik (2007, 2016), and Pavcnik (2017) for surveys).

Moreover, the region has experienced several other trade shocks since the multilateral trade liberalizations of the 1980s and 1990s. For some countries the significant reduction in tariffs

and the exporters are larger, more productive, and pay higher wages than non-exporters, contributing to within-sector wage inequality (Bernard and Jensen 1999; Greenaway and Kneller 2007; Roberts and Tybout 1996). Moreover, in response to trade liberalization, sector-level productivity rises, but this appears to be mainly because of reallocation within sectors toward more efficient firms: more-productive firms grow and less-productive firms shrink or die (Bernard and Jensen 1999; Clerides, Lach, and Tybout 1998; Pavcnik 2002). In a linked literature, Pavcnik (2002) and Fernandes (2007) show the importance of reallocation and within-firm productivity improvement. In this setting, wage inequality arises from differences between exporting and non-exporting firms for observationally similar workers.

was the result of the negotiations to join the World Trade Organization (WTO), while for others, regional preferential agreements had a major impact (Bown et al. 2017).[32] Most-favored-nation (MFM) tariffs fell sharply in South American countries, particularly those in Mercosur, but remained flat in the rest of the region, due to the advent of bilateral free trade agreements with the United States and Europe.[33] Moreover, while the China shock in the 2000s mostly increased import competition in countries like Mexico, it also increased demand for commodities in commodity-rich countries in South America. Finally, throughout this period, countries registered large real exchange rate appreciations and depreciations, and foreign shocks transmitted through trade.[34] Overall, a key message from the literature is that trade effects are very context-specific and, as pointed out by Pavcnik (2017), depend on the nature of the trade policy changes, trade patterns, and transmission mechanisms.[35]

In addition to changes in inequality between skilled and unskilled workers, our results show that a large part of the change in wage inequality occurred within skill groups (section 5). The trade literature highlights that wage gains/losses are unevenly distributed across industries, and regions, and types of workers due to, for instance, limited factor mobility. Because some factors are sector-specific, industry affiliation matters (Goldberg and Pavcnik 2003, 2007; Pavcnik et al. 2004). Industries (and their workers) benefiting from lower export costs fare better, while industries subject to import competition fare worse (see Attanasio, Goldberg, and Pavcnik (2004) for evidence on Colombia, and Goldberg and Pavcnik (2007) and Pavcnik (2017) for a review). Due to the imperfect mobility of workers (and capital) across regions, trade effects also depend on the regional industry mix. Regions with a high concentration of industries benefiting from lower export costs fare better, while workers in regions with high concentration of industries subject to import competition fare worse (Topalova 2007, 2010; Kovak 2013; Dix-Carneiro 2014; Dix-Carneiro and Kovak 2017 and 2019; Costa, Garred, and Pessoa 2016; Chiquiar 2008; McCaig 2011; Erten and Leight 2019). At the worker level, wage

[32]Regional agreements included the Common Market of the South (Mercosur) between Argentina, Brazil, Paraguay, Uruguay, and the República Bolivariana de Venezuela, the North American Free Trade Agreement (NAFTA) between Canada, Mexico, and the United States; the Dominican Republic–Central America Free Trade Agreement (CAFTA-DR) between Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and the United States; and the Pacific Alliance between Chile, Colombia, Mexico, and Peru.

[33]Trade liberalization in several countries also reduced non-tariff barriers to trade.

[34]There is an extensive literature on the positive effects of export shocks on wages in Latin America. See, for example, Verhoogen (2008); Bustos (2011); Kugler and Verhoogen (2012); Brambilla, Lederman, and Porto (2012); and Bastos, Silva, and Proenca (2016). The effects of exporting on product quality, for example, link trade and wage inequality: exports increase the demand for better inputs, as consumers in high-income countries demand high-quality products (Bastos, Silva, and Verhoogen 2018) and skilled labor, as high-quality production and marketing require skill (Verhoogen 2008; Brambilla, Lederman, and Porto 2012).

[35]Several papers analyze the effects of trade shocks beyond the trade liberalizations of the 1980s and 1990s in Latin America. See, for example, Verhoogen (2008), Brambilla, Lederman, and Porto (2012), Araújo and Paz (2014), Cosar, Guner, and Tybout (2016), and Pavcnik (2017) for a survey of the literature.

gaps, job loss, and transitions to informality are key margins of adjustment (Dix Carneiro and Kovak 2017, 2019). As older, less educated, and female workers face substantially higher barriers to mobility across sectors and regions, they experience larger losses after trade liberalization (Dix-Carneiro 2014). Moreover, a substantial part of trade's induced labor market reallocation takes place through transitions into the informal sector. In this context, who enters informality and the formal-informal initial wage gap matter (Goldberg and Pavcnik 2003; Paz 2014; McCaig and Pavcnik 2015, 2018; Dix-Carneiro and Kovak 2019).[36] Thus, the overall effect of trade on wage inequality depends on the initial position of the affected individuals, regions, and industries in the wage distribution. It also depends on the time horizon considered. Evidence from Brazil shows that trade effects are long-lasting and magnified through time: they are still present 20 years after the trade liberalization episode (Dix-Carneiro and Kovak 2018). In this context, the trade liberalizations of the 1990s, through their effects on formal and informal employment, could have been a source of inequality reduction in the 2000s.

Trade may also be an important driver of change in between-firm wage differentials. Recent trade theories emphasize the role of firm heterogeneity and the various channels through which trade could affect wage dispersion across firms within sectors. Helpman et al. (2017) show that around 20 percent of the rise in wage inequality in Brazil during 1986 to 1994 was due to heterogeneous worker exposure to firms that were differentially affected by the trade liberalization.[37] These effects could be further magnified through firms' access to better quality inputs with a higher skill content. The latter channel is emphasized by Fieler, Eslava, and Xu (2018), who show how Colombia's trade liberalization increased within-sector wage inequality and the demand for skilled labor through the input-output linkages across firms. The decompositions in sections 5 and 7 of this paper raise some interesting puzzles about large within-group shares on inequality decline, and about the potential role of between-firm differentials. Documenting trade's contribution to these trends is an important avenue for future research.

Informality. Formalization increased during the 2000s. Section 6 shows that changes in the distribution of wages associated with this process may have reduced inequality through changes in the composition of employment and formal-informal wage gaps. However, estab-

[36]Informal jobs are often characterized by smaller benefits (for example, paid leave), fewer opportunities for training and advancement, and less favorable working conditions (Goldberg and Pavcnik 2007; Bacchetta et al. 2009). In Latin America, there is a considerable wage premium associated with being formally employed, as documented in section 6.

[37]For results from similar models but without firm heterogeneity, see Kambourov (2009); Cosar (2013); Artuc, Chaudhuri, and McLaren (2010); and Dix-Carneiro (2014).

lishing the link between formalization and inequality is not a simple task. To begin, the direction of causality is unclear. Chong and Gradstein (2007) argue that poor individuals have higher incentives to move to the informal sector in environments with weak institutions and high inequality, because the poor are at a disadvantage in extracting resources from the formal sector. Thus, on the one hand, in the model, changes in institutions and inequality lead to changes in informality. On the other hand, in a traditional dualistic view of informality, barriers to entry to the formal sector would lead to different wages paid to identical workers, resulting in more inequality. In this world, the direction of causality goes from changes in informality to changes in inequality.

But the process of formalization may be a mediating factor rather than a driving force of inequality. Haanwinckel and Soares (2016) argue that the increase in education levels is fundamental to understand increasing formalization in Brazil during the 2000s. In this context, it is the rising education level and its effects on the schooling premium that drive changes in inequality, and declining informality accompanies the process. Commodity-led growth may have also played an important role in the formalization process, as stocks of formal employment tend to move pro-cyclically (Bosch and Esteban-Pretel 2015; Bosch and Maloney 2010). But during the 2000s, several countries introduced institutional reforms aimed at reducing the costs of formalization and, at the same time, increased the enforcement of the law, with more frequent and stringent labor inspections. An emerging literature suggests that these measures may have contributed to increased formalization of labor.[38] The extent to which these processes translated into lower inequality remains to be fully quantified.

Minimum wage. The real minimum wage rose in many countries during the 2000s, often above the growth of average and median wages. In Argentina, Brazil, Chile, Ecuador, and Uruguay, the minimum wage grew much faster than in most other Latin American or developed countries, and with the exception of Uruguay where the initial level of the minimum wage was very low, it rapidly approached the median (Messina and Silva 2018). The rapid growth of the minimum wage possibly contributed to the faster growth of wages among low skilled workers documented in sections 2 and 3. However, the study of the minimum wage in the region is particularly complicated because of noncompliance with the law, which tends to be high even among formal workers (Messina and Silva 2018). Moreover, even in countries where the minimum wage remained relatively stable with respect to the median such as Bolivia, Paraguay, and Peru, the distance between the median and the 10th percentile of their respective distributions declined considerably during the period (Messina and Silva 2018).

[38]See Beccaria, Maurizio, and Vázquez (2015) for evidence on Argentina and Amarante and Arim (2015) for a thorough review of the literature.

Although the precise contribution of the minimum wage to the decline of wage inequality remains to be established, there is increasing evidence suggesting that it played an important role. Maurizio and Velazquez (2015) build counterfactual wage distributions using semiparametric methods to analyze the impact of the minimum wage on several inequality measures in Argentina, Brazil, Chile, and Uruguay. They find that, except for Chile where the growth of the minimum wage was more moderate, the minimum wage was a significant driver of wage compression in the bottom half of the distribution. Ferreira, Firpo, and Messina (2017) find that in Brazil increases in the minimum wage significantly helped reduce inequality during the boom years (2002-2012), but not during the preceding period of slow growth (1995-2002). Engbom and Moser (2017) focus on the formal sector in Brazil and find that, once spillover effects are accounted for, the minimum wage had large compressing effects on the distribution of wages.

9. Conclusions

After wage inequality increased in the majority of the countries in Latin America between 1995 and 2002, it fell by 26 percent between 2002 and 2015, measured by the 90/10 log hourly earnings ratio. This paper characterized the evolution of inequality in the region between 1995 and 2015. It used harmonized household survey data for 16 Latin American countries and linked employer-employee data for Brazil, Costa Rica, and Ecuador. It characterized the main stylized facts associated with changes in inequality, discussed the potential driving forces and highlighted promising avenues for future research.

Using harmonized household data representing about 90 percent of the Latin American population, the study uncovered six empirical regularities behind the wage inequality reduction of the 2000s. First, the reduction in wage inequality was a regionwide phenomenon (Costa Rica was the only country where inequality increased). Second, wage inequality fell more in countries in South America relative to Central America and Mexico. Third, wage inequality fell at the upper and lower ends of each country's wage distribution, but the reduction was pushed by faster wage growth of hourly wages in the bottom percentiles. Fourth, the premiums associated with labor market experience and education fell in all countries but Costa Rica. Fifth, two-thirds of the inequality decline took place across workers with similar skills. Sixth, changes in the composition of employment across sectors, occupations, and formal-informal status contributed to the decline, but residual (within education-experience-sector-occupation-formal status) changes in inequality remain a dominant factor, explaining 42 percent of the reduction in the variance between 2002 and 2015.

Using detailed administrative data for the formal sector in Brazil, Costa Rica, and Ecuador, our analysis also shows that firm effects accounted for a larger share of the change in wage inequality than worker effects. Interestingly, in Brazil and Ecuador, where wage inequality fell, differences across firms narrowed over time, whereas in Costa Rica, where wage inequality increased, these differences widened. Further, in all three countries, most of the observed changes in wage inequality were accounted by changes between rather than within firms. The reduction in inter-firm wage differentials in Brazil and Ecuador is in sharp contrast with their expansion in Germany, as documented by Card, Heining, and Kline (2013) and in the United States, as documented by Song et al. (2018). Understanding the large within-group shares in inequality decline and the potential role of between-firm differentials are promising avenues for further research.

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Appendix

S1 Data

S1.1 Harmonized Household Data Sets

Sources and Geographic Coverage

The main data source in sections 2 to 6 of this paper is the Socioeconomic Database for Latin America and the Caribbean (SEDLAC), a harmonized data set of Latin American and Caribbean household surveys compiled by the World Bank and the Center for Distributive, Labor and Social Studies (CEDLAS, for its acronym in Spanish) at the Universidad Nacional de La Plata in Argentina. The analysis includes 16 Latin American countries for 1995-2015. Table S1.1 provides descriptions of the household surveys used for the analysis. For 2015, there are 14,908,680 observations, representing 87.54 percent of the Latin American working-age population.

In some countries, the geographic coverage of the household surveys has changed over time. To ensure comparability, the data were restricted to a common geographical coverage per country. In the case of Argentina, the analysis refers to the following areas: Gran Buenos Aires, Ciudad de Buenos Aires, Partidos del GBA, Gran La Plata, Gran Santa Fé, Gran Paraná, Cdro. Rivadavia – Rada Tilly, Gran Córdoba, Neuquén – Plottier, S.del Estero - La Banda, Jujuy - Palpalá, Río Gallegos, Salta, San Luis - El Chorrillo, Gran San Juan, Santa Rosa - Toay, and Ushuaia - Río Grande. For Brazil, the rural areas of Randonia, Acre, Amazonas, Roraira, Pará, and Amapá were excluded for 2002-15, since they were not surveyed pre-2002. For Colombia, between 2001 and 2005, the survey covered 13 regions: Antioquia, Atlántico, Bogotá, Bolívar, Caldas, Córdoba, Meta, Nariño, Norte de Santander, Risaralda, Santander, Tolima, and Valle del Cauca. The sample has been restricted to these areas for 2008 to 2015. Finally, for Uruguay, the 2006-15 sample was restricted to Montevideo and all localities with more than 5,000 inhabitants, which were the only areas covered before 2006.

Circa Concepts

The analysis often draws comparisons between 1995, 2002, and 2015. However, survey data are not available for all the countries for these three years. A circa concept was applied when these years were not available. Data for 1995 were approximated by data for 1996 for Chile and Mexico; 1997 for Bolivia, Paraguay, and Peru; and 1998 for Nicaragua. Data for 2002 were approximated by data for 2004 for Bolivia and Mexico, and 2005 for Nicaragua. Data for 2015 were approximated by 2014 in Argentina, Guatemala, Mexico, and Nicaragua. In addition, for analysis that required harmonized information for occupation categories, data for 1995 were approximated by data for 1999 for Bolivia, and data for 2015 were approximated

by 2014 in Costa Rica and Peru.

Regional Averages in figures 1-5

All regional and sub-regional averages in figures 1-5 are unweighted averages of 13 countries: Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay. Colombia, Ecuador, and Guatemala were excluded from the regional averages because there is no comparable data for 1995-2002. In the construction of figures 1-5, and to ensure a consistent average of the 13 countries that are included in the sample over time, the data were linearly interpolated at the country level when the survey data were missing for a specific year.

Variable Definitions and Sample Restrictions

Every survey asks individuals about their labor earnings in the main occupation during the last month. Hourly wages are constructed by dividing the monthly wage by the total hours worked during the reference period. Nominal hourly wages are converted into real terms using national consumer price index (CPI) deflators, and they are expressed in dollars using 2005 purchasing power parity (PPP).

The SEDLAC project homogenizes the household surveys' information on educational systems to make it comparable across countries. The variable for educational attainment consists of the following five categories: i) completed primary or less, ii) high school dropout, iii) high school completed, iv) college incomplete, and v) college completed or more. Although educational attainment is classified in five groups, the paper often reports aggregates for the grouping: i) high school dropouts or less, ii) high school completed, and iii) college completed. The level of potential experience of workers is calculated as age minus years of completed education minus six.

Using the International Standard Classification of Occupations (ISCO-08), a homogeneous one-digit-level classification is obtained: i) directors and senior officials, ii) employed workers in administrative occupations or at an intermediate level, iii) employed workers in agricultural occupations, iv) employed workers in other occupations (not classified), v) employed workers in service occupations, vi) employed workers in the military, vii) non-agricultural workers and operators, viii) technical and professional workers, ix) traders, and x) retail workers. However, the analysis in figure 6 presents changes in employment and wages for detailed occupations, as discussed in the paper.

Similarly, the methodology used to classify the economic sector follows the International Standard Industrial Classification of All Economic Activities (ISIC) at the one-digit level. This paper used the classification of industries in every household survey to categorize the economic sector according to the ISIC into 17 groups: i) agriculture, hunting, and forestry; ii) fishing; iii) mining and quarrying; iv) manufacturing; v) electricity, gas, and water supply; vi) construction; vii) wholesale and retail trade; viii) hotels and restaurants; ix) transport, storage, and communication; x) financial intermediation; xi) real state, renting, and business activities; xii) public administration and defense; xiii) education; xiv) health and social work; xv) other community, social, and personal service activities; xvi) activities of private households as employers; and xvii) extraterritorial organizations and trade.

The wage data sample is restricted to all paid workers (employees and self-employed) with ages 18-65. Hence, employers and unpaid family workers are excluded. After dropping zero and negative wages, the 1st and 99th percentiles of hourly wages are trimmed in every country-year to remove outliers.

Data Sources by Country

Table S1.1 lists the name of the household data sets used and the years covered.

Table S1.1. Household Surveys Used

Country	Data set in SEDLAC	Years
1. Argentina	Encuesta permanente de Hogares	1995-2002
	Encuesta permanente de Hogares - Continua	2003-14
2. Bolivia	Encuesta Nacional de Empleo	1997
	Encuesta de Hogares - MECOVI	1999-2002
		2004-09
		2011-15
3. Brazil	Pesquisa Nacional por Amostra de Domicilios	1995-99
		2001-09
		2011-15
4. Chile	Encuesta de Caracterización Socioeconómica Nacional	1996, 1998, 2000, 2003, 2006, 2009, 2011, 2013, 2015
5. Colombia	Encuesta Continua de Hogares	2001-05
	Gran Encuesta Integrade de Hogares	2008-15
6. Costa Rica	Encuesta de Hogares de Propósitos Múltiples	1995-2009
	Encuesta Nacional de Hogares	2010-15
7. Ecuador	Encuesta de Empleo, Desempleo y Subempleo	2003-15
8. Guatemala	Encuesta Nacional sobre Condiciones de Vida	2000, 2006, 2011, 2014
	Encuesta Nacional de Empleo e Ingresos	2002-04
9. Honduras	Encuesta Permanente de Hogares de Propósitos Múltiples	1995-99
		2001-15
10. Mexico	Encuesta Nacional de Ingresos y Gastos de los Hogares	1996, 1998, 2000, 2002, 2004-06, 2008, 2010, 2012, 2014
11. Nicaragua	Encuesta Nacional de Hogares sobre Medición de Nivel de Vida	1998, 2001, 2005, 2009, 2014
12. Panama	Encuesta de Hogares	1995, 1997-2015
13. Peru	Encuesta Nacional de Hogares	1997-2015
14. Paraguay	Encuesta de Hogares (Mano de Obra)	1995
	Encuesta Integrada de Hogares	1997, 2001
	Encuesta Permanente de Hogares	1999, 2002-15
15. El Salvador	Encuesta de Hogares de Propósitos Múltiples	1995-96, 1998-2015
16. Uruguay	Encuesta Continua de Hogares	1995-92
		2000-15

S1.2 Harmonized 12-Month Survey Panels from Labor Force Surveys

The informality section complements the analysis using harmonized household survey data with analysis using 12-month survey panels from Labor Force Surveys. Data for Argentina cover 2003-2014; for Brazil, 2005-2011; and for Mexico, 2005-2015. The data were harmonized by the World Bank and the Center for Distributive, Labor and Social Studies (CEDLAS, for its acronym in Spanish) at the Universidad Nacional de La Plata in Argentina. Because these panels were developed as part of the Labor Force Surveys (Encuesta Permanente de Hogares-Continua (Argentina), Pesquisa Mensal de Emprego (Brazil), and Encuesta Nacional de Ocupación y Empleo (Mexico), the geographic coverage is limited to the main metropolitan areas (31 in Argentina, 6 in Brazil, and 32 in Mexico). For further details on the data see for example Cerutti et al. (2019). Table S1.2 shows the number of workers included in the panel in each year.

Table S1.2 Summary Statistics, 12-Month Survey Panels from Labor Force Surveys

Year	Number of workers		
	Argentina	Brazil	Mexico
2004	2,461,869	-	-
2005	2,628,739	2,539,639	1,770,798
2006	2,742,351	2,515,159	1,611,663
2007	2,795,994	2,618,458	1,591,197
2008	2,844,509	2,708,733	1,552,292
2009	2,918,944	2,715,050	-
2010	2,959,980	2,648,601	-
2011	3,122,041	2,704,008	1,613,610
2012	3,040,144	-	1,552,809
2013	1,525,840	-	1,859,417
2014	1,650,562	-	1,440,487
2015	-	-	1,505,865

Note: All totals from the household surveys are computed applying sampling weights-expansion factors provided by the institutes of statistics.

S1.3 Administrative Matched Employer-Employee Data Sets

Section 7 of this paper used administrative data for Brazil covering 1995-2014 from the Relação Anual de Informações Sociais (RAIS), Costa Rica covering 2006-2011 from the *Caja Costarricense de Seguro Social (CCSS)*, and Ecuador 2006-2012 from the Instituto Ecuatoriano de Seguridad Social (IESS).

The Brazilian administrative data cover all workers who have a signed work card. It omits interns, domestic workers (until 2014), along with those without signed work cards, including the self-employed that are not contributing to the system. The Costa Rican administrative data cover all workers registered with "Caja Costarricense de Seguro Social." Registration is mandatory for all manual and intellectual workers who receive a salary. Benefits include not just old age pension, but also medical services, subsidies for disability, and maternity leave. It also includes uncovered workers and self-employed who voluntarily contribute. The Ecuadorian administrative data cover all workers registered with "Instituto Ecuatoriano de Seguridad Social." Registration is mandatory for all people who work with or without a dependency relationship (in particular, workers in a dependent relationship), self-employed workers, freelance professionals, administrators or employers of a business, unpaid workers at home, and minor independent workers. Benefits include health, pension, rural social security, and labor risks protection. Workers can decide to contribute voluntarily.

The three data sets have unique worker and employer identifiers. In all cases, the analysis focuses on private sector employees. Self-employed are excluded because the administrative data is unlikely to be representative for this group, as there is a large share of self-employed workers non-contributing to the system. If a person had two jobs at the same time, the analysis only considers the main job, which was proxied by the one with the highest wage. The wage measure used in the administrative data is the real monthly wage. Nominal monthly wages are converted into real terms using national consumer price index (CPI) deflators, and they are expressed in dollars using 2005 purchasing power parity (PPP).

Appendix table S1.3 presents the average wage and size of the formal workforce in household surveys versus administrative data. Although the definition of formal employment differs between household surveys and administrative data (see section 7), the number of workers covered in the two data sources and their distribution of wages are roughly comparable (see also figure S5.1 for a comparison of wage distributions in the two data sources).

Table S1.3 Average Wage and Size of the Formal Workforce in Household Surveys versus Administrative Data

a. Brazil

Year	Number of firms	Number of formal workers		Average log real wage (ppp)	
	RAIS	RAIS	PNAD	RAIS	PNAD
1995	1,007,491	15,208,033	18,353,257	6.128	6.170
1996	1,082,197	15,793,866	18,481,332	6.127	6.174
1997	1,222,684	16,947,898	20,382,370	6.137	6.092
1998	1,281,059	17,160,371	20,889,209	6.135	6.101
1999	1,348,541	17,661,290	20,949,785	6.105	6.051
2001	1,495,028	19,545,908	27,124,772	6.106	6.052
2002	1,580,489	20,462,491	25,108,709	6.097	6.015
2003	1,635,272	21,203,348	26,102,820	6.081	5.984
2004	1,718,258	22,959,016	27,737,267	6.086	5.992
2005	1,980,565	24,316,954	29,212,251	6.084	6.018
2006	2,074,024	25,727,246	30,435,573	6.130	6.074
2007	2,158,061	27,623,531	32,455,464	6.161	6.108
2008	2,269,564	29,572,135	34,808,847	6.194	6.130
2009	2,385,507	30,715,862	35,447,309	6.228	6.161
2011	2,434,764	34,836,544	37,818,719	6.315	6.211
2012	2,541,644	36,193,865	39,462,965	6.371	6.271
2013	2,643,683	37,124,736	40,295,263	6.410	6.301
2014	2,730,265	37,472,475	41,470,338	6.420	6.306

b. Costa Rica

Year	Number of firms	Number of formal workers		Average log real wage (ppp)	
	CCSS	CCSS	ENAHO	CCSS	ENAHO
2006	47,145	591,651	671,509	6.592	6.602
2007	51,708	661,500	754,661	6.620	6.618
2008	55,841	722,110	748,548	6.641	6.637
2009	58,870	724,383	785,676	6.674	6.696
2010	59,444	714,004	851,565	6.705	6.664
2011	58,577	678,884	859,973	6.765	6.697

c. Ecuador

Year	Number of firms	Number of formal workers		Average log real wage (ppp)	
	IESS	IESS	ENEMDU	IESS	ENEMDU
2006	62,604	812,659	776,552	6.242	6.436
2007	70,755	894,719	786,785	6.278	6.461
2008	78,204	978,916	907,028	6.31	6.435
2009	87,858	1,094,927	987,285	6.372	6.436
2010	102,339	1,172,687	1,195,190	6.409	6.45
2011	126,161	1,314,478	1,416,680	6.425	6.488
2012	152,355	1,484,112	1,476,213	6.442	6.518

Note: The table reports the average log real wage and total number of workers, working in the private sector, in Brazil, Costa Rica, and Ecuador, using household surveys and administrative data. Wages are defined as real monthly wage in the main occupation. Values are deflated using consumer price indexes and purchasing power parities between each local currency and dollars. All totals from the household surveys are computed applying sampling weights/expansion factors provided by the Institutes of Statistics. Formal workers are defined in PNAD, ENAHO and ENEMDU as those who report having access to a pension through their job. RAIS refers to Brazil's Social Security Records (Relação Anual de Informações Sociais), PNAD refers to Brazil's National Household Survey (Pesquisa Nacional por Amostra de Domicílios), CCSS refers to Costa Rica's Social Security Records (Caja Costarricense de Seguro Social), ENAHO refers to Costa Rica's National Household Survey (Encuesta Nacional de Hogares), IESS refers to Ecuador's Social Security Records (Instituto Ecuatoriano de Seguridad Social), and ENEMDU refers to Ecuador's National Household Survey (Encuesta Nacional de Empleo, Desempleo y Subempleo). PPP = purchasing power parity.

S2 Detailed Country Results

S2.1 Using Harmonized Household Data

Table S2.1 Trends in Overall Inequality

	Level								
	Gini			Variance			log(p90/p10)		
Country	1995	2002	2015	1995	2002	2015	1995	2002	2015
Argentina	34.76	39.16	33.32	0.40	0.52	0.41	1.61	1.84	1.66
Bolivia	49.43	52.28	40.74	1.02	1.35	0.74	2.59	2.92	2.14
Brazil	49.37	48.14	43.91	0.78	0.72	0.54	2.26	2.15	1.70
Chile	44.86	40.98	38.01	0.61	0.52	0.44	1.98	1.80	1.57
Colombia	n.a.	47.86	40.19	n.a.	0.78	0.57	n.a.	2.34	1.89
Costa Rica	36.59	38.72	42.12	0.43	0.49	0.61	1.62	1.75	2.01
Ecuador	n.a.	43.81	33.99	n.a.	0.67	0.46	n.a.	2.08	1.65
Guatemala	n.a.	49.83	41.32	n.a.	1.02	0.71	n.a.	2.61	2.06
Honduras	43.48	46.93	44.87	0.67	0.87	0.86	2.17	2.42	2.35
Mexico	44.61	43.26	40.85	0.74	0.71	0.62	2.18	2.12	1.94
Nicaragua	45.74	39.69	39.41	0.73	0.52	0.51	2.14	1.84	1.79
Panama	41.77	44.89	37.96	0.59	0.80	0.56	1.99	2.34	1.84
Peru	44.03	45.71	39.47	0.81	0.86	0.61	2.24	2.37	1.97
Paraguay	44.75	45.51	40.09	0.78	0.86	0.63	2.20	2.35	2.03
El Salvador	38.20	42.29	36.42	0.50	0.75	0.52	1.86	2.12	1.75
Uruguay	38.64	41.38	33.64	0.49	0.55	0.37	1.80	1.90	1.52

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Wages are defined as real hourly income (using 2005 purchasing power parity conversion rates) in the main occupation. The sample was restricted to individuals ages 18 to 65 years who were employees or self-employed. The 1st and 99th percentiles of the country-year wage distributions were trimmed.

Table S2.2 Trends in Overall Inequality

	Level														
	p5			p10			p50			p90			p95		
Country	1995	2002	2015	1995	2002	2015	1995	2002	2015	1995	2002	2015	1995	2002	2015
Argentina	1.41	0.74	1.29	1.78	1.04	1.69	3.72	2.30	4.02	8.91	6.57	8.93	11.25	8.62	10.71
Bolivia	0.26	0.14	0.50	0.44	0.29	0.82	1.72	1.51	2.73	5.86	5.45	7.00	8.38	8.17	9.31
Brazil	0.54	0.50	1.04	0.69	0.69	1.44	1.77	1.72	2.71	6.62	5.88	7.89	9.93	8.83	11.48
Chile	0.81	0.84	1.41	1.00	1.12	1.88	2.21	2.24	3.41	7.25	6.78	9.04	10.29	9.44	12.58
Colombia	n.a.	0.39	0.58	n.a.	0.52	0.87	n.a.	1.67	2.24	n.a	5.42	5.77	n.a	8.23	8.42
Costa Rica	1.03	0.95	0.85	1.39	1.35	1.30	2.77	2.84	3.17	7.00	7.81	9.75	9.81	10.41	13.32
Ecuador	n.a.	0.46	0.82	n.a.	0.65	1.25	n.a.	1.83	3.01	n.a	5.17	6.54	n.a	7.76	8.55
Guatemala	n.a.	0.23	0.27	n.a.	0.37	0.44	n.a.	1.51	1.33	n.a	5.05	3.44	n.a	7.17	4.80
Honduras	0.31	0.27	0.25	0.41	0.42	0.39	1.26	1.53	1.54	3.62	4.74	4.15	5.16	6.63	5.84
Mexico	0.42	0.49	0.56	0.65	0.78	0.87	1.78	2.21	2.21	5.70	6.47	6.03	7.60	9.05	8.33
Nicaragua	0.29	0.41	0.58	0.45	0.55	0.78	1.16	1.28	1.83	3.80	3.43	4.66	5.17	4.68	6.54
Panama	0.78	0.46	0.80	1.09	0.71	1.32	2.78	2.48	3.46	7.96	7.33	8.31	10.92	10.41	11.25
Peru	0.30	0.25	0.50	0.50	0.40	0.77	1.67	1.45	2.20	4.70	4.33	5.54	6.34	5.85	7.34
Paraguay	0.44	0.29	0.58	0.71	0.47	0.88	2.39	1.72	2.61	6.42	4.88	6.72	9.27	6.87	8.93
El Salvador	0.53	0.39	0.54	0.74	0.68	0.85	1.83	1.94	2.01	4.78	5.65	4.87	6.18	7.69	6.70
Uruguay	0.92	0.76	1.38	1.22	1.00	1.76	2.92	2.41	3.64	7.36	6.68	8.06	10.09	9.22	10.41

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Wages are defined as real hourly income (using 2005 purchasing power parity conversion rates) in the main occupation. The sample was restricted to individuals ages 18 to 65 years who were employees or self-employed. The 1st and 99th percentiles of the country-year wage distributions were trimmed.

Table S2.3 The Evolution of the Education Premium

	Log real wages ratio								
	HS/primary or less			College/primary or less			College/HS		
Country	1995	2002	2015	1995	2002	2015	1995	2002	2015
Argentina	0.23	0.29	0.23	0.71	0.89	0.66	0.48	0.60	0.43
Bolivia	0.56	0.69	0.35	1.22	1.47	0.86	0.66	0.78	0.51
Brazil	0.69	0.56	0.23	1.38	1.39	0.91	0.69	0.83	0.68
Chile	0.38	0.30	0.17	1.04	1.03	0.81	0.66	0.74	0.63
Colombia	n.a.	0.56	0.30	n.a.	1.45	1.03	n.a.	0.89	0.72
Costa Rica	0.32	0.33	0.28	0.92	0.97	1.12	0.59	0.64	0.83
Ecuador	n.a.	0.37	0.22	n.a.	0.99	0.69	n.a.	0.62	0.47
Guatemala	n.a.	0.99	0.66	n.a.	1.55	1.22	n.a.	0.56	0.57
Honduras	0.71	0.75	0.58	1.30	1.40	1.22	0.59	0.65	0.64
Mexico	0.41	0.38	0.24	1.24	1.22	1.01	0.83	0.84	0.77
Nicaragua	0.39	0.28	0.15	0.98	0.84	0.67	0.59	0.55	0.52
Panama	0.44	0.58	0.41	1.08	1.29	0.92	0.64	0.71	0.51
Peru	0.45	0.48	0.38	0.96	1.05	0.85	0.51	0.57	0.47
Paraguay	0.62	0.59	0.37	1.27	1.16	0.86	0.65	0.58	0.49
El Salvador	0.63	0.54	0.33	1.14	1.17	0.92	0.51	0.63	0.59
Uriguay	0.18	0.13	0.12	0.77	0.89	0.72	0.60	0.76	0.59

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Wages are defined as real hourly income (using 2005 purchasing power parity conversion rates) in the main occupation. The log of real hourly wages in the main occupation (labor income in 2005 purchasing power parity) was regressed on dummies of level of education (five levels), five-year intervals of experience, and all possible interactions. All education categories (college, high school, and primary education) follow country-specific classifications for university degrees, secondary education, and primary education, as defined in each household survey. The college educated labor force comprises workers who completed a university degree or higher. "High school" includes complete secondary education and incomplete college educaton. "Primary or less" includes no formal education, incomplete primary, complete primary, and incomplete secondary education. The sample was restricted to individuals between ages 18 and 65 years who were employees or self-employed and between the 1st and 99th percentiles of the wage distribution.

Table S2.4 The Evolution of the Experience Premium

	Log real wages ratio								
	10-19/0-9			20-29/0-9			30 or more/0-9		
Country	1995	2002	2015	1995	2002	2015	1995	2002	2015
Argentina	0.20	0.23	0.14	0.30	0.39	0.20	0.31	0.40	0.19
Bolivia	0.09	0.17	0.09	0.27	0.24	0.13	0.14	0.07	0.05
Brazil	0.27	0.30	0.21	0.44	0.46	0.30	0.42	0.48	0.40
Chile	0.15	0.09	0.14	0.27	0.18	0.17	0.33	0.21	0.15
Colombia	n.a.	0.14	0.12	n.a.	0.26	0.17	n.a.	0.33	0.14
Costa Rica	0.17	0.19	0.20	0.28	0.19	0.28	0.16	0.17	0.22
Ecuador	n.a.	0.12	0.07	n.a.	0.24	0.10	n.a.	0.24	0.04
Guatemala	n.a.	0.15	0.18	n.a.	0.18	0.27	n.a.	-0.02	0.26
Honduras	0.18	0.19	0.14	0.31	0.29	0.35	0.45	0.28	0.29
Mexico	0.17	0.19	0.21	0.35	0.32	0.25	0.25	0.24	0.24
Nicaragua	0.15	0.12	0.11	0.23	0.22	0.16	0.26	0.18	0.17
Panama	0.25	0.14	0.12	0.43	0.27	0.16	0.48	0.34	0.10
Peru	0.07	0.08	0.06	0.13	0.13	0.10	0.13	0.15	0.05
Paraguay	0.11	0.18	0.15	0.18	0.23	0.26	0.09	0.21	0.19
El Salvador	0.14	0.20	0.15	0.23	0.28	0.23	0.15	0.28	0.12
Uruguay	0.26	0.26	0.21	0.32	0.42	0.29	0.32	0.41	0.32

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Each data point is determined considering circa concepts (see Table A.1). The log of real hourly wages in the main occupation (labor income in 2005 purchasing power parity) was regressed on dummies of level of education (five levels), five-year intervals of experience, and all possible interactions. The sample was restricted to individuals between ages 18 and 65 years who were employees or self-employed and between the 1st and 99th percentiles of the wage distribution.

Table S2.5 Relative Supply of Education

	Relative supply								
	HS/primary or less			College/primary or less			College/HS		
Country	1995	2002	2015	1995	2002	2015	1995	2002	2015
Argentina	0.16	0.22	0.41	0.50	0.62	0.97	0.31	0.36	0.42
Bolivia	0.15	0.11	0.34	0.37	0.36	0.96	0.41	0.29	0.35
Brazil	0.06	0.09	0.24	0.21	0.36	0.78	0.30	0.24	0.30
Chile	0.19	0.27	0.56	0.61	0.85	1.39	0.32	0.32	0.41
Colombia	n.a.	0.17	0.30	n.a.	0.49	0.96	n.a.	0.36	0.31
Costa Rica	0.10	0.13	0.17	0.27	0.30	0.53	0.35	0.44	0.32
Ecuador	n.a.	0.07	0.24	n.a.	0.51	0.72	n.a.	0.13	0.33
Guatemala	n.a.	0.04	0.04	n.a.	0.16	0.24	n.a.	0.24	0.16
Honduras	0.02	0.03	0.06	0.16	0.18	0.24	0.14	0.16	0.24
Mexico	0.08	0.10	0.20	0.24	0.30	0.38	0.34	0.35	0.53
Nicaragua	0.04	0.08	0.13	0.15	0.22	0.34	0.31	0.34	0.39
Panama	0.10	0.12	0.28	0.57	0.59	0.84	0.18	0.20	0.33
Peru	0.25	0.31	0.52	0.66	0.73	1.16	0.38	0.43	0.45
Paraguay	0.05	0.05	0.23	0.21	0.27	0.65	0.23	0.18	0.35
El Salvador	0.03	0.07	0.09	0.22	0.29	0.44	0.16	0.25	0.20
Uruguay	0.09	0.11	0.19	0.13	0.35	0.38	0.65	0.31	0.52

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: Relative supply of individuals in the working age population (16-65). All education categories (college, high school, and primary education) follow country-specific classifications for university degrees, secondary education, and primary education, defined in each household survey. The college educated labor force comprises workers who completed a university degree or higher. "High school" includes complete secondary education and incomplete college education. "Primary or less" includes no formal education, incomplete primary, complete primary, and incomplete secondary education.

Table S2.6 Relative Supply of Workers with 20 or More Years of Experience

	Evolution of the 20 or more years of experience ratio		
	20 or more years of experience / total		
Country	1995	2002	2015
Argentina	0.528	0.502	0.490
Bolivia	0.507	0.498	0.496
Brazil	0.565	0.559	0.574
Chile	0.486	0.511	0.531
Colombia	n.a.	0.519	0.523
Costa Rica	0.500	0.537	0.548
Ecuador	n.a.	0.503	0.506
Guatemala	n.a.	0.522	0.534
Honduras	0.529	0.506	0.525
Mexico	0.474	0.508	0.535
Nicaragua	0.521	0.507	0.496
Panama	0.460	0.492	0.532
Peru	0.490	0.491	0.544
Paraguay	0.525	0.528	0.492
El Salvador	0.528	0.520	0.523
Uruguay	0.599	0.584	0.569

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: The ratio represents the share of workers with 20 or more years of experience in the total of employed individuals. The level of experience of workers is calculated as the age minus the number of years of completed education minus six. The sample was restricted to individuals aged 18 to 65.

Table S2.7 Within- and Between-Skill Groups Wage Inequality in Latin America, 1995-2015

	Level																					Change	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	1995-2002	2002-2015
Argentina																							
Between-skill groups component	0.09	0.09	0.11	0.13	0.12	0.14	0.14	0.17	0.13	0.13	0.12	0.13	0.12	0.11	0.11	0.11	0.10	0.08	0.08	0.09	-	0.07	-0.08
Within-skill groups component	0.30	0.31	0.31	0.32	0.33	0.35	0.39	0.35	0.43	0.39	0.37	0.35	0.36	0.36	0.35	0.34	0.35	0.33	0.33	0.32	-	0.05	-0.03
Total wage variance	0.40	0.40	0.42	0.44	0.45	0.49	0.53	0.52	0.56	0.52	0.49	0.49	0.47	0.48	0.46	0.44	0.45	0.41	0.41	0.41	-	0.12	-0.11
Bolivia																							
Between-skill groups component	-	-	0.25	-	0.44	0.42	0.31	0.31	-	0.22	0.32	0.29	0.32	0.23	0.20	-	0.15	0.18	0.19	0.14	0.14	0.05	-0.17
Within-skill groups component	-	-	0.77	-	1.10	1.12	0.99	1.04	-	0.69	0.89	0.86	0.80	0.79	0.75	-	0.62	0.74	0.67	0.62	0.59	0.27	-0.45
Total wage variance	-	-	1.02	-	1.54	1.54	1.30	1.35	-	0.91	1.21	1.15	1.12	1.02	0.95	-	0.77	0.92	0.86	0.76	0.73	0.32	-0.62
Brazil																							
Between-skill groups component	0.24	0.24	0.26	0.27	0.25	-	0.25	0.25	0.24	0.23	0.23	0.22	0.21	0.19	0.19	-	0.18	0.17	0.18	0.16	0.17	0.01	-0.08
Within-skill groups component	0.54	0.55	0.54	0.51	0.49	-	0.48	0.47	0.45	0.44	0.43	0.41	0.41	0.39	0.38	-	0.38	0.36	0.38	0.36	0.37	-0.07	-0.10
Total wage variance	0.78	0.80	0.80	0.77	0.74	-	0.73	0.72	0.70	0.67	0.65	0.63	0.62	0.58	0.57	-	0.56	0.53	0.56	0.52	0.54	-0.06	-0.18
Chile																							
Between-skill groups component	-	0.17	-	0.17	-	0.17	-	-	0.15	-	-	0.13	-	-	0.13	-	0.14	-	0.12	-	0.11	-	-0.04
Within-skill groups component	-	0.44	-	0.38	-	0.39	-	-	0.36	-	-	0.37	-	-	0.35	-	0.35	-	0.36	-	0.32	-	-0.04
Total wage variance	-	0.60	-	0.55	-	0.56	-	-	0.51	-	-	0.50	-	-	0.49	-	0.49	-	0.48	-	0.43	-	-0.08
Colombia																							
Between-skill groups component	-	-	-	-	-	-	0.23	0.31	0.23	0.23	0.23	-	-	0.21	0.21	0.21	0.20	0.21	0.19	0.21	0.17	-	-0.14
Within-skill groups component	-	-	-	-	-	-	0.44	0.46	0.46	0.45	0.41	-	-	0.39	0.40	0.42	0.41	0.43	0.42	0.40	0.39	-	-0.07
Total wage variance	-	-	-	-	-	-	0.67	0.78	0.69	0.68	0.64	-	-	0.60	0.61	0.63	0.61	0.63	0.61	0.60	0.57	-	-0.21
Costa Rica																							
Between-skill groups component	0.12	0.11	0.12	0.12	0.13	0.12	0.14	0.15	0.15	0.14	0.14	0.15	0.14	0.15	0.16	0.16	0.18	0.18	0.19	0.21	0.20	0.03	0.04
Within-skill groups component	0.30	0.32	0.31	0.28	0.31	0.33	0.33	0.33	0.31	0.29	0.30	0.29	0.28	0.26	0.29	0.37	0.40	0.39	0.44	0.41	0.41	0.03	0.08
Total wage variance	0.43	0.43	0.43	0.41	0.44	0.45	0.47	0.49	0.46	0.43	0.44	0.44	0.41	0.41	0.45	0.53	0.59	0.56	0.63	0.62	0.61	0.06	0.13
Ecuador																							
Between-skill groups component	-	-	-	-	-	0.14	-	-	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.08	0.09	-	-0.05
Within-skill groups component	-	-	-	-	-	0.54	-	-	0.53	0.49	0.47	0.42	0.46	0.41	0.42	0.39	0.38	0.35	0.34	0.34	0.37	-	-0.17
Total wage variance	-	-	-	-	-	0.68	-	-	0.67	0.62	0.61	0.55	0.59	0.53	0.54	0.50	0.49	0.46	0.45	0.42	0.46	-	-0.21
Guatemala																							
Between-skill groups component	-	-	-	-	-	0.27	-	0.29	0.25	0.22	-	0.22	-	-	-	-	0.19	-	-	0.17	-	- -	-0.12
Within-skill groups component	-	-	-	-	-	0.58	-	0.73	0.65	0.70	-	0.61	-	-	-	-	0.59	-	-	0.54	-	- -	-0.19
Total wage variance	-	-	-	-	-	0.85	-	1.02	0.90	0.92	-	0.83	-	-	-	-	0.78	-	-	0.71	-	- -	-0.31

	Level																					Change	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	1995-2002	2002-2015
Honduras																							
Between-skill groups component	0.17	0.20	0.17	0.17	0.20	-	0.19	0.19	0.19	0.25	0.27	0.27	0.27	0.24	0.22	0.26	0.26	0.25	0.22	0.18	0.19	0.02	-0.01
Within-skill groups component	0.50	0.55	0.53	0.52	0.56	-	0.55	0.68	0.65	0.75	0.81	0.79	0.77	0.68	0.72	0.77	0.92	0.89	0.84	0.65	0.68	0.17	0.00
Total wage variance	0.67	0.74	0.69	0.69	0.76	-	0.73	0.87	0.83	0.99	1.08	1.06	1.03	0.92	0.94	1.03	1.19	1.14	1.06	0.84	0.86	0.20	-0.01
Mexico																							
Between-skill groups component	-	0.22	-	0.24	-	0.22	-	0.21	-	-	-	-	-	0.16	-	0.17	-	0.17	-	0.16	-	-0.01	-0.04
Within-skill groups component	-	0.52	-	0.52	-	0.48	-	0.50	-	-	-	-	-	0.44	-	0.43	-	0.49	-	0.45	-	-0.02	-0.05
Total wage variance	-	0.74	-	0.76	-	0.70	-	0.71	-	-	-	-	-	0.59	-	0.60	-	0.66	-	0.62	-	-0.03	-0.09
Nicaragua																							
Between-skill groups component	-	-	-	0.11	-	-	0.08	-	-	-	0.08	-	-	-	0.08	-	-	-	-	0.06	-	-	-
Within-skill groups component	-	-	-	0.62	-	-	0.55	-	-	-	0.44	-	-	-	0.43	-	-	-	-	0.44	-	-	-
Total wage variance	-	-	-	0.73	-	-	0.63	-	-	-	0.52	-	-	-	0.51	-	-	-	-	0.50	-	-	-
Panama																							
Between-skill groups component	0.22		0.22	0.21	0.20	0.20	0.24	0.26	0.24	0.25	0.23	0.23	0.19	0.17	0.17	0.17	0.18	0.19	0.17	0.16	0.16	0.04	-0.10
Within-skill groups component	0.37		0.37	0.39	0.35	0.39	0.47	0.54	0.52	0.52	0.51	0.50	0.44	0.42	0.42	0.42	0.43	0.43	0.40	0.39	0.40	0.18	-0.14
Total wage variance	0.59		0.59	0.60	0.56	0.59	0.71	0.80	0.76	0.76	0.74	0.73	0.64	0.60	0.59	0.59	0.61	0.62	0.57	0.56	0.56	0.21	-0.24
Peru																							
Between-skill groups component	-	-	0.15	0.16	0.18	0.18	0.18	0.17	0.17	0.15	0.13	0.15	0.16	0.14	0.13	0.11	0.11	0.11	0.11	0.12	0.12	0.02	-0.06
Within-skill groups component	-	-	0.66	0.63	0.65	0.60	0.77	0.68	0.62	0.60	0.60	0.57	0.58	0.59	0.58	0.56	0.54	0.54	0.53	0.51	0.50	0.02	-0.19
Total wage variance	-	-	0.81	0.79	0.83	0.78	0.95	0.86	0.79	0.75	0.73	0.72	0.74	0.73	0.71	0.68	0.64	0.65	0.64	0.63	0.61	0.05	-0.24
Paraguay																							
Between-skill groups component	-	-	0.20	-	0.16	-	0.22	0.20	0.19	0.13	0.17	0.17	0.15	0.16	0.18	0.17	0.17	0.17	0.18	0.14	0.18	0.00	-0.02
Within-skill groups component	-	-	0.58	-	0.60	-	0.67	0.66	0.68	0.62	0.64	0.56	0.54	0.55	0.58	0.52	0.53	0.51	0.46	0.47	0.46	0.08	-0.21
Total wage variance	-	-	0.78	-	0.76	-	0.88	0.86	0.87	0.75	0.81	0.73	0.69	0.72	0.76	0.68	0.70	0.68	0.64	0.62	0.63	0.08	-0.22
El Salvador																							
Between-skill groups component	0.18	0.19	-	0.17	0.16	0.18	0.19	0.17	0.13	0.13	0.16	0.11	0.14	0.15	0.14	0.13	0.12	0.12	0.12	0.12	0.11	0.00	-0.06
Within-skill groups component	0.32	0.46	-	0.40	0.34	0.53	0.55	0.57	0.35	0.47	0.43	0.46	0.36	0.37	0.39	0.40	0.38	0.38	0.40	0.40	0.41	0.25	-0.16
Total wage variance	0.50	0.65	-	0.57	0.50	0.71	0.74	0.75	0.48	0.60	0.59	0.57	0.50	0.52	0.53	0.53	0.49	0.50	0.52	0.52	0.52	0.25	-0.22
Uruguay																							
Between-skill groups component	0.13	0.13	0.14	0.13	-	0.14	0.15	0.16	0.16	0.19	0.18	0.16	0.17	0.14	0.16	0.16	0.14	0.13	0.13	0.12	0.12	0.03	-0.04
Within-skill groups component	0.36	0.37	0.38	0.36	-	0.35	0.37	0.39	0.39	0.38	0.38	0.41	0.40	0.38	0.36	0.34	0.31	0.29	0.26	0.27	0.26	0.03	-0.13
Total wage variance	0.49	0.51	0.51	0.49	-	0.49	0.52	0.55	0.55	0.57	0.56	0.57	0.57	0.52	0.52	0.50	0.45	0.41	0.39	0.39	0.37	0.06	-0.18

Table S2.8 Variance Decomposition in Sector-Occupations and Skills Using the AKM Model by Country

	Level			Change	
	1995	2002	2015	1995-2002	2002-15
Argentina					
Total variance	0.396	0.473	0.381	0.077	-0.092
Variance in sector-occupation	0.059	0.069	0.039	0.009	-0.030
Variance in skill-groups	0.058	0.093	0.041	0.035	-0.051
2*Cov(sector-occupation, experience-education)	0.036	0.049	0.024	0.013	-0.025
Residual	0.242	0.262	0.277	0.020	0.014
Bolivia					
Total Variance	1.157	0.986	0.572	-0.170	-0.415
Variance in sector-occupation	0.304	0.258	0.096	-0.046	-0.161
Variance in skill-groups	0.171	0.092	0.046	-0.079	-0.046
2*Cov(sector-occupation, experience-education)	0.117	0.073	0.041	-0.044	-0.032
Residual	0.565	0.563	0.388	-0.002	-0.175
Brazil					
Total Variance	0.687	0.622	0.437	-0.064	-0.185
Variance in sector-occupation	0.065	0.084	0.029	0.019	-0.055
Variance in skill-groups	0.165	0.115	0.095	-0.050	-0.020
2*Cov(sector-occupation, experience-education)	0.057	0.088	0.042	0.031	-0.046
Residual	0.400	0.335	0.272	-0.065	-0.063
Costa Rica					
Total Variance	0.338	0.422	0.427	0.085	0.005
Variance in sector-occupation	0.049	0.074	0.098	0.024	0.024
Variance in skill-groups	0.044	0.048	0.031	0.004	-0.017
2*Cov(sector-occupation, experience-education)	0.046	0.068	0.060	0.022	-0.008
Residual	0.199	0.233	0.238	0.034	0.005
Mexico					
Total Variance	0.533	0.566	0.510	0.033	-0.056
Variance in sector-occupation	0.078	0.086	0.067	0.008	-0.018
Variance in skill-groups	0.084	0.083	0.068	-0.001	-0.015
2*Cov(sector-occupation, experience-education)	0.066	0.063	0.061	-0.003	-0.002
Residual	0.305	0.335	0.314	0.029	-0.020
Nicaragua					
Total Variance	0.564	0.476	0.358	-0.088	-0.118
Variance in sector-occupation	0.079	0.051	0.034	-0.028	-0.017
Variance in skill-groups	0.049	0.031	0.029	-0.018	-0.002
2*Cov(sector-occupation, experience-education)	0.036	0.026	0.024	-0.010	-0.002
Residual	0.400	0.368	0.271	-0.032	-0.097
Peru					
Total Variance	0.555	0.653	0.501	0.098	-0.152
Variance in sector-occupation	0.099	0.134	0.088	0.035	-0.046
Variance in skill-groups	0.059	0.052	0.033	-0.007	-0.019
2*Cov(sector-occupation, experience-education)	0.040	0.053	0.043	0.013	-0.009
Residual	0.358	0.415	0.337	0.058	-0.078
El Salvador					
Total Variance	0.446	0.633	0.411	0.188	-0.222
Variance in sector-occupation	0.092	0.154	0.082	0.062	-0.072
Variance in skill-groups	0.064	0.028	0.023	-0.035	-0.005
2*Cov(sector-occupation, experience-education)	0.058	0.036	0.037	-0.021	0.001
Residual	0.232	0.414	0.269	0.182	-0.146

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Total wage variance is the variance of the log hourly wage in the household surveys data set. Variance in skill-groups is the variance of the log real hourly wage that is explained by a full set of gender, education, and experience dummies, and their interaction. The variance in sector-occupation is the variance of the log real hourly wage that is explained by a full set of sector-occupation dummies. AKM = Abowd, Kramarz, and Margolis (1999).

Table S2.9 Share of Formal Employment, Informal Employment, and Self-employed in Total Employment (percent)

	Share in total employment													
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Argentina														
Share of formal workers	57	54	55	55	57	60	60	61	63	62	63	62	62	62
Share of informal workers	24	28	27	27	26	24	22	21	22	22	21	21	21	22
Share of self-employed	19	18	18	18	17	16	18	18	15	16	16	17	17	16
Bolivia														
Share of formal workers	12	13	13	15	19	18	17	18	20	21	22	24	21	21
Share of informal workers	40	41	42	35	34	39	39	39	36	33	33	29	32	31
Share of self-employed	48	46	44	50	47	43	44	42	44	45	46	47	47	49
Brazil														
Share of formal workers	54	55	56	57	58	60	62	62	63	64	65	67	66	66
Share of informal workers	23	22	22	22	21	20	19	18	17	16	15	14	14	13
Share of self-employed	23	23	22	21	21	21	19	19	20	20	20	19	20	21
Chile														
Share of formal workers	69	69	70	70	71	71	70	69	71	73	74	76	75	75
Share of informal workers	15	14	14	13	13	13	14	15	13	11	11	10	10	11
Share of self-employed	17	17	17	16	16	16	16	16	16	16	15	14	14	15
Costa Rica														
Share of formal workers	62	63	64	63	63	65	65	67	65	66	66	67	68	66
Share of informal workers	20	21	19	22	21	21	19	19	20	20	19	19	19	20
Share of self-employed	18	16	17	15	16	14	15	15	15	15	15	15	14	14
Mexico														
Share of formal workers	37	38	38	39	40	40	41	39	38	37	36	38	39	41
Share of informal workers	45	46	47	48	49	49	50	51	53	53	54	53	52	51
Share of self-employed	18	17	15	13	12	11	9	9	10	10	10	9	9	8
Nicaragua														
Share of formal workers	25	24	24	24	24	25	25	25	27	28	29	31	32	33
Share of informal workers	44	44	43	42	41	40	39	38	38	39	40	40	41	42
Share of self-employed	31	32	33	34	35	36	36	37	35	33	31	29	27	25
Peru														
Share of formal workers	29	30	16	31	33	37	38	42	42	45	47	49	50	48
Share of informal workers	67	65	79	64	63	60	59	54	54	51	49	48	46	48
Share of self-employed	4	5	5	5	4	4	4	4	4	4	3	3	3	4
Paraguay														
Share of formal workers	7	6	7	9	7	9	10	11	11	12	13	14	13	13
Share of informal workers	17	18	20	21	21	20	20	20	18	20	20	20	20	20
Share of self-employed	77	76	73	70	72	71	70	70	71	68	67	67	67	67
El Salvador														
Share of formal workers	34	34	32	35	33	34	36	34	34	33	34	36	37	38
Share of informal workers	32	31	35	33	36	33	32	33	34	35	35	33	35	30
Share of self-employed	34	35	33	33	31	33	31	33	32	32	31	30	29	32

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).

Note: The shares shown in this table were calculated based on total employment. If a specific country did not have information available for a particular year, a simple interpolation was applied. The sample was restricted to individuals between ages 18 and 65 years.

Table S2.10 Variance of Earnings among Formal Employees, Informal Employees and Self-Employed workers

	Variance of log real hourly wages													
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Argentina														
Share of formal workers	0.357	0.332	0.296	0.280	0.268	0.293	0.284	0.253	0.267	0.267	0.244	0.234	0.208	0.181
Share of informal workers	0.359	0.360	0.363	0.357	0.375	0.343	0.362	0.354	0.330	0.367	0.318	0.318	0.328	0.338
Share of self-employed	0.517	0.516	0.576	0.587	0.577	0.547	0.553	0.515	0.500	0.524	0.469	0.448	0.434	0.421
Bolivia														
Share of formal workers	0.517	0.491	0.465	0.471	0.498	0.368	0.370	0.317	0.317	0.317	0.307	0.283	0.258	0.237
Share of informal workers	0.413	0.399	0.386	0.342	0.397	0.404	0.341	0.378	0.350	0.321	0.379	0.317	0.318	0.281
Share of self-employed	1.111	0.961	0.811	1.134	1.051	1.093	1.129	1.104	1.007	0.910	1.062	0.933	0.816	0.774
Brazil														
Share of formal workers	0.530	0.485	0.469	0.450	0.436	0.428	0.409	0.394	0.391	0.388	0.371	0.367	0.365	0.357
Share of informal workers	0.428	0.415	0.402	0.406	0.414	0.412	0.402	0.402	0.385	0.368	0.365	0.387	0.368	0.359
Share of self-employed	0.689	0.698	0.708	0.689	0.690	0.692	0.642	0.660	0.639	0.618	0.583	0.597	0.582	0.563
Chile														
Share of formal workers	0.386	0.379	0.366	0.352	0.339	0.326	0.313	0.301	0.301	0.300	0.293	0.286	0.268	0.249
Share of informal workers	0.345	0.337	0.339	0.341	0.343	0.335	0.327	0.319	0.314	0.309	0.314	0.319	0.308	0.298
Share of self-employed	0.512	0.498	0.518	0.538	0.558	0.533	0.508	0.483	0.496	0.508	0.490	0.471	0.450	0.429
Costa Rica														
Share of formal workers	0.357	0.341	0.326	0.330	0.322	0.305	0.294	0.310	0.325	0.321	0.303	0.310	0.319	0.284
Share of informal workers	0.313	0.315	0.259	0.279	0.277	0.251	0.279	0.286	0.300	0.361	0.331	0.415	0.362	0.355
Share of self-employed	0.515	0.506	0.475	0.498	0.468	0.468	0.479	0.438	0.591	0.624	0.594	0.723	0.588	0.634
Mexico														
Share of formal workers	0.377	0.376	0.375	0.374	0.374	0.373	0.372	0.372	0.371	0.386	0.401	0.386	0.371	0.356
Share of informal workers	0.420	0.416	0.412	0.408	0.403	0.399	0.395	0.394	0.393	0.389	0.385	0.396	0.407	0.418
Share of self-employed	0.856	0.841	0.825	0.810	0.794	0.779	0.764	0.773	0.781	0.771	0.760	0.754	0.748	0.743
Nicaragua														
Share of formal workers	0.403	0.377	0.352	0.326	0.313	0.300	0.286	0.273	0.260	0.247	0.234	0.220	0.207	0.194
Share of informal workers	0.339	0.340	0.340	0.340	0.335	0.330	0.324	0.319	0.314	0.308	0.303	0.298	0.293	0.287
Share of self-employed	0.633	0.625	0.617	0.609	0.594	0.579	0.563	0.548	0.546	0.544	0.542	0.540	0.538	0.536
Peru														
Share of formal workers	0.282	0.265	0.264	0.275	0.279	0.299	0.284	0.284	0.281	0.257	0.234	0.228	0.233	0.223
Share of informal workers	0.372	0.341	0.380	0.363	0.348	0.350	0.333	0.326	0.323	0.309	0.296	0.299	0.286	0.259
Share of self-employed	0.665	0.690	0.687	0.695	0.695	0.656	0.688	0.628	0.656	0.755	0.723	0.664	0.714	0.729
Paraguay														
Share of formal workers	0.255	0.263	0.203	0.254	0.192	0.196	0.230	0.225	0.234	0.205	0.221	0.229	0.202	0.204
Share of informal workers	0.357	0.399	0.379	0.357	0.360	0.334	0.342	0.345	0.330	0.373	0.273	0.314	0.284	0.289
Share of self-employed	0.753	0.667	0.637	0.634	0.622	0.589	0.628	0.603	0.603	0.573	0.599	0.579	0.582	0.586
El Salvador														
Share of formal workers	0.338	0.276	0.339	0.347	0.343	0.313	0.312	0.293	0.266	0.249	0.241	0.260	0.262	0.241
Share of informal workers	0.302	0.279	0.259	0.281	0.250	0.224	0.229	0.211	0.210	0.195	0.206	0.211	0.216	0.203
Share of self-employed	0.715	0.754	0.702	0.847	0.703	0.713	0.705	0.774	0.731	0.791	0.719	0.680	0.635	0.703

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Nominal hourly wages are converted into real terms using national consumer price index deflators and expressed in dollars using 2005 purchasing power parity. The 1st and 99th percentiles of real hourly wages in each country-year were trimmed. If a specific country did not have information available for a particular year, a simple interpolation was applied. The sample was restricted to individuals between ages 18 and 65 years.

Table S2.11 Variance Decomposition in Sector-Occupation-Formal Status and Skills, by Country

	Level		Change
	2002	2015	2002-15
Argentina			
Total variance	0.473	0.381	-0.092
Variance in sector-occupation-formal status	0.093	0.078	-0.015
Variance in skill-groups	0.086	0.033	-0.053
2*Cov(sector-occupation-formal status, experience-education)	0.050	0.027	-0.023
Residual	0.243	0.243	0.000
Bolivia			
Total Variance	0.986	0.572	-0.415
Variance in sector-occupation-formal status	0.315	0.135	-0.180
Variance in skill-groups	0.079	0.033	-0.046
2*Cov(sector-occupation-formal status, experience-education)	0.071	0.042	-0.029
Residual	0.521	0.362	-0.160
Brazil			
Total Variance	0.622	0.437	-0.185
Variance in sector-occupation-formal status	0.107	0.042	-0.066
Variance in skill-groups	0.103	0.086	-0.016
2*Cov(sector-occupation-formal status, experience-education)	0.095	0.048	-0.048
Residual	0.317	0.261	-0.056
Costa Rica			
Total Variance	0.422	0.427	0.005
Variance in sector-occupation-formal status	0.090	0.116	0.026
Variance in skill-groups	0.047	0.030	-0.017
2*Cov(sector-occupation-formal status, experience-education)	0.067	0.058	-0.010
Residual	0.218	0.222	0.005
Mexico			
Total Variance	0.566	0.510	-0.056
Variance in sector-occupation-formal status	0.124	0.103	-0.021
Variance in skill-groups	0.073	0.057	-0.017
2*Cov(sector-occupation-formal status, experience-education)	0.064	0.063	-0.001
Residual	0.304	0.287	-0.017
Nicaragua			
Total Variance	0.476	0.358	-0.118
Variance in sector-occupation-formal status	0.068	0.059	-0.009
Variance in skill-groups	0.027	0.021	-0.007
2*Cov(sector-occupation-formal status, experience-education)	0.025	0.026	0.001
Residual	0.356	0.253	-0.103
Peru			
Total Variance	0.653	0.501	-0.152
Variance in sector-occupation-formal status	0.185	0.133	-0.052
Variance in skill-groups	0.044	0.024	-0.019
2*Cov(sector-occupation-formal status, experience-education)	0.044	0.038	-0.006
Residual	0.380	0.305	-0.075
El Salvador			
Total Variance	0.633	0.411	-0.222
Variance in sector-occupation-formal status	0.239	0.126	-0.113
Variance in skill-groups	0.021	0.016	-0.005
2*Cov(sector-occupation-formal status, experience-education)	0.019	0.031	0.012
Residual	0.354	0.238	-0.117

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Total wage variance is the variance of the log hourly wage in the household surveys data set. Variance in skill-groups is the variance of the log real hourly wage that is explained by a full set of gender, education, and experience dummies, and their interaction. The variance in sector-occupation-formal status is the variance of the log real hourly wage that is explained by a full set of sector-occupation-formal status dummies. AKM = Abowd, Kramarz, and Margolis (1999).

S2.2 Using Administrative Matched Employer-Employee Data

Table S2.12 Variance Decompositions, AKM Model: Brazil, Costa Rica, and Ecuador

a. Brazil (data available 1995-2014)

	1995-98 (1)	1998-2001 (2)	2001-04 (3)	2004-07 (4)	2007-11 (5)	2011-14 (6)	Change 1995-2001 (2)-(1)	Change 2001-14 (6)-(3)	Change 1995-2014 (6)-(1)
Variance of worker effects	49 (0.299)	50 (0.280)	52 (0.252)	54 (0.230)	56 (0.217)	59 (0.216)	36 (-0.020)	31 (-0.035)	34 (-0.083)
Variance of firm effects	31 (0.188)	29 (0.163)	28 (0.133)	25 (0.107)	28 (0.087)	21 (0.075)	46 (-0.025)	50 (-0.057)	46 (-0.112)
2xCov. Worker and firm effects	13 (0.077)	14 (0.076)	13 (0.064)	12 (0.052)	12 (0.048)	11 (0.042)	2 (-0.001)	19 (-0.022)	15 (-0.035)
Residual	7 (0.045)	7 (0.037)	7 (0.033)	8 (0.033)	9 (0.033)	9 (0.033)	46 (-0.025)	0 (0.000)	5 (-0.012)
Variance of log earnings	100 (0.609)	100 (0.556)	100 (0.482)	100 (0.422)	100 (0.385)	100 (0.366)	100 (-0.054)	100 (-0.115)	100 (-0.243)

b. Costa Rica (data available 2006-11)

	2006-08 (1)	2009-11 (2)	Change 2006-11 (2)-(1)
Variance of worker effects	55 (0.233)	53 (0.238)	22 (0.005)
Variance of firm effects	29 (0.125)	32 (0.144)	84 (0.019)
2xCov. Worker and firm effects	7 (0.029)	7 (0.030)	6 (0.001)
Residual	9 (0.039)	8 (0.037)	-12 (-0.003)
Variance of log earnings	100 (0.426)	100 (0.448)	100 (0.022)

c. Ecuador (data available 2006-12)

	2006-09 (1)	2009-12 (2)	Change 2006-12 (2)-(1)
Variance of worker effects	54 (0.211)	58 (0.175)	41 (-0.036)
Variance of firm effects	39 (0.152)	36 (0.109)	50 (-0.043)
2xCov. Worker and firm effects	-1 (-0.004)	-5 (-0.016)	14 (-0.012)
Residual	8 (0.030)	11 (0.034)	-5 (0.005)
Variance of log earnings	100 (0.388)	100 (0.302)	100 (-0.086)

Sources: Authors' calculations based on data from Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador.
Note: The table reports the results of the variance decomposition. Cells contain the share of the total variance explained by each decomposition element. The total variance explained by each decomposition element is shown in parentheses. AKM = Abowd, Kramarz, and Margolis (1999).

Table S2.13 Variance Decompositions, Between- and Within-Firms: Brazil, Costa Rica, and Ecuador

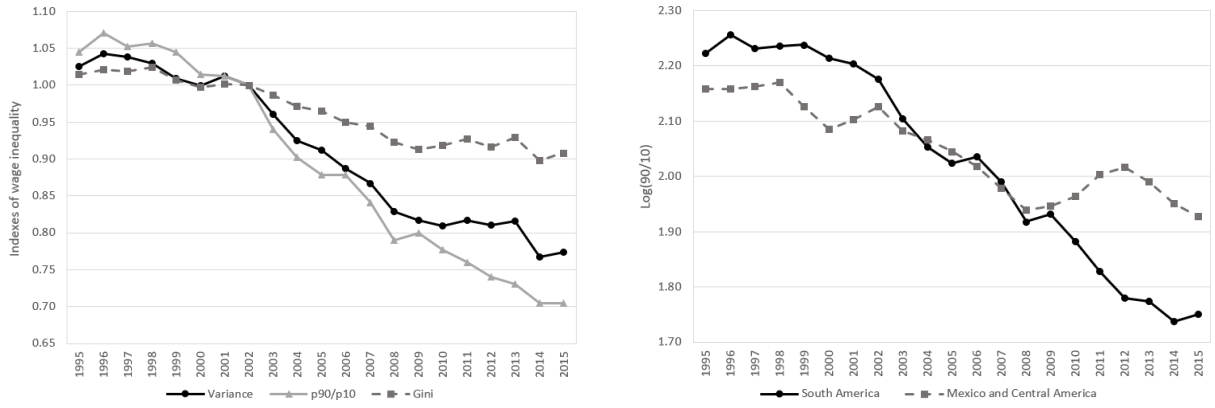
a. Brazil			
	Between-firm component (1)	Within-firm component (2)	Total variance (3)
1995	58 (0.367)	42 (0.261)	100 (0.628)
1996	59 (0.364)	41 (0.255)	100 (0.619)
1997	60 (0.366)	40 (0.247)	100 (0.613)
1998	58 (0.341)	42 (0.246)	100 (0.587)
1999	59 (0.337)	41 (0.235)	100 (0.572)
2000	59 (0.329)	41 (0.230)	100 (0.559)
2001	58 (0.296)	42 (0.218)	100 (0.514)
2002	56 (0.275)	44 (0.212)	100 (0.487)
2003	56 (0.262)	44 (0.204)	100 (0.466)
2004	55 (0.252)	45 (0.204)	100 (0.456)
2005	54 (0.230)	46 (0.197)	100 (0.427)
2006	52 (0.210)	48 (0.191)	100 (0.401)
2007	52 (0.203)	48 (0.190)	100 (0.393)
2008	51 (0.201)	49 (0.193)	100 (0.394)
2009	50 (0.189)	50 (0.188)	100 (0.377)
2010	49 (0.180)	51 (0.187)	100 (0.367)
2011	48 (0.179)	52 (0.192)	100 (0.371)
2012	47 (0.170)	53 (0.190)	100 (0.360)
2013	46 (0.167)	54 (0.192)	100 (0.359)
2014	46 (0.162)	54 (0.194)	100 (0.356)
Change 1995-2001	63 (-0.071)	37 (-0.043)	100 (-0.114)
Change 2001-2014	85 (-0.134)	15 (-0.024)	100 (-0.158)
Change 1995-2014	75 (-0.205)	25 (-0.067)	100 (-0.272)
b. Costa Rica			
2006	51 (0.216)	49 (0.207)	100 (0.423)
2007	52 (0.228)	48 (0.214)	100 (0.442)
2008	50 (0.225)	50 (0.223)	100 (0.448)
2009	54 (0.249)	46 (0.216)	100 (0.465)
2010	53 (0.240)	47 (0.213)	100 (0.453)
2011	54 (0.250)	46 (0.215)	100 (0.465)
Change 2006-2011	80 (0.034)	20 (0.009)	100 (0.043)
c. Ecuador			
2006	61 (0.265)	39 (0.170)	100 (0.435)
2007	57 (0.232)	43(0.173)	100 (0.405)
2008	52 (0.194)	47 (0.173)	100 (0.367)
2009	49 (0.167)	51 (0.175)	100 (0.342)
2010	47 (0.153)	53 (0.170)	100 (0.323)
2011	47 (0.145)	53 (0.165)	100 (0.310)
2012	46 (0.144)	54 (0.169)	100 (0.313)
Change 2006-2012	99 (-0.121)	1 (-0.001)	100 (-0.122)

Sources: Authors' calculations based on data from Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador.
Note: The table reports the results of the variance decomposition. Cells contain the share of the total variance explained by each decomposition element. The total variance explained by each decomposition element is shown in parentheses.

S3 Additional Figures with Regional Averages

Figures 1 and 2 in the main text report unweighted regional averages. This means that this paper computes the average for each country and the regional average is the average of these values. In appendix figures S3.1 and S3.2, this paper presents results using (population) weighted regional averages. In this case, the regional average is computed using each country's average, weighted by the country's employment share in the region.

Figure S3.1 Wage Inequality Trends in Latin America - Population Weighted Regional Averages

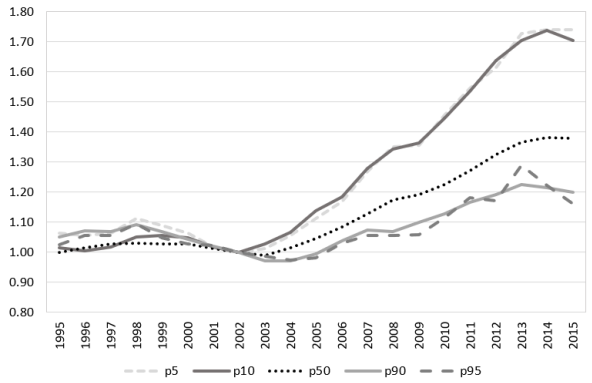


(a) LAC

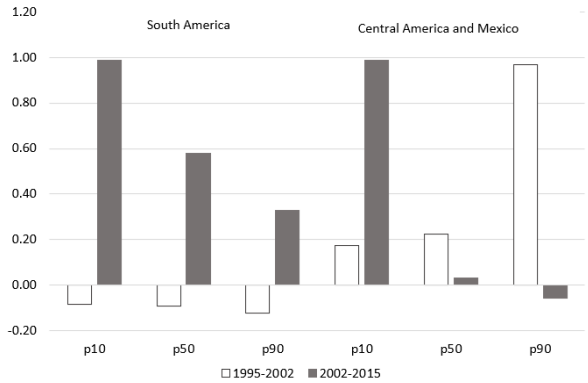
(b) South America vs. CAM

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Index base: 2002=1. The regional aggregates are weighted averages of each inequality measure (Gini, log(90/10) ratio, and variance) for 13 countries (Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay). If a specific country did not have information available for a particular year, a simple interpolation was applied. Wages are defined as real hourly income in the main occupation, and the variance is defined as the logarithm of the real hourly income in the main occupation. South America includes Argentina, Bolivia, Brazil, Chile, Paraguay, Peru, and Uruguay; Central America and Mexico (CAM) includes Costa Rica, Honduras, Mexico, Nicaragua, Panama, and El Salvador.

Figure S3.2 Wage Growth by Percentile in Latin America - Population Weighted Regional Averages



(a) Index (2002=100) of real hourly wages

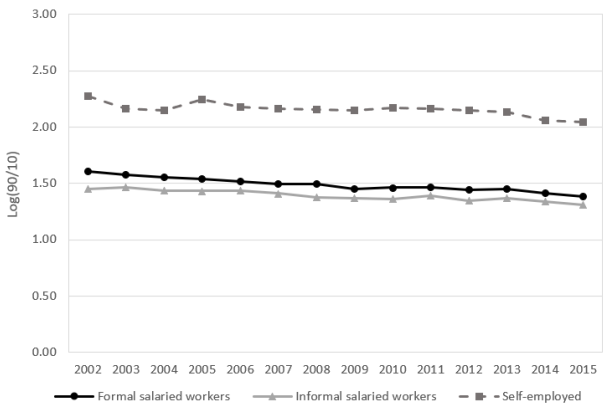


(b) Growth rate of real hourly wages by subregion

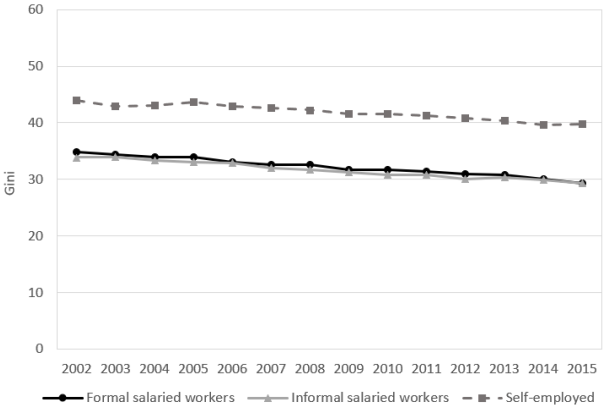
Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: Index base: 2002=1. The regional aggregates are weighted averages of each percentile for 13 countries (Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay). If a specific country did not have information available for a particular year, a simple interpolation was applied. The sample was restricted to individuals between ages 18 and 65 years that are employees or self-employed and between the 1st and the 99th percentiles of the wage distribution. Labor income is 2005 purchasing power parity.

In the appendix figure S3.3, this paper presents wage inequality trends among formal employees, informal employees, and self-employed workers using alternative indicators to the variance of log real wages presented in Figure 7, panel b, in the main text.

Figure S3.3 Wage Inequality Trends among Formal Employees, Informal Employees and Self-Employed Workers in Latin America Using Alternative Inequality Measures



(a) Log(90/10), 2002-2015



(b) Gini, 2002-2015

Source: Authors' calculations based on data from the Socioeconomic Database for Latin America and the Caribbean, World Bank and Center for Distributive, Labor and Social Studies of the Universidad Nacional de La Plata (CEDLAS) (http://sedlac.econo.unlp.edu.ar/eng).
Note: The regional aggregates are unweighted averages of the variance of earnings from 13 countries (Argentina, Bolivia, Brazil, Chile, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, and Uruguay). If a specific country did not have information available for a particular year, a simple interpolation was applied. Wages are defined as real hourly income in the main occupation. Labor income is in 2005 purchasing power parity (PPP).

S4 Supplemental Empirical Results on Formal Status

Table S4.1 Switching to the Formal Sector

	Informality			Self-employment		
	Argentina	Brazil	Mexico	Argentina	Brazil	Mexico
	(1)	(2)	(3)	(4)	(5)	(6)
Age 25-29	0.050***	0.006***	0.003***	-0.025***	-0.023***	-0.044***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age 30-39	0.006***	-0.003***	-0.007***	-0.041***	-0.032***	-0.056***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age 40-49	-0.016***	-0.038***	-0.017***	-0.069***	-0.066***	-0.055***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age 50-64	-0.017***	-0.080***	-0.018***	-0.076***	-0.100***	-0.070***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.054***	0.075***	0.025***	0.025***	0.043***	0.008***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Primary education	-0.010***	0.035***	0.036***	0.013***	0.010***	0.011***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
Secondary education	0.041***	0.107***	0.120***	0.015***	0.033***	0.036***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
Terciary education	0.143***	0.172***	0.290***	0.059***	0.067***	0.099***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Survey-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,849,340	2,295,693	5,031,670	4,912,294	3,085,027	2,552,231
R-squared	0.037	0.044	0.059	0.023	0.029	0.027

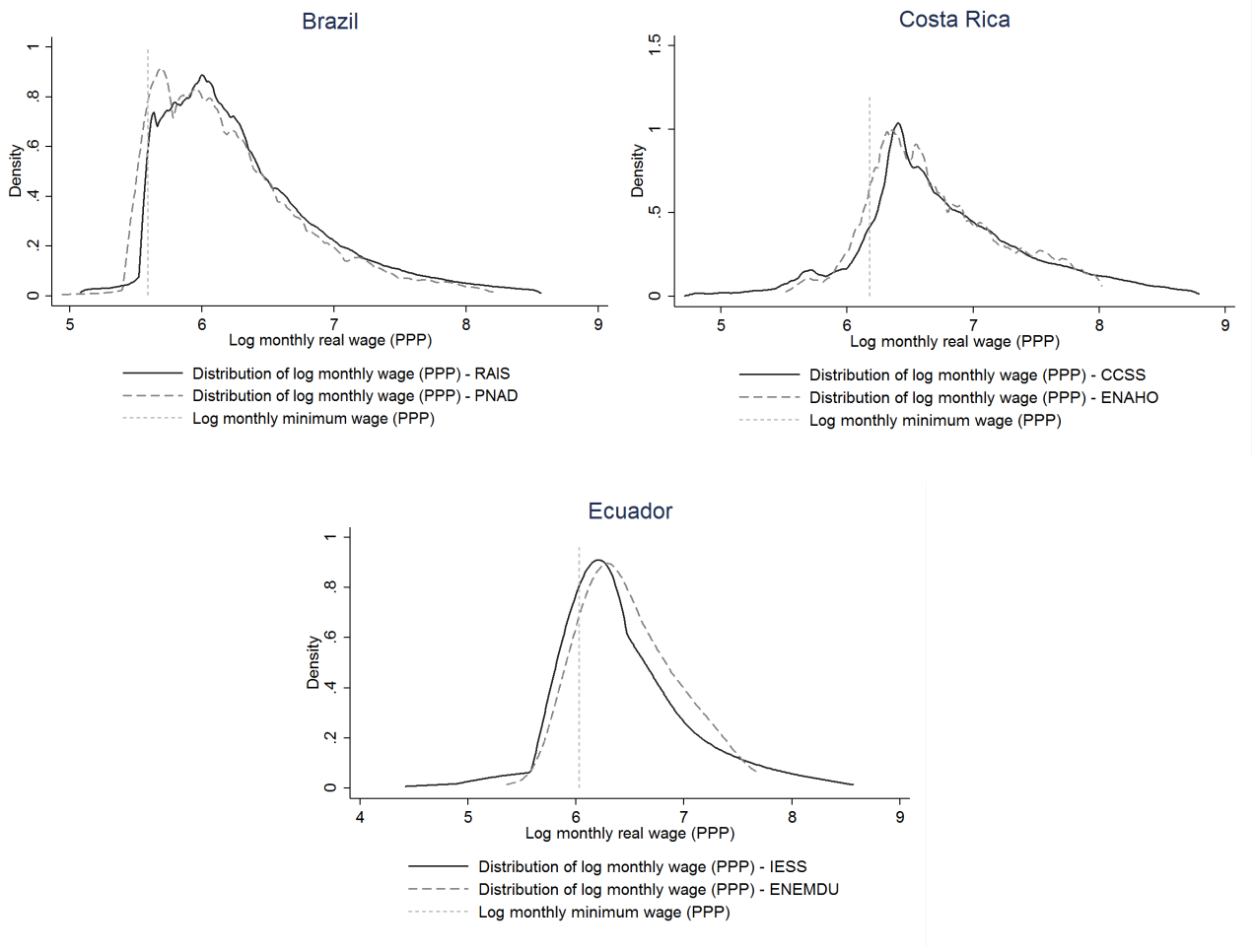
Source: Authors' calculations based on data from 12-months survey panels from Labor Force Surveys. *Note:* Each column reports regression results from a linear probability model of the effect of the listed individual characteristics on the probability of switching to formal employment. Regressions include survey-year and region fixed effects. Columns 1-3 and 4-6 have different subsamples. The sample considered in columns 1-3 includes all panel individuals (interviewed in one survey and 12 months later) who worked in both periods, were 20-64 years old and were informal-employee at the initial period. The sample considered in columns 4-6, includes all panel individuals (interviewed in one survey and 12 months later) that worked in both periods, were ages 20-64 years, and were self-employee in the initial period. All totals from the household surveys are computed applying sampling weights-expansion factors provided by the institutes of statistics. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

S5 Wage distribution among Formal Workers in Household Surveys and Social Security Records

This appendix assesses the cross-sectional differences in wage distributions between the administrative databases and the household surveys. Figure S5.1 follows Kumler, Verhoogen, and Frias (2015) and presents kernel estimates of the wage density for all formal salaried workers in the various countries from the administrative data (solid black line) and monthly take-home wages from the household survey data (dashed black line). The figure presents results for 2011, a year for which data was available for all the countries. The pattern is clear: the wage distribution is very similar for formal workers between administrative data and household surveys. There is more measurement error in the household survey data. The wage distribution based on administrative data is slightly to the left of the household survey distribution, but the differences are very small and the means are similar (in line with appendix table S1.3). In the three countries, the spikes in density are high around the minimum wage and there is a large drop-off to the left of the spike, showing reasonable compliance and suggesting that many of these workers are now in the spike, although, as everywhere in Latin America, some workers are to the left of the spike (indicating noncompliance).[39]

[39]These results contrast with Mexico, where the minimum wage is too low to be binding and the distribution of wages using administrative data lies largely on the left of the household survey distribution.

Figure S5.1 Wage Kernels, Formal Workers in Household Surveys and Social Security Records



Source: Authors' calculations based on Social Security Records: Relação Anual de Informações Sociais (RAIS) in Brazil, Caja Costarricense de Seguro Social (CCSS) in Costa Rica, and Instituto Ecuatoriano de Seguridad Social (IESS) in Ecuador; and on Household surveys: Pesquisa Nacional por Amostra de Domicílios (PNAD) in Brazil, Encuesta Nacional de Hogares (ENAHO) in Costa Rica and Encuesta de Empleo, Desempleo y Subempleo (ENEMDU) in Ecuador.
Note: Data are from Social Security Records is restricted to private sector workers and considers real monthly pre-tax reported wages. Data from household surveys considers the real monthly take-home wage reported to the respective survey. Wages are in 2005 local currency. Average 2005 exchange rates: 1.571 real/dollar for Brazil, 278.961 colón/dollar for Costa Rica, and a fixed index of 0.501 for Ecuador. Data from both data sources are from the second quarter of the year. Vertical lines indicate minimum and average real wages.