DISCUSSION PAPER SERIES

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ABSTRACT

New Perspectives on Inequality in Latin America*

Latin American countries have some of the highest levels of income inequality in the world. However, earnings inequality significantly changed over the last three decades, increasing during the 1980s and 1990s, declining sharply in the 2000s, and stagnating or even increasing in some countries during the last decade. Macroeconomic instability in the region in the 1980s and early 1990s, and the introduction of structural reforms like trade, capital, and financial liberalization, affected the patterns of relative demand and relative earnings across skill-demographic groups in the 1990s, increasing inequality. Significant gains in educational attainment, the demographic transition, and rising female labor force participation changed the skill-demographic composition of labor supply, pushing education and experience premium downward, but this was not enough to counteract demand-side trends. At the turn of the century, improved external conditions, driven by China's massive increase in demand for commodities boosted economies across Latin America, which began to grow rapidly. Growth was accompanied by a positive shift in the relative demand for less-educated workers, stronger labor institutions, rising minimum wages, and declining labor informality, a confluence of factors that reduced earnings inequality. In the aftermath of the global financial crisis, particularly after the end of the commodities price boom in 2014, economic growth decelerated, and the pace of inequality decline stagnated. There is extensive literature trying to explain the causes of earnings inequality dynamics during the last three decades in Latin America. We discuss this literature regarding themes, methodological approaches, and key findings, emphasizing the latest perspectives. The focus is on earnings inequality and how developments in labor markets have shaped it.

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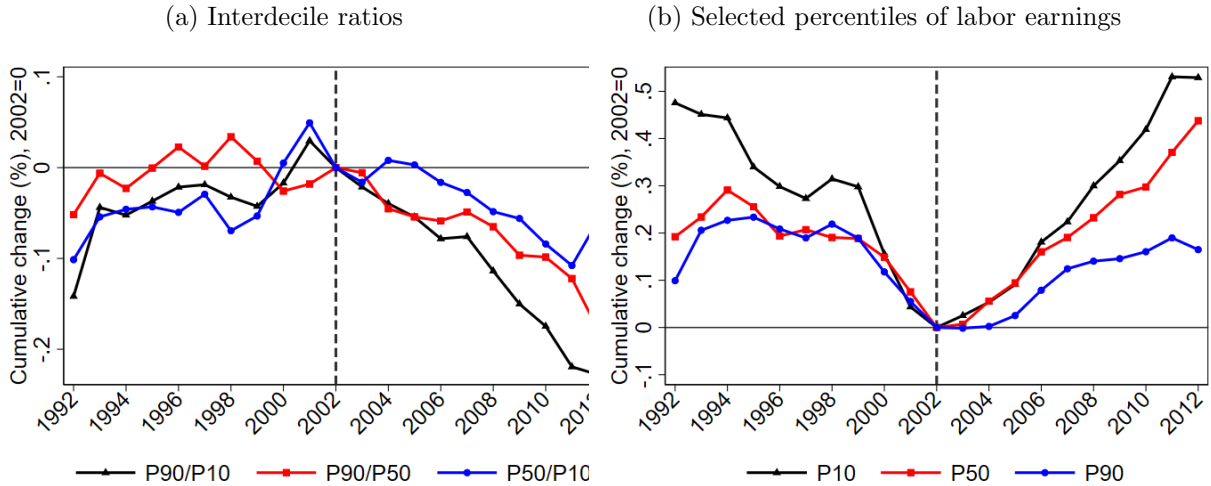Colombia
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1 Introduction

Latin American countries have some of the highest levels of income inequality in the world. Of the 30 countries with the highest Gini coefficient, 17 belong to the region (World Bank, 2022a). However, income distribution in Latin America has significantly changed over the last three decades, with well-defined periods of expansion and contraction common across most countries. The magnitude of these changes, their commonality, and the fact that they sometimes contrast with the patterns observed in high-income economies have motivated extensive literature investigating its causes. This article discusses this literature regarding themes, methodological approaches, and key findings. Although inequality in Latin America is pervasive, affecting every aspect of life, including access to education, healthcare, productive assets, and political voice, we focus on earnings inequality and how developments in labor markets have shaped it. This is not overly restrictive. Labor earnings are the largest income source for most households in Latin America, representing close to 80% of total income on average. Moreover, most studies of the region analyzing income inequality focus on determinants that operate through labor market dynamics.

The recent evolution of earnings inequality in Latin America can be divided into three periods: a period of increasing inequality during the 1980s and 1990s; a period of a sharp contraction of the earnings distribution during the 2000s and the first years of the 2010s; and a period after the end of the commodities price boom in 2014 were inequality decline decelerated, even increasing in some countries, although some trace the deceleration to the aftermath of the global financial crisis (Cord et al., 2017). The two panels of Figure 1 show a subset of the years of expansion and contraction for which we have available microdata. Panel (a) shows the (unweighted) average across eight of the largest economies in the region: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay, of three interdecile earnings ratios, capturing either total inequality (P90/P10), inequality at the upper-tail (P90/P50), or inequality at the lower-tail (P50/P10). Panel (b) shows the respective average deciles (see Figure notes for details about the construction of the series). These are countries for which it is possible to construct comparable long-term series, and they account for 88.2% of the region's GDP and 78.9% of its population.

Between 1992-2002, total inequality, as measured by the P90/P10 interdecile earnings ratio, increased by 14.2%, similar in magnitude to the increase observed in the US during the same period, which has drawn plenty of attention in the literature (Acemoglu and Autor, 2011). This was a substantial expansion of the earnings distribution. Although Figure 1 reports an average across countries, the pattern was common: except for Brazil, the only major Latin American economy where inequality fell since the early 1990s (Ferranti et al., 2004; Ferreira et al., 2008), all other countries in the sample saw total inequality increasing, with magnitudes varying in a range from 5.5% in Chile to 46.1% in Argentina, a country that saw a drastic deterioration leading up to its economic

crisis at the turn of the century.

Figure 1: Earnings inequality in Latin America between 1992-2012

(a) Interdecile ratios

(b) Selected percentiles of labor earnings

Notes: Panel (a) shows three interdecile ratios of the monthly labor income distribution, averaged across eight Latin American countries: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay. For each country and year, we first calculate the respective ratios and then normalize them to take the value of zero in 2002. The reported series is an unweighted average across the eight countries. Panel (b) shows the respective average deciles, calculated using an analogous procedure. All series are constructed using country-specific microdata on monthly labor income of prime-age workers (between ages 25-55). The microdata comes from household surveys gathered and made consistent by The Center for Distributive, Labor and Social Studies (CEDLAS) and The World Bank (CEDLAS and The World Bank, 2013). The eight selected economies account for 88.2% of the region's GDP and 78.9% of its population.

The 1980s and early 1990s were characterized by significant macroeconomic instability in the region and the introduction of major market-oriented reforms, both factors affecting income distribution. Between 1980-1995, GDP per capita at the regional level had zero real growth (World Bank, 2022b), but there were 40 episodes where per capita output fell by 4% or more (Lustig, 2000). Repeated crises resulted from macroeconomic imbalances that had been building up during the 1960s and 1970s, which led to a growing dependence on foreign borrowing for capital accumulation, high levels of external debt, and inflationary financing of government expenditures (Edwards, 1995). When interest rates increased in the US and the prices of primary resources, Latin America's largest export, fell sharply in the early 1980s, external financing halted and sovereign debt crises ensued. The path to recovery and stabilization was disorderly and costly, with drastic declines in real income and adverse effects on inequality (Morley, 1995; Psacharopoulos et al., 1995; Londoño and Székely, 2000; De Janvry and Sadoulet, 2000; Lustig, 2000; Altimir, 2008). The crises affected inequality through three main channels: deteriorating labor market conditions in a context of little or no access to public social insurance (Altimir, 2008); attempts to control accelerating inflation by curtailing wage adjustments,

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and the vulnerability of the poor to protect themselves from the inflation tax (Cardoso, 1992; Ocampo, 2004; Ferreira et al., 2008; Gasparini and Lustig, 2011); and also from cuts in social programs and public benefits at a time of fiscal retrenchment (Dornbusch and Edwards, 1990; Edwards, 1995; Morley, 2001; Ferranti et al., 2004).

In parallel with the efforts to recover from the crises, many countries introduced reforms to reduce state intervention and exploit the opportunities provided by international markets, changing the inward-oriented strategies for growth of the post-WWII era. The reforms included trade, capital, and financial liberalization, privatization of state-owned firms, and, to a lesser degree, deregulation of labor markets. This broad shift in policy, and the fact that inequality continued to rise even after regional GDP resumed positive growth in the 1990s, ignited extensive literature trying to understand the effects of the reforms on income distribution.

There is a broad agreement that reforms led to sectoral reallocation of production and employment that favored more educated workers. Some of these reforms spurred investment in physical capital, which had been lagging for at least a decade, accelerating technological change and favoring the growth of sectors with higher demands for human capital (Feenstra and Hanson, 1997; Sanchez-Paramo and Schady, 2003; Attanasio et al., 2004; Behrman et al., 2007; Gasparini and Cruces, 2013). The process of modernization of the economy then led to a sizable reduction in the relative demand for less-educated workers, which, in the absence of compensatory social protection programs and weak labor market institutions, resulted in falling living standards for this group (Green et al., 2001; Székely, 2003; Ocampo, 2004; Bosch and Manacorda, 2010; Gasparini and Lustig, 2011). Some authors also argue the reforms brought increasing dualism, with part of the labor force working in dynamic high-productivity firms that could take advantage of the new economic environment, while the majority worked in small low-productivity units, usually under informal conditions (Ocampo, 2004). Recent research has shown that this duality is vital to understanding earnings inequality in the region (Eslava et al., 2021). However, there is substantial variation across countries on the estimated impact of the reforms, and the topic is still subject to intense debate (Behrman et al., 2007; Gasparini and Cruces, 2013).

At the start of the millennium, the economic outlook of Latin American economies took a turn for the better. Most countries had corrected some of the macroeconomic imbalances of the past, especially on the fiscal and inflation fronts, and China's massive increase in demand for commodities, on which the regional external sector relies heavily, was pushing commodity prices upward (Kaplinsky, 2006; Radetzki, 2006; Erten and Ocampo, 2013; Autor et al., 2013; Costa et al., 2016).

Between 2002-2014, the years of the commodity price boom, Latin America experienced uninterrupted growth of GDP per capita, with an accumulated increase of 30.7% at the regional level (World Bank, 2022b). The inequality trend also changed drastically. In

the decade after 2002, total inequality fell by 22.8%, more than enough to recover the lost ground during the 1990s (Panel (a) of Figure 1). Again, this was a common phenomenon across Latin America: of the seventeen countries in the region that have consistent microdata, sixteen saw inequality declining (Rodriguez Castelan et al., 2016; Messina and Silva, 2021). Within our sample, total inequality fell between 8.8% in Colombia and 33.4% in Ecuador. Earnings growth during this period was particularly strong at the bottom of the distribution, with the 10th percentile increasing by more than 55.9% on average (Panel (b) of Figure 1). The fact that earnings growth at the bottom (P10) was faster than at the middle (P50), which in turn was faster than at the top (P50), presents a sharp contrast with many developed economies, especially the US, where the opposite happened (Acemoglu and Autor, 2011).

What explains this change in dynamics of income inequality? The literature has proposed at least four potential drivers, some of which complement and reinforce each other: i) fast GDP growth and improved labor market conditions (Cornia, 2010; Gasparini and Cruces, 2013); ii) increases in education attainment and the fertility transition, which led to a larger relative supply of more educated and older workers, putting downward pressure on the education and experience premiums (Manacorda et al., 2010; Campos-Vázquez, 2013; Rodriguez Castelan et al., 2016; Fernández and Messina, 2018; Acosta et al., 2019; Messina and Silva, 2021); iii) stronger labor institutions, rising minimum wages and declining labor informality (Gasparini and Lustig, 2011; Maurizio, 2014; Amarante et al., 2016; Ferreira et al., 2017; Engbom and Moser, 2021; Engbom et al., 2021); and iv) the arrival of governments that implemented a more progressive agenda, including increases in social assistance transfers targeted to the poor (Ferreira et al., 2008; Cornia, 2010; Gasparini and Lustig, 2011; Levy and Schady, 2013; Lustig et al., 2013). We discuss evidence on these drivers in the following sections.

Since the end of the commodities price boom, regional economic growth has stagnated. Between 2014-2019, average real GDP per capita growth was close to zero (World Bank, 2022b), and this negatively impacted inequality dynamics (Gasparini et al., 2016). However, there were already signs of a deceleration of inequality decline since the aftermath of the global financial crisis (Cord et al., 2017; Messina and Silva, 2018, 2021). The evidence for the deceleration is limited, and the phenomenon could be transitory, so there is not much that can be said of this period at the moment.

The document is organized into four sections, including this introduction. The first part of Section 2 discusses supply-side drivers of earnings inequality, including changes in the education, age, and sex composition of labor supply. The second part deals with demand-side drivers, including trade, foreign direct investment (FDI), technological change, the commodities price boom, and the role of firm heterogeneity. Section 3 focuses on the effect of labor market institutions on earnings inequality, including the role of minimum wages and informality. Section 4 concludes.

2 Market-based drivers of inequality

2.1 Supply-side factors

Earnings dynamics and inequality are strongly correlated in Latin America, a direct consequence of the large proportion of total income represented by labor income. Traditionally, regional high-earnings inequality has been attributed to supply-side factors such as the scarcity of well-educated labor (Behrman et al., 2007). Moreover, some authors argue that the rise in inequality in the 1980s was partly driven by increases in the population's educational attainment in a context of convex returns to schooling, which leads to higher wage dispersion among the more educated. In this scenario, inequality can potentially increase because of changes in the workforce's educational distribution, even without changing relative prices (Reyes, 1988; Almeida dos Reis and Paes de Barros, 1991; Bourguignon et al., 2005; Ferreira et al., 2008).

Latin America has had steady gains in educational attainment in recent decades. The average number of years of schooling among the population aged 25 and over increased by 93%, from 4.7 in 1980 to 9.1 in 2015, while the fraction with at least some tertiary education tripled, from 5.6% in 1980 to 16.7% in 2015 (Barro and Lee, 2013). These gains effectively changed the skill composition of the workforce. Panel (a) of Figure 2 presents two series showing the average log ratio of the number of prime-age workers by education groups, using the same sample of countries as in Figure 1. Panel (b) shows the respective average log earnings ratios, capturing the evolution of education premiums (see Figure notes for details). It is clear from the plots that the relative supply of more educated workers in Latin America has increased continuously over time. Importantly, education premiums follow a similar pattern as that of income inequality discussed in Section 1, growing during the 1990s and declining sharply after 2002. This is indicative that the recent evolution of inequality is strongly influenced by developments in labor markets.

Figure 2: Education composition and education premiums in Latin America

(a) Education composition

(b) Education premiums
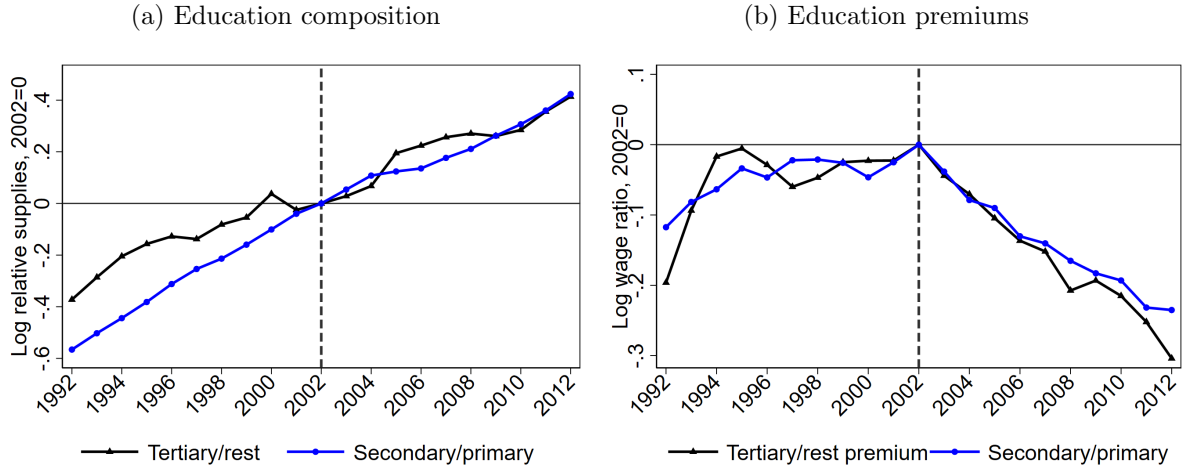
Notes: Panel (a) shows the average log ratio of the number of prime-age workers (between ages 25-55) by education groups. The black series corresponds to the log ratio between the number of workers with tertiary education completed and those with at most secondary education; the blue series corresponds to the log ratio between the number of workers with secondary education completed but no higher education, and those with less than secondary. The averages are across eight Latin American countries: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay. For each country and year, we first calculate the respective ratios and then normalize them to take the value of zero in 2002. The reported series is an unweighted average across the eight countries. Panel (b) shows the respective average log earnings ratios, calculated using an analogous procedure. All series are constructed using country-specific microdata on monthly labor income. The microdata comes from household surveys gathered and made consistent by The Center for Distributive, Labor and Social Studies (CEDLAS) and The World Bank (CEDLAS and The World Bank, 2013). The eight selected economies account for 88.2% of the region's GDP and 78.9% of its population.

Several studies try to quantify the effect of changes in the education and demographic composition of the workforce on the wage structure (Sanchez-Paramo and Schady, 2003; Rojas, 2006; Manacorda et al., 2010; Fernández and Messina, 2018; Acosta et al., 2019; Bhalotra et al., 2022). These studies aim to test whether shifts in relative supplies induce changes in relative returns that are consistent with the way inequality is evolving. The literature follows the canonical supply-demand framework that has been extensively applied to the US labor market (Katz and Murphy, 1992; Katz and Autor, 1999; Card and Lemieux, 2001; Card and DiNardo, 2002; Goldin and Katz, 2009). In this framework, workers are divided into demographic-skill groups that can be imperfect substitutes in production, so changes in relative wages can arise in response to changes in relative supplies. The magnitude of the response is governed by the degree of substitutability between the groups, commonly parameterized using a nested-CES production function. One advantage of these models is that changes in relative earnings can be conveniently decomposed into a relative supply effect and a residual effect, where the latter is interpreted as capturing changes in relative demand coming from forces like skill-biased technological change (SBTC), automation, trade, offshoring, and labor market reforms. On the downside, the typical model assumes inelastic short-term relative supplies, which

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is unlikely to hold in the context of rising female labor force participation in Latin America (Ñopo, 2012; The World Bank, 2012), and the estimated elasticities of substitution can be very sensitive to model specification (Borjas et al., 2012).

For example, Manacorda et al. (2010) studied trends in men's return to education in the five largest economies in Latin America between 1980-1999. The authors build on the model of Card and Lemieux (2001) but extend the number of skill groups to differentiate between primary, secondary, and tertiary-educated workers. In the US literature, the typical approach is to divide workers by education into two groups: "skilled" (college) and "unskilled" (high school or less), which in practice implies assuming that people with at most secondary education completed are perfect substitutes to those with at most primary. Given that the latter group still represents a large share of the population in Latin America, and that the secondary-to-primary premium changed substantially (Panel (b) of Figure 2), omitting this separation can be misleading. The authors estimate an elasticity of substitution between workers with primary and secondary education of 2.3, implying that the 40 log points average increase in the secondary-to-primary relative supply since 2002 (Panel (a) of Figure 2) would translate, everything else equal, into a decline of the respective premium of 18.2 log points, almost 60% of the observed change. The main takeaway is that increases in secondary completion rates in the region reduced lower-tail earnings inequality. Like for the US, the authors find that workers with tertiary education are imperfect substitutes to those with at most secondary education (elasticities between 2.6 and 5), again implying that growth in tertiary education acted to lower the college premium. Acosta et al. (2019) updates and extends this analysis for 16 Latin American countries between 1991-2013, finding similar results.

The evolution of the experience premium has received considerably less attention, although the workforce in the region is also becoming older. Fernández and Messina (2018) show that experience premiums fell within the three education groups in Argentina, Brazil, and Chile since the turn of the millennium, contributing to the fall in earnings inequality. To test if relative supply shifts can explain these patterns, the authors extend the models of Manacorda et al. (2010) and Card and Lemieux (2001) to allow for different degrees of substitution across experience groups, depending on their level of schooling. They find that the estimated elasticity of substitution is slightly higher among college graduates (elasticity of 5.5) than among less-educated workers (elasticity of 4.0). However, in both cases, the estimated elasticities suggest that changes in the age composition of workers exerted downward pressure on the experience premiums, reinforcing the argument that supply-side changes are affecting inequality dynamics. Ferreira et al. (2022) reach a similar conclusion for the case of Brazil. Using decomposition techniques, the authors find that a reduction in the returns to labor market experience was a significant force driving the decline in inequality, accounting for 53% of the observed fall in the Gini index between 1995-2012.

More recently, Bhalotra et al. (2022) extended the supply-demand model into an equilibrium framework, following the work of Johnson and Keane (2013). With this extension, they can analyze the effect of increasing female labor force participation on the wage structure, a significant demographic shift that has been mostly ignored in the literature. Labor force participation among women in Latin America has increased substantially since the end of the 1980s, changing the sex composition of labor supply. Using data from Mexico between 1989-2012, a country where the female participation rate doubled during the period, the authors find that the increase in participation of more educated women was a driver of the compression of male inequality (a decline in the college premium), a result that contrasts with the finding of Topel (1994) for the US.

Most of the evidence from the application of the supply-demand framework in Latin America points to the same direction: changes in the age, sex, and education composition of the workforce impacted the wage structure, reducing the experience and education premiums and hence reducing between-group inequality. However, there is general agreement that supply-side effects cannot be the whole story. During the 1980s and 1990s, increases in relative wages of more educated workers happened concurrently with increases in their relative abundance (Figure 2), a clear sign that the relative demand for more educated workers was growing. After the 2000s, the share of workers with secondary and tertiary education continued to increase at similar rates, but the education and experience premiums declined. This pattern strongly suggests a significant shift in the demand-side of the labor market.

2.2   Demand-side factors

2.2.1   Trade, FDI and technological change

As discussed in the introduction, most Latin American countries opened their trade and capital accounts during the 1980s and early 1990s. There is extensive evidence that this process led to a decline in the relative demand for less-educated workers, at least in the initial years post-reform, although countries like Brazil appear to be an exception. This shift in relative demand can be puzzling because, given the region's relative abundance of low-skilled labor, Heckscher-Ohlin trade models would predict the opposite. However, premiums and inequality rose in a way that is not entirely consistent with Stopler-Samuelson effects (Hanson and Harrison, 1995; Galiani and Sanguinetti, 2003; Attanasio et al., 2004; Goldberg and Pavcnik, 2007). Authors like Wood (1997) argued that standard theory is not necessarily invalidated once we consider that some large east Asian countries, including China, also entered into world markets for labor-intensive manufacturing in the 1980s, shifting the comparative advantage of Latin America into goods of medium skill intensity, a point that was also made by Hanson and Harrison (1999). However, some initial expectations that the reforms would be equalizing were not fulfilled

(Goldberg and Pavcnik, 2007; Pavcnik, 2017).

Tariffs. How did trade reforms affect relative labor demand and inequality in Latin America? The literature on this topic is vast, but there is no consensus. Studying the case of Mexico, Harrison and Hanson (1999) show that before the major trade reform of 1985, protection across sectors was not uniform but skewed towards sectors intensively using less-educated workers, a pattern observed in other countries in the region. It was in those more protected sectors where tariffs fell the most. This observation could account for the discrepancy between the data and Stopler-Samuelson-type predictions. If protection is initially granted in sectors that use less-educated labor more intensively, then trade liberalization might cause their relative wages to decline, thus increasing inequality.

Galiani and Sanguinetti (2003) find some evidence for this argument in Argentina. The authors show that after the reforms, the manufacturing sector, which is more intensive in less-educated labor, faced intense competition from foreign markets, as reflected by significant increases in the import penetration ratios. They show that inequality increased the most in those sectors where import penetration deepened. Galiani and Porto (2010) find similar results. For Colombia, Attanasio et al. (2004) show evidence that trade liberalization was concentrated in labor-intensive sectors employing a high percentage of less-educated workers. They find that sectors associated with proportionately larger decreases in protection experienced a decrease in their sectoral wage premiums (i.e., premiums relative to the economy-wide average). The high concentration of less-educated workers and falling sectoral premiums increased inequality. However, in each of these studies, the effects on premiums are not large enough to fully explain inequality changes during the 1990s, so direct effects from tariff reductions are part, but not the whole story, a conclusion that is shared more generally in the literature (Pavcnik, 2017).

FDI. A more open economic environment could also lead to surges in foreign direct investment (FDI). Feenstra and Hanson (1997) argue that rising wage inequality in Mexico in the 1980s is linked to foreign capital inflows. The authors show that the flow of capital into Mexico, via outsourcing by US firms, shifted an increasing portion of input production to the country. A large share of FDI in manufacturing went into the creation of assembly plants, known as maquiladoras. From the US perspective, the activities outsourced were intensive in less-skilled labor, but, from Mexico's perspective, it was the reverse. The authors measure state-level growth in FDI using data on the regional activities of maquiladoras, finding that growth in FDI can account for over 50% of the increase in the skilled labor wage share that occurred in the late 1980s. Behrman et al. (2007), using data from 18 Latin American countries between 1977-1998, show that the reduction of the price of capital goods, a result of the reforms, generated higher demand for both capital goods and skilled labor.

For Argentina, Acosta and Gasparini (2007) show that foreign direct investment in the country grew 11.2% annually between 1991 and 2000, while fixed gross investment in machinery and equipment increased 6.8% per year during the same period. The authors show that in sectors in which capital accumulation was more intense, the skill premium increased significantly. However, they can not disentangle if this is because new machinery and equipment may incorporate skill-biased technological innovations or because capital goods tend to be skill complementary (Krusell et al., 2000).

Technological change. Another alternative mechanism linking trade and inequality is technological change. Trade is an avenue through which new technologies enter most developing countries, so the relaxation of trade barriers could reduce the price of importing those technologies, causing firms to switch toward new production techniques. The vast literature in the US and other developed countries suggests that technological change is skill-biased, increasing the demand for more educated workers and hence pushing for an increase in the skill premium (Berman et al., 1998; Katz and Autor, 1999; Acemoglu, 2002). Via cheaper access to new technologies, trade reforms could have negatively affected less-educated labor demand.

Estimating the impact of technological change on the wage structure is difficult because we do not have direct measures for it, so most studies rely on indirect arguments. For example, Sanchez-Paramo and Schady (2003) study the evolution of relative wages in five Latin American countries: Argentina, Brazil, Chile, Colombia, and Mexico, during the 1990s. They find that increases in the wage bill of skilled workers occurred largely within sectors, and in the same sectors in different countries, consistent with skill-biased technological change. Attanasio et al. (2004) find that changes in skill premiums in Colombia were roughly the same across industries and were not related to changes in tariffs across sectors. However, the proportion of skilled workers rose in every industry, again consistent with the hypothesis of skilled-biased technological change. Moreover, employment changes were larger in sectors that experienced larger tariff reductions, suggesting that skilled-biased technological change was partly an endogenous response to increased foreign competition.

Since the seminal work of Autor et al. (2003), the thinking about the relation between technology and inequality shifted (Autor, 2022). Technologies in this framework can complement or substitute workers depending on the task-content of occupations. This is important because recent technological developments have enabled information and communication technologies to either directly perform or permit the offshoring of a subset of the core job tasks previously performed by middle skill workers in developed countries, thus causing a substantial change in the returns to certain types of skills (Acemoglu and Autor, 2011).

Studying automation in Latin America is particularly hard because there are no suit-

able measures of the task content of occupations in the region, and applying measures of the US occupational structure can be misleading. However, the studies that have tried to quantify its effects find little evidence to support that it has played an important role in recent decades (Maloney and Molina, 2016; Messina and Silva, 2021). This is not to say that automation and developments in artificial intelligence will not affect the region, which is highly unlikely. However, there is still a large gap in our understanding of how these forces will shape labor markets in the future, given the particularities of Latin America.

Geography. More recently, a growing number of studies looked at the effects of trade and import competition on workers in geographic regions with different patterns of industrial specialization. A key insight from this literature is that trade's costs and benefits are unevenly distributed geographically within a country. Most of the evidence on this topic in Latin America comes from Brazil (Kovak, 2013; Dix-Carneiro and Kovak, 2015, 2017, 2019). One example is Dix-Carneiro and Kovak (2015), who study trade's differential effects on workers with different levels of education across local labor markets. They first develop a theoretically consistent approach to analyze the causal effect of trade liberalization on the skill premium at the local level. The model predicts that liberalization affects skill premiums through four channels: imperfect mobility across regions, differential tariff changes across sectors, regional specialization across sectors, and differences in sectoral intensities in the use of skilled and unskilled labor. In contrast to most previous work, they estimate that trade liberalization in Brazil drove small but statistically significant declines in skill premiums during the post-liberalization period. Dix-Carneiro and Kovak (2017) and Dix-Carneiro and Kovak (2019) show that wage gaps, job loss, and transitions to informality are also key margins of adjustment to trade shocks.

Frictions that impede workers from moving across industries, firms, or locations shape trade's impact (Pavcnik, 2017). As older, less-educated, and female workers face substantially higher barriers to mobility across sectors and regions, they experience greater losses after trade liberalization (Dix-Carneiro, 2014). Moreover, Dix-Carneiro and Kovak (2019) show that trade effects are long-lasting and magnified through time: they are still present 20 years after the trade liberalization episode in Brazil.

Firms. Trade openness can also induce productivity upgrading of firms, either because of import competition or because trade shifts resources from non-exporters to exporters. In Latin America, exporting firms are almost exclusively large firms, which, even before liberalization, were more productive. Moreover, export-intensive sectors and exporting firms in the region tend to have greater relative demands for more educated workers and higher education premiums (Harrison and Hanson, 1999; Brambilla et al., 2012).

Helpman et al. (2017), using employer-employee data from Brazil, show that a significant share of overall wage inequality arises within sector-occupations and for workers with similar characteristics. They find that wage dispersion across firms explains a large share of this inequality and is related to firm size and trade participation. There are also sizable effects of trade on inequality through the mechanism of firm selection into export markets. Consistent with this story, Frías et al. (2022) find that exports have a significant positive effect on plant-level wage premiums in Mexico. However, this might not be the full story. Dix-Carneiro et al. (2021) develop a general equilibrium framework to study the impact of trade on economic outcomes in the presence of informality. A key result is that the inclusion of the informal sector reverses predictions on the effects of trade on inequality driven by firm heterogeneity. Within the formal sector alone, trade liberalization contributes to a rise in wage inequality. However, the effect in the informal sector goes in the opposite direction, while the distance between average formal and informal wages decreases. This implies that trade liberalization reduces aggregate wage inequality driven by differences across firms.

Fieler et al. (2018) use data from a Colombian manufacturing survey around the 1991 trade liberalization to study the effects of international trade on quality upgrading and demand for skilled labor. They propose a model in which output quality is a latent variable that heterogeneous firms choose at a cost. Because the production of higher quality is intensive in high-quality inputs, upgrading among importers and exporters increases the domestic supply and demand for high-quality inputs. Results from counterfactual exercises using estimates of the model parameters show a selection of higher-quality, skill-intensive goods into importing and exporting. In particular, trade liberalization increases aggregate skill intensity by 33%.

In summary, the bulk of the evidence on the impact of the structural reforms of the 1980s and 1990s in Latin America indicates that they were unequalizing during the first years post-reform, shifting the relative demand in favor of skilled workers and pushing skill premiums upward. Tariffs were skewed towards sectors intensively using less-educated workers, so trade reform differentially affected this group; foreign direct investment concentrated in activities more intensive in skilled labor, at least within the regional context; relaxation of trade barriers reduced the price of importing new technologies, causing firms to switch toward production techniques that tend to be skilled-biased; and exporting firms, which tend to demand more educated workers, gained participation in the economies. The effects were accentuated because of barriers to mobility across sectors and regions that tend to be higher for older, less-educated, and female workers.

2.2.2 *The commodities boom*

Education and experience premiums began to decline at the turn of the century while the relative supply of more educated workers grew (Figure 2), suggesting that additional demand-side forces acted to reverse the pattern of the 1990s. A strong candidate to explain this shift in demand is the commodities price boom that started around 2001 and ended in 2014, with a gap during the first two years of the global financial crisis. The boom was triggered to a large extent by China's rising demand for commodities, particularly energy and mineral resources, as a byproduct of its transition to a market-oriented economy in the early 1990s and the impressive growth performance that followed (Kaplinsky, 2006; Radetzki, 2006; Erten and Ocampo, 2013; Autor et al., 2013; Costa et al., 2016; Autor et al., 2016a).

The export sector of many countries in Latin America is highly dependent on commodities. In 2006, primary products represented about 55.1% of South America's total value of exports, but if one adds manufactured exports based on natural resources, the number goes up to 78.4% (Ocampo, 2008). The same numbers for Central America plus Mexico are 40.1% and 61.4% respectively. The confluence of good prices of raw materials and exceptional external financing conditions generated a strong boost for economies in the region in the 2000s. During the years of the price boom, Latin America experienced an average growth of real GDP per capita of 2.5% per year, a number 2.4 times larger than the one observed for the OECD (1.8 times larger omitting the first two years of the global financial crisis) (World Bank, 2022b).

Faster economic growth helped bring income inequality down. A good indication that the commodity boom was a factor behind the regional inequality declines was that countries that benefited from the boom experienced stronger growth and greater reduction in inequality during the 2000s than the net commodity importers (Messina and Silva, 2018). Moreover, between 2014-2019, after commodity prices fell, the average real GDP per capita growth in the region stagnated, and the fall in inequality decelerated, even increasing in some cases.

Standard models of Dutch disease predict that an increase in income derived from natural resources, driven either by an exogenous world price increase or a discovery, creates excess demand for non-traded products and generates a reallocation of factors and value added towards non-tradable sectors (Corden and Neary, 1982; Corden, 1984; Sachs and Warner, 1995, 2001). In this framework, the effect of a natural resource boom on the distribution of income depends on the relative factor intensity across sectors: factors in which non-tradable production is more intensive gain, while factors in which tradable production is more intensive lose. The tradable sector in general, and the exporting sector in particular, tends to use high-skilled labor more intensively in Latin America, so the expectation is that natural resource booms will be equalizing. Furthermore, wage

disparity within the non-tradable sector tends to be lower than in the tradable. As workers move towards the thriving sector, income inequality could be reduced as a result. (Messina and Silva, 2018).

Goderis and Malone (2011) develop a two-sector growth model in which learning-by-doing drives growth to explain the time path of income inequality following natural resource booms. In line with the literature on dutch disease, they predict that if non-tradable sectors are more intensive in less-skilled labor vis-à-vis (non-resource) tradable sectors, a natural resource windfall will reduce the labor earnings Gini coefficient. Using data for 90 countries between 1965-1999, they find evidence that resource booms, especially oil and mineral booms, lower inequality. More recently, Dávila et al. (2021) studied how the factorial income distribution responded to the commodity price boom using data from 50 countries, including ten countries from Latin America, between 1995-2010. They show that during the boom years, there was a redistribution of the aggregate labor income share in favor of less-educated workers.

For Brazil, Costa et al. (2016) shows that, in 2000, the country received approximately 2.3% of its imports by value from China and sent 2.0% of its exports to China; by 2010, these shares were 14.5% and 15.1% respectively. Importantly, Brazilian exports to China are increasingly products of the agricultural and extractive sectors, while Brazilian imports from China have remained concentrated in manufacturing, so there is a commodities-for-manufactures trade relationship that is also characteristic of many Latin American countries. The authors use data from the Brazilian Censuses of 2000 and 2010, exploiting spatial variation in a differential exposure design to generate predictions about the effects of the China shock on wages across local labor markets. The empirical strategy follows closely the work of Autor et al. (2013) for the US. The main finding is that local labor markets more affected by Chinese import competition experienced slower growth in manufacturing wages between 2000 and 2010, consistent with evidence found for the US (Autor et al., 2013, 2016a). However, there was faster wage growth in locations benefiting from rising Chinese commodity demand during the same period. Interestingly, increased demand from China is associated with a rise in the share of employed workers in formal jobs, a factor also associated with declining inequality (see Section 3.2).

Adão (2015) shows that increases in the world prices of basic commodities were accompanied by reductions in Brazilian wage inequality between 1981-2010. They argue that the adjustment to changes in sector labor demand caused by global price shocks depends on three margins: changes in relative sector wages, the degree of mobility of workers across sectors, and within-sector earnings dispersion. They use data from the Brazilian Census of 1991, 2000, and 2010 to quantify the effect of global shocks in commodity prices on aggregate movements in between- and within-group wage inequality, finding that variations in world commodity prices explain between 5 and 10 percent of the decline in log wage variance between 1991 and 2010. For Mexico, Verhoogen (2008)

show that an exchange-rate devaluation leads more-productive plants to increase exports, upgrade quality, and raise wages relative to less-productive plants within the same industry, increasing within-industry wage dispersion. The results is consistent with decreasing earnings inequality as a response of the currency revaluation experienced by commodity producers that resulted from the boom.

2.2.3 *The role of firm heterogeneity*

Even if working in the same sector, occupation, and region, equally skilled workers can have different earnings depending on the firms they are employed in. Access to administrative linked employer-employee data in a few countries in Latin America has permitted the study of how firm characteristics and cross-firm pay differentials help determine the distribution of earnings. We already discussed part of this literature in Section 2.2.1, so we focus here in the work that follows Abowd et al. (1999) and Card et al. (2013) in decomposing the variance of earnings into worker and firm heterogeneity using high-dimensional worker and firm fixed-effects models. The method had been primarily applied to developed countries because reliable data on firms in Latin America is scarce, and firm and labor informality is pervasive.

Alvarez et al. (2018) study the case of Brazil between 1988-2012. The authors show significant variability in earnings within firms, but an even greater amount of earnings inequality between firms, with a substantial share of the cross-sectional variation explained by more productive and larger firms paying more. Importantly, when looking at changes in inequality across time, they find that firm effects account for 40% of the total decrease in inequality between 1996-2012, while worker effects account for 29%, the remainder explained residually. A key result is that this decline is not explained by changes in the productivity dispersion across firms, which increased, nor by changes in the skill composition of workers. What explains the fall in inequality is declining firm productivity premiums and declining returns to worker characteristics, much in line with the evidence discussed in Section 2.1. Using a sub-sample of large firms in the manufacturing and mining sectors, they show that the fall in the productivity premium was driven by a weakening pass-through from firm characteristics to pay. This could be explained by changes in bargaining power between employers and employees or by substantial increases in minimum wages in the country during this period (see Section 3.1).

Messina and Silva (2021) use a similar methodology with data covering the formal sectors of Brazil, Costa Rica, and Ecuador. Similar to Alvarez et al. (2018), the authors find that changes in the variance of firm effects are a major contributor to changes in the variance of earnings. In Brazil and Ecuador, where wage inequality fell, the contribution of firm effects also fell significantly, something that is in sharp contrast to what has been documented in other developed economies (Cardoso, 1999; Card et al., 2013; Song et al.,

2019). In Costa Rica, the only country in which inequality rose, the contribution of firm effects increased.

Eslava et al. (2021) reinforce the importance of firm characteristics in understanding earnings inequality in the region. They do this by looking at the relationship between the firm size distribution and wage inequality. The firm size distribution in Latin America is characterized by a large concentration of low-productivity small businesses, many of which are self-employed individuals working under informal conditions, and a small share of large high-productivity firms. The authors show that this dualism maps very closely to the earnings distribution, a correlation that is not replicated in the US. In Latin America, the proportion of workers in the bottom income quintile that work for or own a firm with more than 10 employees is only 5%, but it goes up to over 52% among workers in the top quintile. By contrast, in the US at least 70% of workers fall in this category in any quintile of the personal income distribution. The authors show that the excess mass of Latin American low-income workers in tiny productive units with precarious income levels deepens inequality. In particular, it explains 34% of the bottom-tail (P50/P10) earnings gap in the region relative to the US.

Although still limited, the available evidence from linked employer-employee data indicates that firm dynamics have played an essential role in the recent levels and evolution of earnings inequality in Latin America. This is an area where there is plenty of space for new research to broaden our understanding of the subject.

3 Labor market institutions

3.1 *Minimum wages*

Real minimum wages rose substantially in Latin America since 2002, coinciding with the moment when inequality began to decline. Figure 3 shows the average across eight Latin American countries of the cumulative change of the minimum wage, mean earnings, and median earnings relative to 2002 (see Figure notes for details). On average, the growth of the minimum wage was faster than that of mean and median earnings, so it potentially contributed to declining inequality and the strong growth of earnings among less-educated workers (Panel (b) of Figure 1). In this case, however, average trends concealed substantial heterogeneity across countries. For example, between 2002-2012, the real minimum wage more than doubled in Argentina and Uruguay, while it slightly declined in Mexico.

Studying the impact of minimum wages on inequality in Latin America is difficult because most workers are informal, and noncompliance is pervasive, two factors that are not present in developed economies. The average informality rate in the region, defined narrowly as the share of workers that do not contribute to pension funds, is

close to 68%, but it can go up to 80% for firms with less than 4 employees and to 93% among the self-employed (Eslava et al., 2021). More generally defined, informality implies employment relations in which labor norms are not enforced, including mandates on minimum remuneration. Changes in the minimum wage not only affect the structure of wages and the level of employment, but they can also induce reallocations between the formal and informal sectors to avoid the regulation, and even affect wages in the informal sector due to indexation (Maloney and Nuñez, 2003; Maurizio, 2015; Meghir et al., 2015; Broecke et al., 2017; Jales, 2018; Pérez Pérez, 2020). Analysis of the distributional effects of minimum wages within the region must consider this interplay.

Figure 3: Minimum wage and average and medial real earnings
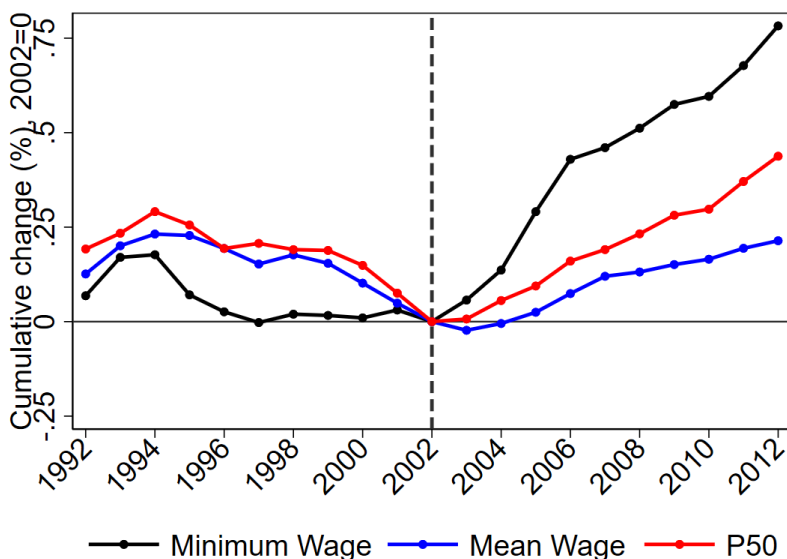
Notes: The figure depicts the average cumulative change of the minimum wage (black series), mean earnings (blue series), and median earnings (red series) relative to 2002. The averages are across eight Latin American countries: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay. We calculate the respective series for each country and year and then normalize them to take the value of zero in 2002. The reported series is an unweighted average across the eight countries. The minimum wage series is taken from official sources in each country. If the minimum wage changes within a year, we take the average over the year. The wage series is constructed using country-specific microdata on monthly labor income of prime-age workers. The microdata comes from household surveys gathered and made consistent by The Center for Distributive, Labor and Social Studies (CEDLAS) and The World Bank (CEDLAS and The World Bank, 2013). The eight selected economies account for 88.2% of the region's GDP and 78.9% of its population.

Noncompliance with the minimum wage, defined as the share of the workforce earning less than the minimum wage, tends to be high, but it is heterogeneous across the region. In countries like Mexico and Uruguay, where the minimum wage is low relative to each country's median wage, the noncompliance rate is below 10%. In countries like Colombia and Peru, where the minimum-to-median wage ratio is above 80%, the noncompliance

rate is above 35% (Messina and Silva, 2018). How binding is the minimum wage can matter greatly for its distributional consequences. For example Bell (1997), studying the cases of Colombia and Mexico in 1980s, finds substantial disemployment effects of minimum wages among less-educated workers in Colombia, where the minimum wage "bite" is high, but no employment nor wage effects in Mexico, where it is not. However, there is no consensus in literature. Analyzing the case of Mexico between 1989-2001, Bosch and Manacorda (2010) find that a substantial part of the growth in inequality, and essentially all the growth in inequality at the lower-tail of the distribution, was due to the steep decline in the real value of the minimum wage in that country.

Recent evidence specific to Brazil suggests that the contribution of the minimum wage to the decline of wage inequality was significant in that country. Engbom and Moser (2021) quantify the effects on inequality and unemployment of the more than doubling of the minimum wage in Brazil between 1996-2012. The authors follow the methodology of Lee (1999) and Autor et al. (2016b), exploiting variation in the effective "bindingness" of the federal minimum wage across states. They show that a higher minimum wage is associated with lower inequality, with little evidence of adverse effects on employment. In particular, rising minimum wages can account for one-third of the fall in the variance of log earnings in Brazil since 1994. A key factor behind these large effects on inequality is that the rise in the minimum wage induces firms above the new minimum wage to raise pay to maintain their rank in the wage distribution, with spillover effects that can reach up to the 90th wage percentile. This mechanism can explain the weakening pass-through from firm characteristics to pay found in Alvarez et al. (2018) and discussed in Section 2.2. The authors further show that the magnitudes of the estimated effects of the minimum wage on inequality are driven by how binding the minimum wage is, together with the extent of firm productivity dispersion in Brazil.

Also for Brazil, Ferreira et al. (2017) use distributional decomposition methods based on re-centered influence function regressions (Firpo et al., 2009; Fortin et al., 2011) to estimate the quantitative impact of alternative candidate explanatory factors on the changes in the earnings distribution, including the rise of the minimum wage. They find that the key contributor to falling inequality was the decline in the experience premium (see Section 2.1), accounting for close to 39% of the fall in the Gini coefficient, but that minimum wages also played a role, albeit conditional on the period. Rising minimum wages were equalizing during 2003-2012, but they had the opposite effects during 1995-2003 because of declining compliance. Over the entire period, the direct effect of minimum wages on inequality was muted. Finally, Jales (2018) proposes a framework that uses the discontinuity of the wage distribution around the minimum wage to identify noncompliance and estimate the distributional effects of the minimum wages in Brazil between 2001-2009. One novelty is that the method allows them to identify the effects of minimum wages on the size of the informal sector, capturing the reallocation mechanism. Their analysis

shows that the size of the informal sector is increased by around 39%, compared to what would prevail in the absence of the minimum wage. The effect is attributable to the unemployment effects of the minimum wage on the formal sector and movements of workers from the formal to the informal sector as a response to the policy.

Summarizing recent studies on minimum wage effects on inequality in Latin America since the 1990s, Messina and Silva (2018) conclude that results are highly sensitive to its level, how much it increases, the extent of noncompliance, and whether it is binding. However, studies focusing on the post-2000s period consistently show an equalizing effect of minimum wages (Maurizio and Vázquez, 2016; Ferreira et al., 2017; Jales, 2018; Campos-Vazquez and Esquivel, 2021). The solid economic growth in the region between 2002-2014 might explain this result because labor markets can afford minimum wage hikes in such favorable macroeconomic conditions. In a weak economy with sluggish labor demand, sharp rises in minimum wages can induce a reallocation of workers to the informal sector and exacerbate noncompliance, with negative distributional effects.

3.2   Informality

Having a sizeable informal sector can enhance or dampen inequality. If workers with similar characteristics get paid different wages depending if they work in the formal or informal sectors, within-group inequality increases. There is extensive evidence of a formality premium in the region, which persists even after controlling for several observable characteristics (Messina and Silva, 2018, 2021; Ulyssea, 2020). There is also some evidence that inequality is higher within the informal sector (Binelli and Attanasio, 2010; Engbom et al., 2021), mainly because a large share of the self-employed are informal and they tend to have higher earnings dispersion. However, the earnings and productivity distributions in the two sectors overlap, so informality is not restricted to low-pay workers or low-productivity firms (Meghir et al., 2015; Ulyssea, 2020).

A different argument that has been put forward is that the large concentration of employment in small informal firms, pervasive in Latin America (Maloney, 2004; Perry et al., 2007; Eslava et al., 2021), can potentially limit wage inequality because within-firm pay differentials in these firms is lower (Levy and López-Calva, 2016). This generates a misallocation problem because some high-skilled workers are matched with low-productivity informal firms, compressing skill premiums. The mechanism can be important in the region's context of increasing educational attainment. The role of firms in explaining the formality gap was also pointed out by Ulyssea (2018). Using matched employer-employee data on both formal and informal firms in Brazil, the author finds that when adding firm fixed effects in log-wage regression the wage gap between formal and informal workers vanishes. To the extent that there is assortative matching between firms and workers, this results suggests self-selection might be behind the wage gap.

The level of informality can be very sensitive to macroeconomic conditions, growing during recessions and declining in periods of expansion (Bosch and Maloney, 2007; Perry et al., 2007; Bosch and Maloney, 2008; Bosch and Esteban-Pretel, 2012). In a way, the informal sector can operate as a safety net, absorbing workers who otherwise would end up in unemployment during bad times (Attanasio et al., 2004; Engbom et al., 2021). However, this view of the informal sector as a second, less desirable, option is contentious (Maloney, 2004).

The counter-cyclicality of informality has implications for inequality. As a bad shock hits, wages in the informal sector respond more than those in the formal sector: they are not bound by the minimum wage nor set by collective agreements, and they are not protected by labor regulation. This exacerbates the formality premium while the informality share grows, so wage inequality increases. Binelli and Attanasio (2010), using microdata for Mexico, show that changes in the size of the informal sector closely follow changes in wage inequality. Attanasio et al. (2004) find that the tariff reductions in Colombia in the 1980s and 1990s led to stronger foreign competition and increased informality within the most exposed sectors. This compositional change contributed to rising inequality in the country in the 1990s.

To a greater or lesser extent, the informality rate declined during the years of strong economic growth in the 2000s in the vast majority of the countries in the region (Amarante et al., 2016; Messina and Silva, 2018, 2021; Engbom et al., 2021). Available evidence suggests that this fall in informality had equalizing effects. For Brazil, Ferreira et al. (2017) found that the formal-informal wage gap declined between 1995-2012, and this factor contributed to about 18% of the reduction of the Gini coefficient. Maurizio (2014) and Amarante et al. (2016) find similar results in the cases of Argentina and Uruguay respectively.

Engbom et al. (2021) study the interaction between informality and earnings inequality in Brazil using administrative and household survey data between 1985-2018. The combination of the two data sources allows the authors to compare earnings levels and earnings changes between workers in Brazil's formal and informal sectors and for workers switching sectors over time. The richness of the data implies they can provide a clear picture of how transitions between sectors impact individual earnings and overall inequality. They find that workers who switch between sectors have highly asymmetric earnings changes: workers transitioning from the informal to the formal sector tend to make earnings gains, whereas workers making the opposite transition on average lose earnings. They show that the significant employment shift toward the less volatile formal sector in the 2000s resulted in a fall in earnings volatility, accounting for 50% of its total decline since 2002. Consistent with most of the evidence for the region, the process of labor market formalization in Brazil appears to have played an essential role in the decline in inequality.

4 Conclusions

Earnings inequality in Latin America increased in the 1980s and 1990s, declined sharply in the 2000s, and stagnated at the beginning of the 2010s. An extensive literature has tried to understand the drivers of this pattern, focusing on supply, demand, and institutional factors that shape developments in labor markets.

On the supply side, changes in the workforce's age, sex, and education composition impacted the wage structure, reducing the experience and education premiums and hence reducing between-group inequality. These compositional changes happened throughout the period, so they are unlikely to explain the shift in inequality at the turn of the century. For that, we need alternative demand-side or institutional explanations.

On the demand side, the bulk of the evidence on the impact of the structural reforms of the 1980s and 1990s in Latin America indicates that they were unequalizing during the first years post-reform, shifting the relative demand in favor of skilled workers and pushing skill premiums upward. Tariffs were skewed towards sectors intensively using less-educated workers, so trade reform differentially affected this group; foreign direct investment concentrated in activities more intensive in skilled labor, at least within the regional context; relaxation of trade barriers reduced the price of importing new technologies, causing firms to switch toward production techniques that tend to be skilled-biased; and exporting firms, which tend to demand more educated workers, gained participation in the economies. The effects were accentuated because of barriers to mobility across sectors and regions that tend to be higher for older, less-educated, and female workers.

Improved external conditions due to the commodities price boom of the 2000s boosted economic growth in the region. Evidence suggests this shock had equalizing effects. Moreover, significant increases in minimum wages and a decline in labor informality reduced earnings dispersion across skill-demographic groups. Over the last decade, inequality decline decelerated, reflecting the general deceleration of economic growth since the end of the commodities price boom. However, evidence to explain this phenomenon is limited, so there is not much that can be said of this period at the moment.

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