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Firms, Regularization, and Immigrant Integration^{*}

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Abstract

This paper examines the labor market integration of Venezuelan migrants in Colombia during a large-scale regularization program. Using labor force survey data on Venezuelan-born migrants and longitudinal data for the universe of regularized migrants, I find that migrants are much more likely than comparable natives to work informally, and only a small share of regularized migrants end up in formal jobs. Those who enter the formal sector earn substantially less than natives, and up to half of this wage gap is due to their sorting into lower-paying firms. Comparing job movers, I show that as migrants transition to better-paying firms, they do not capture their pay premiums fully. There are some improvements as regularized migrants gain formal sector experience, but most of the gap remains after five years. I discuss why formalization rates are not higher despite migrants' similar language, culture, education, and near-universal access to work permits.

Keywords: Labor Market Integration, Immigration, Formal Employment, Firm Heterogeneity.

JEL Codes: J15, J61, F22, O15, O17.

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1 Introduction

Understanding whether migrants and natives differ in the labor market has attracted considerable attention in high-income countries (e.g., [Borjas \(1985\)](#) and [Borjas \(2015\)](#) provide a long span of evidence from the United States). This question, however, remains less explored in developing countries where many migrants and refugees also settle. Over the past decade alone, tens of millions of individuals from Syria and Venezuela have relocated to neighboring low- and middle-income countries ([UNHCR 2023a](#)). Measuring differences in earnings and job opportunities of migrants compared to natives in these contexts, where the informal sector serves as a stepping stone for short- and often longer-term employment, gains importance.¹ Moreover, it is key to determine how these patterns are shaped by firm heterogeneity and migrants' progression along the job ladder ([Arellano-Bover and San 2026](#)), as well as from having regularization programs that suddenly facilitate access to formal employment and entrepreneurship ([Bahar et al. 2022a](#); [Ibáñez et al. 2025](#)). This evidence would help to develop more effective integration policies, reduce labor misallocation, and more profoundly benefit the receiving economies by capturing the productive potential of migrant workers.

In this paper, I broadly examine the labor market integration of millions of Venezuelan immigrants in Colombia, focusing on employment and wage gaps by informality, as well as the roles of job mobility and firms in shaping the labor market dynamics of assimilation.² Colombia is the main destination of Venezuelans, severely hit by both economic and political crises at home, where more than one-fifth of its entire population has been forced to flee ([UNHCR 2023b](#)). Figure 1a illustrates the rapid growth of the Venezuelan working-age population in Colombia, which surged from less than 1% in 2016 to approximately 7% by 2021. Administrative sources estimate the Venezuelan migrant population in Colombia at around 2.9 million as of August 2023 ([Migración Colombia 2023](#)).

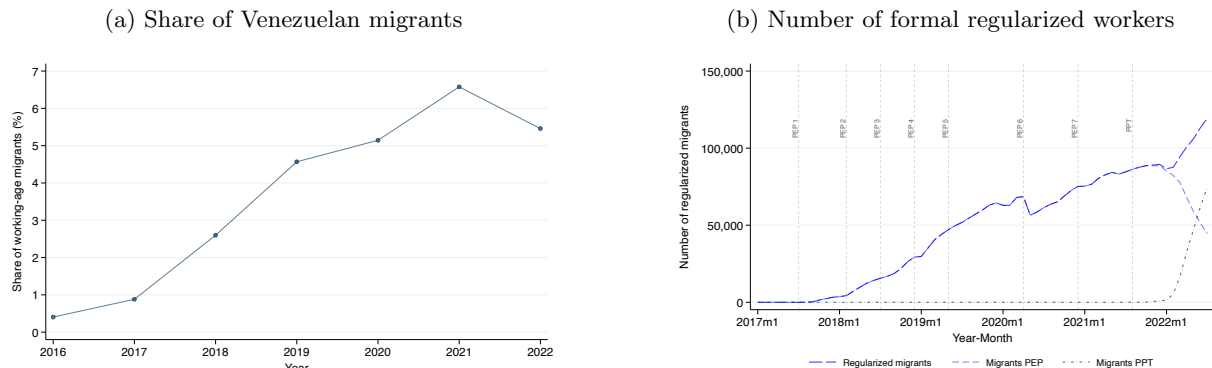
During this time, the government also enacted one of the most extensive regularization programs

¹Most papers have focused on the direct economic impacts on natives. For instance, in Colombia, among others, [Caruso et al. \(2021\)](#), [Bonilla-Mejía et al. \(2024\)](#), and [Lebow \(2024\)](#) studies overall labor market effects; [Delgado-Prieto \(2024\)](#) documents asymmetric effects in the formal and informal labor markets; and [Delgado-Prieto \(2026\)](#) focuses on the role of firm heterogeneity. In Turkey, among others, [Tumen \(2016\)](#) and [Aksu et al. \(2022\)](#) studies overall effects by formality status; [Aracı et al. \(2022\)](#) shows heterogeneity by regional development; and [Altındağ et al. \(2020\)](#) and [Akgündüz et al. \(2023\)](#) focus on firm performance.

²Venezuelan immigrants in this context can be either refugees or voluntary migrants. Formal employment throughout the paper is defined as workers contributing to the health or pension system.

in history, aiming to enhance Venezuelans’ integration into Colombian society and facilitate their access to formal employment. Figure 1b shows that as of July 2022, there were around 120,000 regularized Venezuelan workers in the formal sector, which represented around 1.2% of all formal workers. The massive migrant inflow, one of the largest immigration shocks in recent history, together with a rapid, sustained government response (CONPES 2022), which includes extensive regularization policies, motivates a detailed assessment of Venezuelans’ labor market integration in Colombia. This becomes even more relevant, as a representative migrant survey indicates that four out of five migrants intend to settle permanently (DANE-EPM 2024).

Figure 1: **Migrant-to-native population ratio and formal regularized workers**



Note: In Panel (a), I show the share of migrants as the population aged 20 to 60 born in Venezuela, divided by the total population aged 20 to 60, using national survey weights. Source: GEIH, 2016–2022. In Panel (b), I display the number of regularized workers with regularized documentation, either PEP or PPT, defined in the next section. The dashed lines indicate the enactment dates of the first seven waves of the regularization program, and the last dashed line marks the implementation of the latest PPT program. Source: PILA, 2017–2022.

For the analysis, I combine information on *Venezuelan-born migrants* in the informal and formal sectors from the labor force survey with panel data on all *regularized migrants* from the social security records, thus providing a comprehensive labor market analysis in a developing country, examining up to 7 years post-arrival, during which a massive regularization program was implemented. With the complementary data sources, I study not only the cross-sectional descriptive patterns between migrants and natives but also, as I track regularized migrants over time with the matched employee-employer dataset, I quantify assimilation trends to determine how much regularized migrants improve relative to native workers on formal wage gaps, and how the lack of convergence can be shaped by job mobility and the types of firms they work for. In this way,

I differentiate from other studies that focus on the effects of the first waves of the regularization program on migrants' socioeconomic well-being (Ibáñez et al. 2025), entrepreneurial rates (Bahar et al. 2022a), crime (Ibáñez et al. 2026), or resilience during the COVID-19 pandemic (Urbina et al. 2023). My analysis covers multiple stages of the regularization program between 2018 and 2022 and, for the first time, incorporates matched employer–employee data that provide firm-level factors and offer novel insights into migrants' labor market dynamics in developing countries.

I first document the informality gaps between migrants and natives using cross-sectional evidence from the household survey. Venezuelan immigrants are disproportionately employed in the informal sector, even after controlling for time, age, and education. In 2018, migrants were about 35 percentage points (pp) more likely to work informally than comparable natives, whose informality rate was about 50%. These differences narrowed slightly after 2018, when the regularization program allowed undocumented migrants to access formal employment. In comparable countries, the informality gap between Venezuelans and native workers in Peru is relatively small (Groeger et al. 2024), in Ecuador, Venezuelans are even more likely to hold formal jobs than natives (Fabregas and Zanoni 2025), while in Turkey, nearly all Syrian refugees work informally (Demirci and Kırdar 2023). I discuss potential explanations behind the substantial informality gaps in the final section of the paper.

I then zoom in on regularized migrants who transition into the formal sector using social security records. I find that about 10% to 14% of regularized migrants had entered formal employment by January 2021, though this share has been increasing slightly over time. Among those who do enter, there are substantial wage gaps relative to natives: on average, regularized migrants earn about 28% less than comparable natives, with around 60% of them having minimum-wage jobs, compared to 30% of natives. Turning to the role of firms in explaining wage differentials, I examine how much of the formal wage gap is driven by worker sorting *between* firms, as recent studies in developed economies suggest that it accounts for an important share. Specifically, in Colombia, this sorting component contributes to between 30% and 50% of the overall formal wage gap, depending on whether minimum-wage workers are included, a significantly higher contribution compared to Canada, the Netherlands, or Israel, where firm effects explain around 14% to 20% of the wage gap (Dostie et al. 2023; Cole et al. 2024; Arellano-Bover and San 2026), or Portugal, where reallocation into higher-paying firms explains about 30% of immigrants' initial wage growth

(Damas de Matos 2017). In this context, regularized migrants are often refugees without formal recognition of their educational backgrounds and can have lower reservation wages, thus leading to higher firm segregation in the labor market (Amior and Stuhler 2024). The importance of firm heterogeneity in the Colombian context is also emphasized in Delgado-Prieto (2026), which shows that the Venezuelan immigration has stronger effects in small firms, given their reliance on informal workers.

Splitting migrants into cohorts of arrival, these wage disparities and employment concentration in lower-paying firms show only minor improvements five years after migrants enter the formal labor market, indicating that initial labor market gaps persist. I also compare firm movers, stayers, and those exiting the formal sector over time, to find that migrant movers do climb the job ladder by transitioning to better-paying firms, although they do not capture their pay premiums fully, whereas low-ability migrants are more likely to exit the formal labor market altogether. This sorting process is helping to narrow some of the job disparities over time.

Finally, I discuss why formalization rates remain low, focusing on migrants' firm-specific attachment. The panel data reveal that regularized migrants are significantly more likely to exit formal employment than natives, also within the same firm, while having higher mobility across firms (partly reflecting their concentration in high-turnover firms). One potential explanation, among others, is that employers may anticipate higher job turnover from migrants, and because this would decrease the expected returns to on-the-job training investments, they continue to hire natives. I show descriptive evidence on this by comparing the allocation of migrants across industries with potentially varying use of training, and complement it with a monopsony model (Kline 2025) that shows how information frictions stemming from migrants' uncertain match quality increase firms' incentives to hire natives. It predicts that a lower expected quality of migrants induces not only fewer wage offers but also explains the sorting among low-productivity firms, as they have the least to lose from an unproductive match. This points to one demand-side mechanism for why formalization rates are not higher among regularized migrants in Colombia, complementary to labor supply explanations based on migrants' preferences for informality, despite their cultural, linguistic, and educational similarities with natives.

Altogether, these findings highlight the need for complementary strategies to support broader regularization policies for Venezuelan immigrants. In particular, labor market policies focused on

boosting and sustaining formal employment among migrants, such as faster validation of foreign degrees, which lets employers verify migrants' education, or the regularization work permit (PEPFF, by its Spanish acronym), which ties regularization to a formal job offer, can help improve their economic prospects in the long term. Skill certification by the National Training Service (SENA, by its Spanish acronym) is another option, although experimental evidence finds no significant effects on migrants' employment or wages (Busso et al. 2026). Importantly, such policies could also benefit the Colombian government, as greater integration of migrants into the formal economy increases tax revenues and social security contributions.³ The insights I provide are useful for other Latin American and middle-income countries facing similar migrant inflows, highlighting both the importance and the limitations of regularization policies for migrants' labor market integration.

Related literature. This paper primarily contributes to the literature on migrant assimilation by examining the role of firms and job mobility, which recent studies highlight as key in shaping outcomes beyond migrant characteristics and host-country policies. In developed economies, firm pay policies explain a smaller but relevant part of native-migrant wage gaps and of migrants' early wage growth (Damas de Matos 2017; Dostie et al. 2023; Cole et al. 2024; Arellano-Bover and San 2026). I show that, in a developing country with a large informal sector, sorting into low-paying firms is more important and persistent: cohorts of regularized migrants close little of the gap in firm pay premiums as they gain formal experience. Firm mobility helps, as migrant movers transition to firms with higher premiums than native movers, but they capture only part of these premiums, pointing to lower pay within firms. Related evidence documents negative attitudes of Colombians toward Venezuelan migrants (Chatruc and Rozo 2024) and a lower probability of Venezuelans being selected for formal jobs in Ecuador (Fabregas and Zanoni 2025). I contribute to this literature by using, for the first time, the universe of matched employer–employee records for migrants in a developing country to study these firm-level dynamics.

I also contribute to the literature on immigrant labor market integration. Most existing literature focuses on the comparison of migrants and natives within developed labor markets.⁴ Massive

³From January 2017 to July 2022, the number of regularized migrants formally employed has generated health and pension tax contributions amounting to 67 million USD, or around 0.02% of Colombia's GDP in 2018. This exercise can be interpreted as a lower bound of the fiscal impacts, as the employers also pay an additional 20.5% of their reported income in health and pension contributions for each of their workers, apart from other fiscal effects of the immigration shock.

⁴For instance, early evidence from the United States documented a substantial earnings gap between migrants

population outflows from Afghanistan, Syria, Ukraine, and Venezuela in the past decade toward middle- and low-income countries have gradually shifted the focus to developing countries. The conditions under which migrants or refugees initially enter these labor markets and whether they assimilate have become an increasingly important question to study, yet the evidence remains limited. An exception is [Demirci and Kırdar \(2023\)](#), which examines the labor market integration of the world’s largest refugee population: Syrians in Turkey. Using a single cross-sectional survey, the study finds that employment rate gaps between refugees and native men are less pronounced than in developed economies and that integration improves over time. In Colombia, [Bahar et al. \(2022b\)](#) identifies the “missing” migrants in the formal economy over different locations and sectors from an accounting perspective as a measure of integration, suggesting that the lack of accreditation is an important barrier for migrants. I contribute to this literature by analyzing labor market dynamics for migrants in both the informal and formal sectors, along with longitudinal evidence of formal regularized migrants.

Finally, I speak to the literature on regularization policies, which examines how labor market interventions shape outcomes for migrants and natives. Studying France’s 1981 regularization, [Borjas and Edo \(2026\)](#) shows that it reduces employers’ monopsony power over undocumented workers, increasing employment and wages for both immigrants and natives. [Elias et al. \(2025\)](#) examined the 2004 immigrant regularization in Spain, finding that it boosted immigrants’ formal employment without adversely affecting natives or increasing public costs. [Bahar et al. \(2021\)](#) and [Gulek et al. \(2024\)](#) examine the causal impacts of the Colombian regularization using labor force survey data.⁵ The slow transition I find towards formality among regularized migrants helps

and natives ([Borjas 1985](#)), with a notable slowdown in convergence since the 1980s ([Borjas 2015](#)), that is partly attributed to the rising migrant inflows that increase labor market competition ([Albert et al. 2026](#)). Relatedly, [Berbée and Stuhler \(2025\)](#) conducts an analysis in Germany over 50 years, uncovering a ten pp employment gap between migrants and natives a decade after arrival. They also highlighted the influence of the initial economic conditions for enhanced assimilation. Analyzing refugee integration, [Brell et al. \(2020\)](#) focused on labor market integration in high-income countries and found that fewer than 20 percent were employed within their first years of arrival. They argue that the labor market integration of voluntary migrants differs from that of forcibly displaced individuals. Similarly, [Fasani et al. \(2022\)](#) documented that refugees in 20 European countries are over 20% more likely to be unemployed and have lower income and occupational quality than comparable migrants, with disparities persisting up to 15 years post-immigration.

⁵Although administrative data could provide a more detailed analysis of these impacts on natives and earlier migrant cohorts, I set this analysis aside because areas with higher regularization rates also show greater immigrant inflows, which are in turn driven by local labor market conditions. Identifying their causal effects separately would require a valid instrument for each endogenous variable. However, plausibly exogenous instruments previously used in the literature may not satisfy the multiple exclusion restrictions, as they similarly predict local regularization rates and immigration shocks.

explain the limited effects on natives, and rationalizes why [Lombardo et al. \(2025\)](#) find that the regularization only partially mitigated the negative wage effects of immigration. Relatedly, [Bahar et al. \(2022a\)](#) and [Bahar et al. \(2023\)](#) find that the regularization program causally increases formal entrepreneurship among Venezuelan migrants and that Venezuelan-owned firms are more capitalized at founding but survive at rates comparable to those of locally owned businesses, respectively. I contribute to this literature by documenting the negative assortative matching between migrants and firms after regularization in Colombia and by providing a theory of why firms' hiring decisions might contribute to migrants' lower wages and rates of formalization.

The rest of the paper is structured as follows. Section 2 discusses the Venezuelan immigration and the different regularization programs. Section 3 describes the data and empirical strategy. Section 4 presents results from the survey and administrative data. Section 5 discusses why formalization rates are not higher among regularized migrants. Section 6 concludes.

2 Regularization Program

The rapid increase in irregular migration has led governments in different countries to implement regularization programs. In Colombia, the path to regularization and legalization for irregular Venezuelans began with the introduction of the *Permiso Especial de Permanencia* (PEP), one of the largest regularization programs in the world. It granted legal residence for two years, renewable thereafter, including access to public health and education but excluding voting rights. The initial rounds of PEP, announced in July 2017 and February 2018, were designed explicitly for Venezuelans with formal entry into Colombia.⁶ In August 2018, subsequent rounds extended the process to include undocumented migrants with irregular entry into the country. Altogether, the PEP program comprises multiple waves unfolding between 2017 and 2021. As of January 2021, around 760 thousand Venezuelans had a regular status in the country due to the PEP, while 980 thousand Venezuelans were still irregular ([Migración Colombia 2021](#)).⁷

To address the challenges Venezuelan migrants face due to documentation renewal and to provide a longer-term solution, the Colombian government introduced a Temporary Protection Statute

⁶Venezuelans must have a passport stamp when they enter the country and not have any criminal record or current deportation measure in place.

⁷From 2020, undocumented migrants can also be granted regular status whenever they receive a formal job offer using the PEPFF program.

in May 2021, which encompasses the earlier PEP. The new program, known as *Permiso de Protección Temporal* (PPT), marked a significant change in the regularization process by granting up to ten years of legal documentation instead of two.⁸ As of August 2023, approximately 1.9 million Venezuelans had been granted the PPT from a total of 2.9 million registered Venezuelans, while around 420 thousand applicants were in the process of approval ([Migración Colombia 2023](#)). However, the program’s implementation has encountered some challenges. For instance, according to a representative migrant survey, about half of the remaining undocumented migrants reported difficulties engaging with government agencies and cited a lack of information as a barrier to accessing the PPT program ([DANE-EPM 2024](#)).

One of the main objectives of the PEP and, later on, PPT is to enhance the well-being of Venezuelans by promoting their social and economic integration. In that sense, these programs are necessary to access formal employment, which offers a range of benefits over informal employment, including legal protections, pension benefits, stable income, and opportunities for career growth. Thus, I first calculate the insertion of Venezuelan migrants in the formal sector. Strikingly, only between 10% and 14% of regularized Venezuelans had formal employment in January 2021, after combining information from migrants with PEP in the social security records and total numbers from [Migración Colombia \(2021\)](#).⁹ The formalization has grown over time. For the latest period available, July 2022, the administrative dataset shows that nearly 120,000 regularized migrant workers hold either PEP or PPT documentation in the formal sector (about 1.2% of all formal workers). The recent adoption of the PPT, which encompasses the previous PEP, has altered the distribution of document types among workers in the formal sector. Notably, there is a shift in 2022 with more regularized migrant workers now being registered under the PPT category, as illustrated in [Figure 1b](#).

There was also an adverse change in the trend of regularized migrant workers in the formal sector during the initial months of COVID-19 in 2020. Although the regularization program granted many migrants the right to work, most did not enter the formal sector. In the last section of this paper,

⁸All Venezuelans are required to undergo a pre-registration process called *Registro Único de Migrantes Venezolanos* (RUMV), show evidence they were in Colombia before a specific date, and not have any previous criminal records.

⁹The lower bound is $9.9\% = 75,350/759,584$, where the numerator includes all PEP holders contributing to social security and the denominator all regular Venezuelans, regardless of age or labor force status. The upper bound of about 14% restricts the denominator to those aged 18 to 59, who represent 72% of Venezuelans in Colombia ([Migración Colombia 2022](#)).

I discuss potential explanations for why formalization rates have not increased further, including a lack of incentives for employers to hire regularized migrants. This, however, does not mean the program does not strongly promote formalization, as [Ibáñez et al. \(2025\)](#) and [Bahar et al. \(2022a\)](#) show a high formalization effect for undocumented migrants in the initial stages of the PEP program relative to similar peers.

3 Data and Empirical Strategy

3.1 Data

Data sources. In this paper, I leverage the migrant-friendly context that facilitated the recollection of extensive information about migrants. First, to construct measures of informality and wage gaps, I use the *Gran Encuesta Integrada de Hogares* (GEIH), a comprehensive labor force survey that includes questions on birthplace and arrival time in Colombia for recent migrants, enabling the characterization of the migrant population. Unlike certain countries, such as Turkey ([Demirci and Kırdar 2023](#)), which often restrict the inclusion of migrants in labor force surveys, the GEIH survey enables a detailed exploration of migrants’ integration patterns relative to natives across several labor market outcomes in the informal sector. For the main analysis, I focus on workers between 20 and 60 years old in urban areas using monthly information from 2016 to 2022.¹⁰ I exclude rural areas as their labor markets behave much differently from urban ones, and most immigrants reside in urban areas.

Second, to construct assimilation dynamics holding the population constant, I exploit worker-level data of the *Planilla Integrada de Liquidación de Aportes* (PILA). A dataset of administrative records from Colombia’s social security system that contains the universe of formal workers in tax-registered companies, excluding those engaged in informal work or in informal firms, and includes self-employed formal workers. This dataset is based on monthly contributions to the health system in Colombia, derived from their labor income, providing a comprehensive overview of formal employment.¹¹ The PILA is constructed at the contribution level, yet workers with multiple contracts can have multiple contributions. To transform it at the worker level, I use the highest observed

¹⁰Note that before 2018, Venezuelans were not statistically representative in the survey.

¹¹The labor income reported in the PILA can be up to a maximum of 25 monthly minimum wages.

income for workers with multiple contracts and retain the job characteristics of the one with the highest base income. Thus, each observation represents a worker-firm match for a specific month and year. The longitudinal aspect of the data, coupled with detailed information on the worker’s document type, allows for a dynamic examination of trajectories over time for all migrant holders with PEP or PPT in the formal sector relative to natives, capturing frequent, month-to-month changes.¹²

It is important to note that the definition of migrants differs between the survey and the administrative data. In the PILA, nationality is inferred from documentation, which means I identify only Venezuelans who enrolled in the regularization program, so I refer to them as *regularized migrants* throughout the paper. Instead, Venezuelans who obtained Colombian nationality would be defined as natives. In contrast, in the GEIH, Venezuelans are identified by their place of birth, including those who are undocumented or documented but not regularized, so I refer to this broader group as *migrants* throughout the paper.

Firm-level outcomes. One of the main contributions of this paper, relative to other papers comparing labor market outcomes of migrants and natives in developing countries, is to quantify the degree of integration according to firm outcomes. This is key as several papers emphasize how firms play an important role in assimilating migrants in high-income countries (Dostie et al. 2023; Arellano-Bover and San 2026). In this regard, I present several comparisons with natives, focusing on time-constant measures of firm variables, mostly constructed before the COVID-19 pandemic, to understand these patterns without additional noise from pandemic-specific dynamics. For all firm outcomes, I use the full sample of workers in the PILA, then merge the resulting firm-level constant measure with all worker-date observations in the main dataset.

To begin, I measure firm employment as of August 2019. Next, I estimate the standard AKM model proposed by Abowd et al. (1999) to construct a proxy for firm-specific pay premiums, em-

¹²As I track the universe of monthly workers in the formal sector from January to December from 2017 to 2021 and from January to July 2022, the resulting dataset would have more than 500 million worker-date observations after combining all months and years. To manage this extensive dataset, I instead take an approximate 8% random sample for natives while retaining the complete records of migrants and other foreigners. Specifically, I take a 4% random sample of natives observed between January and July 2017 and trace them through 2022. I then conduct a parallel process from January to July 2022 to take an additional 4% random sample of natives and trace them back to 2017. Lastly, I include in this data all migrants and foreigners observed throughout the period. Hence, after restricting the sample to workers aged 20 to 60 between 2018 and 2022, I have 28,299,039 observations for natives, 2,999,688 for regularized migrants, and 1,588,671 for other foreigners in the PILA.

ploying the estimation methodology outlined in Card et al. (2016). The regression model takes the following form: $\ln w_{it} = \alpha_i + \psi_{j(i,t)} + X'_{it}\gamma + v_{it}$, capturing formal wages as an additive linear combination of unobserved worker Fixed Effects (FEs) α_i and unobserved firm FEs ψ_j . The notation $j(i, t)$ denotes the firm j of worker i in period t , and the vector X_{it} comprises time-varying controls, including age squared and its cubic (both normalized to age 40), and year FEs. Consistent estimation of the parameters requires an exogenous mobility assumption, which allows for sorting conditional on worker and firm fixed components. Appendix Figure A.1 supports this assumption: workers' residual wages show flat trends before and after the move, while during the transition, they experience either wage gains or losses depending on the origin-destination firm pair, consistent with evidence from Brazil (Gerard et al. 2021) and Portugal (Card et al. 2016). These flat trends also suggest that workers do not move in response to transitory or match-specific wage shocks, which would bias the firm effects. A remaining concern is limited mobility bias: with few movers per firm, the firm effects are estimated with sampling error, which inflates their variance. This affects the variance decomposition in Table 1, but less so the sorting component of the wage gap, which relies on differences in mean firm effects across groups, where this error averages out.

The estimation period for this outcome spans from 2015 to 2019, using August for tractability, with all firm FEs relative to the largest firm in the country.¹³ As robustness, I also estimate the model for 2018–2022, using July, which covers the period of analysis and firms created after 2019, and for 2015–2019 excluding minimum-wage workers, as their mass point may compress the firm effects. In this context, the minimum wage is highly binding, as its ratio to the median wage is about 90%, compared to an OECD average close to 50% (Arango et al. 2022).¹⁴ For the analysis, I do not estimate separate AKM models by origin status as the share of migrants is consistently below 1% in all periods, which substantially reduces the number of connected firms as they need to have both native and migrant movers. Thus, I will not measure the degree of differential pay setting *within* firms directly, and it will be part of the unexplained component of the observed wage gaps. I still provide an approximation of this term by comparing the wage and pay premium gains

¹³The final estimation sample contains 27,618,254 person-year observations, restricting to full-time native workers aged 20 to 60 who appear multiple years, have 30 days of employment in the month, and belong to the largest connected set of firms and workers.

¹⁴Colombia has a single national monthly minimum wage for all formal employees, set by a tripartite commission of government, unions, and employer associations that negotiates it every December, but it rarely reaches an agreement, so the government de facto sets it by decree. Employers who pay below the minimum wage face fines from the Ministry of Labor for each violation.

of migrant and native job movers.

Finally, I construct the poaching index developed by [Bagger and Lentz \(2019\)](#) as an outcome. This index, denoted as $\pi_{j,t} = \frac{N_{j,t}^{EE}}{N_{j,t}^{EE} + N_{j,t}^{UE}}$, serves as an indirect measure of workers' revealed preferences and the desirability of the firm. Here, $N_{j,t}^{EE}$ represents the number of hires by firm j in year t who were employed in other formal firms, and $N_{j,t}^{UE}$ is the count of hires from outside the formal sector. I construct the average poaching index by considering data from 2017 to 2019 for February and August.¹⁵ Appendix Figures [A.6a](#) and [A.6b](#) show a positive correlation between firm pay premiums, poaching index, and firm size.

Descriptives. I provide a summary of the various worker and firm variables I analyze with the administrative data in Appendix Tables [A.3a](#), [A.3b](#), and [A.3c](#), adding another comparison group: other foreigners. The inclusion of this group is motivated by the possibility that Venezuelans may have entered the formal sector with different documentation, separate from PEP or PPT. First, the proportion of males among native workers (58%) consistently remains below that of regularized migrants and other foreigners across all years. Regularized migrants also display a younger age profile, with an average age under 34 in all years, whereas natives and other foreigners tend to be older. Regarding wages, regularized migrants earn significantly lower wages than natives, often earning the minimum wage (around 60% of them). In contrast, other foreigners earn substantially higher wages than both groups, suggesting they are likely highly skilled workers, possibly in managerial positions. By firm size, natives tend to work in considerably larger firms compared to other foreigners and regularized migrants. However, when examining firm-specific pay premiums, the largest differences emerge, with other foreigners sorting into higher-paying firms than natives and regularized migrants. Finally, when looking at the firms' poaching index, regularized migrants are generally associated with less desirable firms than natives. In the main analysis, I focus only on natives and regularized migrants, as the group of other foreigners is less clear regarding their arrival in Colombia and their origin, and their numbers have been declining in recent years.

¹⁵If the firm did not make any hiring in the year, the index takes a missing value. For all workers in new firms that appear from 2020, the value of the firm outcome is missing.

3.2 Empirical Strategy

Cross-sectional specification. To analyze cross-sectional dynamics, mainly focusing on the labor force survey, I estimate the following regression model:

$$Y_{it} = \alpha + \sum_y \beta_y T_y * M_i + \gamma_y + \gamma_m + \gamma_{ae} + \gamma_d + \epsilon_{it}. \quad (1)$$

Here, the outcome Y_{it} is either the logarithm of wages or labor income, or an employment indicator for the formal or informal sector of individual i in period t . The interaction of migrant dummies M_i with year dummies T_y produces the dynamic coefficients β_y . Additionally, I control for year (γ_y) and month fixed effects (γ_m) to absorb any seasonal and yearly changes affecting all workers, the interaction of age and education fixed effects (γ_{ae}) to control non-parametrically for varying returns to education with experience, and for department fixed effects (γ_d) to control for the geographic sorting of immigrants, and when pooling both genders, I include sex dummies. I define eight age groups in five-year bins, from 20 to 60, and three broad education groups: less than high school, high school, and college. The error term is denoted as ϵ_{it} . In all the regressions with the GEIH survey, I use national survey weights.

Longitudinal specification. To analyze regularized migrants' outcomes, I divide them by year of first entry into the formal sector. This grouping is necessary to measure assimilation over time, as I keep the population composition constant at baseline. More formally, I estimate the following regression model separately by year:

$$Y_{it} = \alpha_t + \sum_g \beta_g * \mathbb{1}\{M_i = 1, G = g\} + \gamma_m + \gamma_{as} + \epsilon_{it}. \quad (2)$$

Here, the individual outcome Y_{it} represents the logarithm of wages, employment indicators, or specific firm characteristics. The cohort assimilation coefficients β_g are derived from the dummies of migrants by year of first entry g into the formal sector, where $G \in \{2018, \dots, 2022\}$. These coefficients then compare migrants who become formal workers in the same year with natives over time. I also include controls for month fixed effects (γ_m) and the interaction of age and sex fixed effects using eight age groups (γ_{as}). However, I do not control for education as it is not observed

in the administrative data. The error term is denoted as ϵ_{it} , and standard errors are two-way clustered by worker and firm.

4 Migrants and Natives in the Colombian Labor Market

I start with the labor force survey, which covers both the informal and formal sectors, to document employment, informality, and earnings gaps between Venezuelan-born migrants and natives. I then turn to the social security records to examine how much of the formal wage gap of regularized migrants is explained by the firms where they work, whether it narrows for earlier cohorts of migrants as they gain formal experience, and what migrants gain when they move across firms.

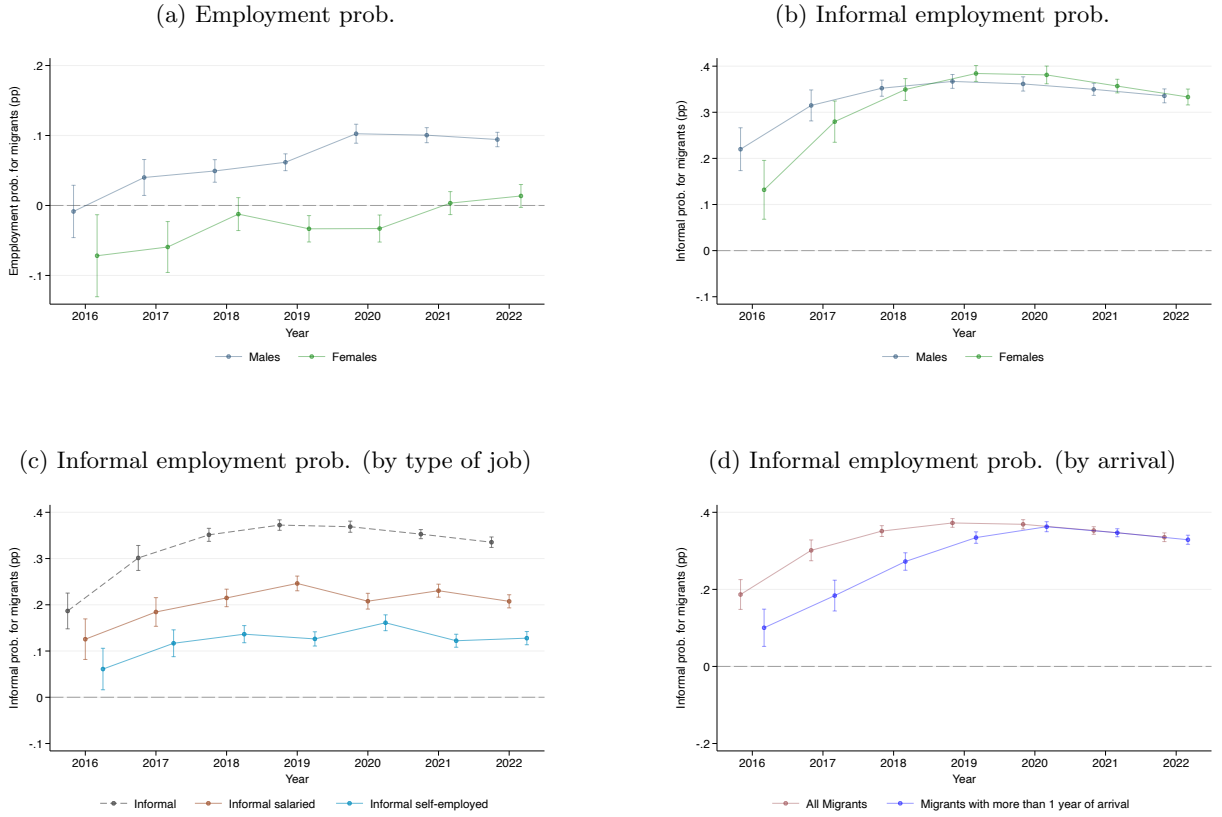
4.1 Employment and Informality Gaps

I begin by examining the employment gaps between migrants and natives over time and by gender. Figure 2a shows that migrant males tend to exhibit a higher likelihood of employment than their native male counterparts, with this disparity growing over time as more migrants arrive in the country. By 2020, the probability reached approximately a ten pp positive difference, in line with evidence that undocumented migrant men have higher employment rates than comparable natives (Borjas 2017). In contrast, migrant females initially lag behind native females in employment during the early years of the immigration shock. However, after 2017, they began to converge, and since 2021, they have been slightly more likely to be employed.

Figure 2b shows the probability gap of informal employment, which steadily rises from 2016 to 2018 with the inflows of migrants and slightly decreases after that. The contrast in this outcome is stark: migrants were around 35 pp more likely to engage in informal work than their native counterparts in 2018, and although the gap is somewhat smaller after 2018, it remains substantial. Because the share of informality is around 50% among natives in the period of analysis, a 35 pp gap implies an informality rate of about 85% for comparable migrants. Figure 2c splits this gap into informal salaried employment, with a gap of 21 pp in 2022, and informal self-employment, with 13 pp. I also identify, based on the survey, whether a migrant has been in Colombia for less than one year, between one and five years, or more than five years. This allows me to calculate the likelihood that migrants work informally based on their duration of stay in Colombia. Figure

2d illustrates that migrants who have been in the country for over a year are less likely to work informally, while newer arrivals are more likely, as shown in the red line. Since 2020, the majority of migrants have settled in the country for more than a year, and the differences in informality have narrowed. Notably, the different regularization programs aimed at promoting formal employment, among other objectives, seem to have only a minor impact on these aggregate trends, at least according to the survey data.

Figure 2: **Employment and informality gaps for migrants**



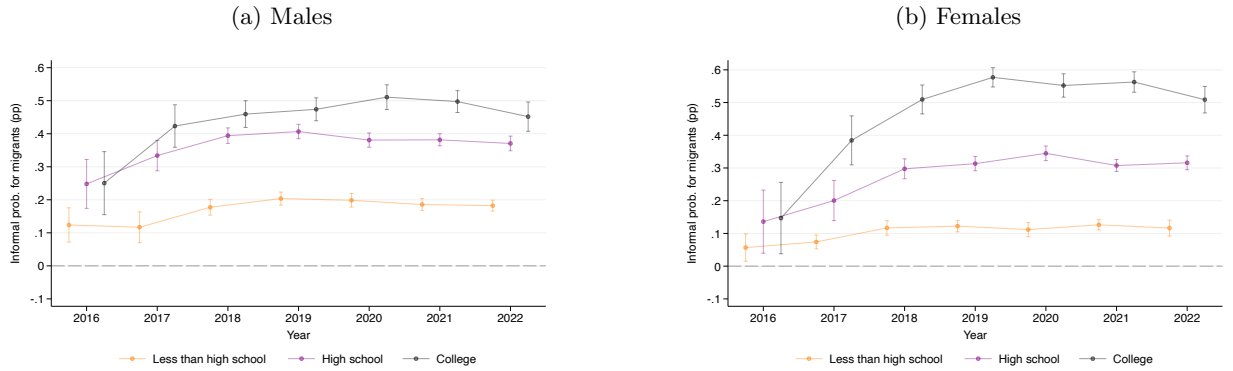
Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). I use as controls three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. In Panel (c) and (d), I pool males and females and add sex fixed effects to the regression, and the gaps in informal salaried employment and informal self-employment add up to the informal employment gap. The regression uses survey weights. Source: GEIH, 2016–2022.

Examining the characteristics that drive the informality gap, I find the most substantial gaps in informal employment among college-educated male and female migrants (see Figures 3a and 3b). Since 2019, college-educated migrant males are around 45 to 51 pp more likely to work informally than comparable natives, and college-educated migrant females are between 51 and 58 pp more

likely, compared to gaps of 10 to 20 pp for migrants with less than high school. The gap for college-educated migrants rose quickly between 2016 and 2019, as migrant inflows intensified, and has declined only slightly since then, even after the regularization programs. This suggests a strong occupational downgrading and a more limited integration for this group, consistent with [Lebow \(2024\)](#). A likely barrier is the lack of recognition of foreign credentials ([Bahar et al. 2022b](#)), which matters most for college graduates, as their skills are harder to signal to formal employers without validated degrees. In contrast, among low- and middle-educated males, there is a slightly clearer decline in informality, consistent with regularization policies that facilitated their transition into formal employment.

Lastly, contrary to the common view that migrants are overrepresented in self-employment, migrants are less likely than comparable natives to be self-employed once workers are divided by informality status. As of 2022, the self-employment gap is -7.8 pp for males and -6.2 pp for females in the formal sector, and -13.6 pp and -7.8 pp in the informal sector (see Appendix Figures [A.2b](#) and [A.2a](#)). Hence, wage employment, rather than self-employment, is the most frequent entry point of migrants into the labor market.

Figure 3: **Informal employment gap for migrants by sex and education**



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). I use as controls three education groups, eight age groups, the interaction between them, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

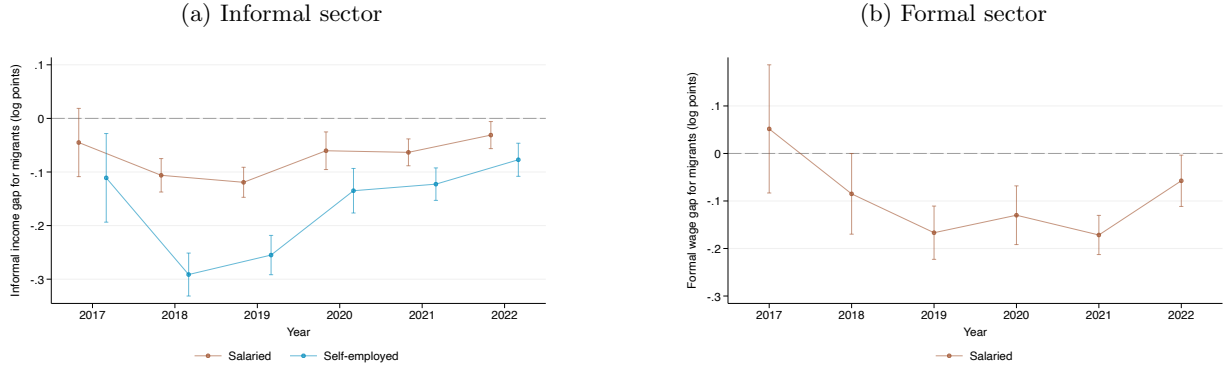
4.2 Earnings Differentials

Labor force survey. I measure earnings gaps between migrants and natives using the GEIH survey, which covers both informal labor income and formal wages. Starting with the informal sector, Figure 4a highlights a negative gap in hourly wages and labor income that has begun to narrow in recent years. In 2022, the gap is -0.03 log points in wages for salaried migrants and -0.08 in labor income for self-employed migrants. The reduction in the informal earnings gap over time is partly driven by a decrease in informal native earnings during the immigration shock (Delgado-Prieto 2024). I then analyze the hourly formal wage gap, noting that the sample of formally employed migrants is substantially smaller and likely positively selected. Figure 4b shows that during the initial stages of the immigration inflows, the estimates were quite noisy, while after 2018, the estimates show a more negative differential that narrows around 2022.¹⁶ In Appendix Table A.2 I further show that controlling for the workers' industry and occupation does not reduce the informal income gaps. Further controlling for firm size increases the informal gaps (Column 4), from -0.036 to -0.049 for salaried and from -0.088 to -0.101 for self-employed migrants, suggesting that informal migrants are in larger informal workplaces compared to natives.¹⁷

¹⁶Working hours contribute to the conditional earnings gap between migrants and natives. Appendix Figure A.3a shows that in the informal sector, salaried migrants worked 6.4% more weekly hours than natives in 2022, and self-employed migrants 4.4% more. In the formal sector, Appendix Figure A.3b shows no significant difference for salaried migrants (-1.1%).

¹⁷Appendix B shows integration patterns by industry and occupation over time. Importantly, migrants are over-represented in the commerce, hotels, and restaurant industries, where informality is higher. By occupation, they are more likely to work as street vendors or delivery personnel.

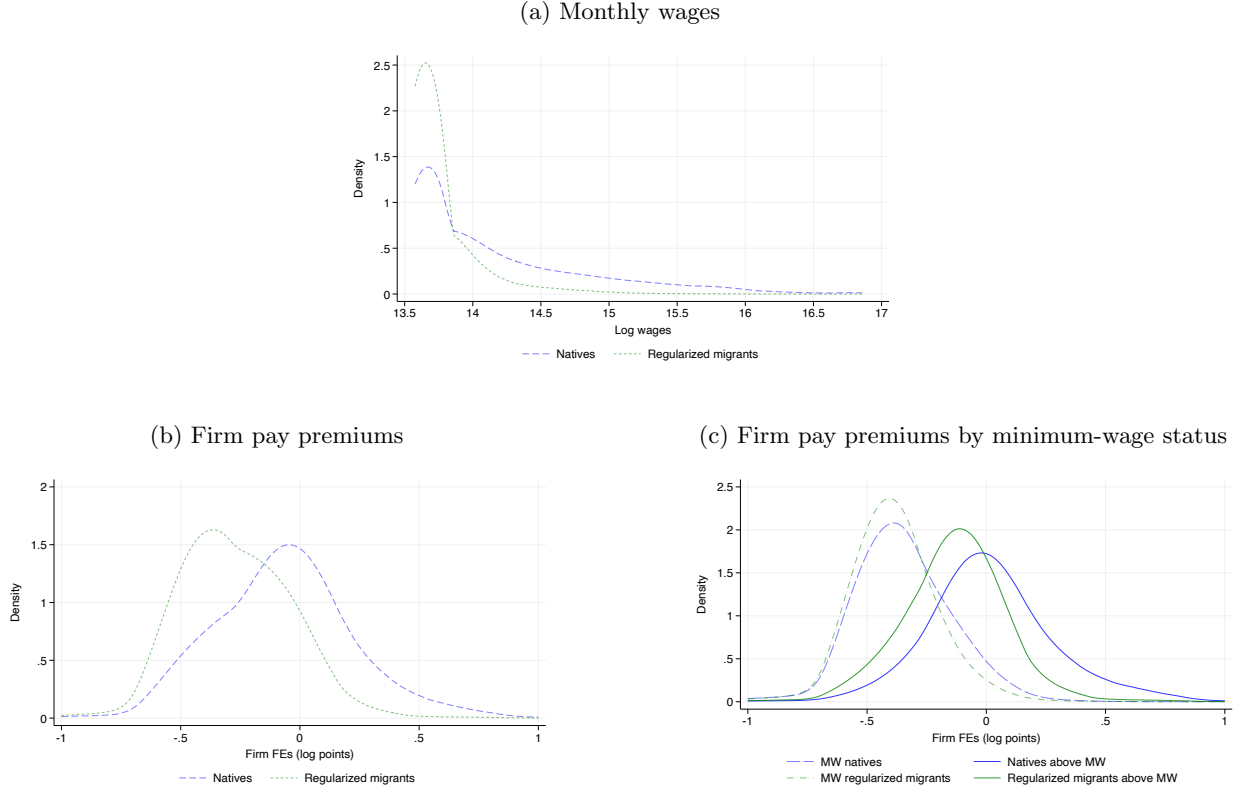
Figure 4: **Hourly wage and labor income gap for migrants by type of job and sector**



Note: I restrict the sample to full-time workers between 20 and 60 years old in urban areas. Hourly measures divide monthly wages or labor income by usual weekly hours. The plotted coefficients come from equation (1). I use as controls sex, three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2017–2022.

Social security records. Examining worker and firm variables with a matched employee-employer dataset that identifies all regularized migrants and natives is novel in developing countries. This allows me to uncover important mechanisms that more precisely explain the drivers of the formal wage gaps. To start, Figure 5a shows the distribution of wages, revealing that migrants are concentrated at substantially lower wage levels than natives. Figure 5b then displays the distribution of workers across firm fixed effects and reveals strong sorting patterns: regularized migrants are disproportionately concentrated in the lower end of the firm pay distribution, while natives are more evenly spread but skewed to the right. Figure 5c shows that this sorting is not only driven by the minimum wage: minimum-wage natives and migrants work in similar low-paying firms, while above the minimum wage, migrants remain in much lower-paying firms than natives. Together, these patterns point to systematic differences in both wages and the types of firms in which each group is employed.

Figure 5: **Wage and firm pay premium distributions by origin**



Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. Firm fixed effects are estimated from the AKM equation from 2015 to 2019 and censored at -1 and 1. In Panel (c), minimum-wage workers earn exactly the monthly minimum wage. Source: PILA, 2018–2022 for July.

Over time, between January 2018 and July 2022, regularized migrants have earned substantially lower wages than natives (Appendix Figure A.4a), primarily because around 60% of them hold minimum-wage jobs, against 30% of natives, a difference that barely changed in this period (Appendix Figure A.4b). I quantify how much of the wage gap is explained by the minimum wage: the higher probability of migrants holding minimum-wage jobs accounts for about 60% of this gap, with the remaining being differences in wages above the minimum wage.¹⁸

Turning to which firms they work for, regularized migrants work in much smaller firms. The typical regularized migrant works in a firm with around 50 workers, against around 200 for natives

¹⁸Mean log wages of group $g \in \{N, M\}$ are $E[\ln w_{it}|g] = p_g E[\ln w_{it}|g, \overline{MW}] + (1 - p_g) E[\ln w_{it}|g, MW^+]$, where p_g is the share of minimum-wage workers, $\overline{MW}$ denotes workers at the minimum wage, and MW^+ workers above it. The gap can be expressed as $E[\ln w_{it}|N] - E[\ln w_{it}|M] = (p_M - p_N)(E[\ln w_{it}|N, MW^+] - E[\ln w_{it}|N, \overline{MW}]) + (1 - p_M)(E[\ln w_{it}|N, \overline{MW}] - E[\ln w_{it}|M, MW^+])$. The first term is the higher probability of minimum-wage jobs, and the second is the gap above the minimum wage.

(see Appendix Figure A.5b), in line with evidence from other countries that migrants concentrate in smaller firms upon arrival in Germany (Amior and Stuhler 2024) and Israel (Arellano-Bover and San 2026), and this sorting barely changes over time (see Appendix Figure A.5a). Hence, migrants earn less partly because of the firms where they work.

Wage decomposition. To quantify how much of the wage gap is due to sorting across firms, I perform a Blinder-Oaxaca decomposition outlined in Card et al. (2016) and Dostie et al. (2023) to decompose how much of the cross-sectional difference in mean log real wages between natives and regularized migrants is due to the sorting component of workers *between* firms. Table 1 shows the baseline wage inequality decomposition by workers, firms, and the covariance between them. Then, the wage gap decomposition between groups, omitting the time-varying controls, takes the following form:

$$E[\ln w_{it}|N] - E[\ln w_{it}|M] = \underbrace{E[\alpha_i|N] - E[\alpha_i|M]}_{\text{Skill differences}} + \underbrace{E[\hat{\psi}_{J(i,t)}^N|N] - E[\hat{\psi}_{J(i,t)}^N|M]}_{\text{Differential sorting}} + \underbrace{E[\hat{\psi}_{J(i,t)}^N - \hat{\psi}_{J(i,t)}^M|M]}_{\text{Differential pay-setting}}. \quad (3)$$

I mainly focus on the second term, which captures the sorting component in explaining wage differentials between natives and regularized migrants. The ratio of the difference in mean firm effects to the difference in mean log wages indicates that sorting accounts for approximately 49% of the overall formal wage gap between these groups (see Table 2 for alternative estimates). For the third term (within-firm pay differentials), it requires estimating separate AKM models by migrant status. However, I am limited by a small number of firms with a dual-connected sample of migrant and native movers. In the next subsection, I approximate this term by comparing job movers and find that migrants earn about 84% of natives' pay premiums. Scaling the remaining 16% by the average firm effects for migrants in Column 1 would explain an additional 11% of the wage gap (0.04 of the 0.41 log points), and the remaining 40% would reflect differences in constant and time-varying worker characteristics.

Table 1: **Variance decomposition of formal wages**

	(1)	(2)
	2015–2019	2018–2022
$Var(lnw_{it})$	0.411	0.432
$Var(\alpha_i)$	0.232 (56.5%)	0.233 (53.8%)
$Var(\psi_{j(i)})$	0.081 (19.7%)	0.090 (20.9%)
$2Cov(\alpha_i, \psi_{j(i)})$	0.069 (16.9%)	0.080 (18.5%)
$Var(v_{it})$	0.020 (4.8%)	0.020 (4.7%)
$Corr(\alpha_i, \psi_{j(i)})$	0.253	0.276
Worker-year observations	27,618,254	27,377,010
Workers	7,908,438	7,997,952
Firms	470,418	488,111

Note: This table reports the variance decomposition of wages in Colombia’s formal sector using the largest connected set of workers and firms, following [Card et al. \(2016\)](#) and including year FEs as controls. The full decomposition is: $Var(lnw_{it}) = Var(\alpha_i) + Var(\psi_{j(i)}) + Var(X'_{it}\gamma) + Var(v_{it}) + 2Cov(\alpha_i, \psi_{j(i)}) + 2Cov(\alpha_i, X'_{it}\gamma) + 2Cov(\psi_{j(i)}, X'_{it}\gamma)$. The table focuses on the main components, with shares of $Var(lnw_{it})$ in parentheses. Column (1) uses August 2015–2019 and Column (2) uses July 2018–2022. Both samples include native full-time employees aged 20 to 60. Source: PILA, 2015–2022.

Discussion of sorting component. I interpret the sorting share as an upper bound for various reasons. First, the administrative data do not include education, and some of the education returns may load on the firm effects. Second, if the differential within-firm pay component is not zero, using migrant instead of native firm effects would give a lower sorting share, of about 41% when scaling the sorting component by the 84% of firm premiums that migrants capture (0.84×0.20). Third, alternative firm fixed effects that exclude minimum wage workers provide a lower sorting share. Given that the mass of minimum-wage workers might compress firm effects and violate the additive AKM structure, I re-estimate firm effects excluding minimum-wage workers. Table 2 shows that sorting then accounts for 37% of the gap (Column 2), and 30% when restricting the decomposition to workers above the minimum wage (Column 3). Lastly, when I estimate firm effects for 2018–2022, which covers the period of analysis and firms created after 2019, sorting accounts for 48% of the wage gap (Column 4), similarly to the baseline in Column 1.¹⁹

¹⁹With the baseline firm effects, these are missing for 7% of natives and 20% of regularized migrants. With the 2018–2022 firm effects, the missing share is 3% for natives and between 4% and 5% for all migrant cohorts.

Table 2: **Decomposition of the formal wage gap with alternative firm fixed effects**

	(1)	(2)	(3)	(4)
	2015–2019	2015–2019 excl. MW	2015–2019 excl. MW, above MW	2018–2022
$E[\ln w_{it} N]$	14.17 (0.65)	14.23 (0.66)	14.36 (0.65)	14.16 (0.65)
$E[\ln w_{it} M]$	13.76 (0.27)	13.81 (0.30)	13.95 (0.33)	13.75 (0.26)
Wage gap	0.41	0.42	0.42	0.40
$E[\hat{\psi}_{J(i,t)}^N N]$	-0.08 (0.29)	-0.06 (0.27)	-0.01 (0.24)	-0.02 (0.30)
$E[\hat{\psi}_{J(i,t)}^N M]$	-0.28 (0.23)	-0.22 (0.28)	-0.14 (0.22)	-0.22 (0.21)
Sorting component	0.20	0.16	0.13	0.19
Sorting share	48.7%	37.4%	30.2%	47.9%
Natives	699,743	649,367	578,565	713,973
Regularized migrants	173,156	131,560	84,978	209,549

Note: This table decomposes the formal wage gap between natives and regularized migrants into the sorting component. Standard deviations in parentheses. The last two rows report the number of workers. Firm fixed effects come from AKM models estimated on native workers in 2015–2019 (Columns 1 to 3) or 2018–2022 (Column 4). Columns 2 and 3 exclude workers earning exactly the minimum wage from the AKM estimation, and Column 3 also restricts the decomposition to workers above the minimum wage. I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment and non-missing firm fixed effects. The sorting share is the gap in firm fixed effects divided by the gap in log wages. Source: PILA, 2018–2022.

International comparison. Compared to recent findings in Canada (Dostie et al. 2023) and Israel (Arellano-Bover and San 2026), which document that firm effects explain around 20% of the wage gap, these results are substantially larger.²⁰ In contrast, Guo et al. (2025) documents that sorting across firms plays only a limited role in explaining wage differentials between internal migrants and natives in China. Firms may play a stronger role in Colombia because of its labor market structure, so when decomposing the formal wage variance of all workers into the variance explained by firm fixed effects, Table 1 shows that it explains from 19.7% to 20.9%, which is on the upper end of estimates surveyed in Card et al. (2018) for developed countries. This suggests that the labor market context explains some of the differences in the sorting component across countries. At the same time, the type of immigration is also relevant. In this context, most regularized migrants are refugees lacking formal documentation of their educational backgrounds or work experience, so they face more firm segregation compared to other countries. This can happen because they cannot credibly signal their skills and lack the country-specific experience required to access high-

²⁰When compared to the gender wage gap, Card et al. (2016) finds that firm effects, both the pay-setting and sorting components, explain around 20% of the overall gap in Portugal. Regarding the racial wage gap, Gerard et al. (2021) finds that the sorting component explains around 20% of the gap in Brazil for both genders.

paying firms.²¹ Nevertheless, [Cole et al. \(2024\)](#) examines refugee integration in the Netherlands and finds that firm sorting accounts for 14% of the refugee-native overall wage gap. This suggests that factors, besides the lack of formal documentation, such as the relatively high minimum wage and large informal sector in this context, may also play a role.

Wage gaps in administrative and survey data. To compare the two data sources more directly, I focus on the monthly wage gap of formal salaried workers for 2021.²² Without controls, [Table 3](#) shows the gap is 0.42 log points in the administrative data and 0.20 in the survey, and after controlling for demographics, industry, and firms, it is 0.13 and 0.06. Notably, the survey gaps are about half of those in the administrative data, but the two sources are not entirely comparable. Migrants in the survey are more often in firms with more than 100 workers (42% versus 36%), while natives have a similar firm size distribution in both sources (see [Appendix Figure A.14](#)). This may reflect an overrepresentation of migrants in large firms in the survey, but also that the survey includes Venezuelans with other types of documentation, whom I cannot identify as Venezuelans in the administrative data. The wage gap that remains unexplained in both sources may reflect unobserved worker characteristics or wage discrimination within firms ([Fabregas and Zanoni 2025](#)).

²¹A theoretical explanation behind workplace segregation is that migrants typically have lower reservation wages than natives, leading them to accept positions in the low-pay sector that natives would reject ([Amior and Stuhler 2024](#)).

²²Because the dependent variable is in logs, coefficients can be interpreted as percentage differences using $100 \times (e^\beta - 1)$. Hours worked do not differ significantly between formal salaried migrants and natives (see [Appendix Figure A.3b](#)).

Table 3: **Formal wage gap in administrative and survey data, 2021**

	(1)	(2)	(3)
<i>Panel A: Administrative</i>			
$\mathbb{1}\{M_i = 1\}$	-0.420*** (0.0150)	-0.334*** (0.0132)	-0.127*** (0.0073)
N	4,878,265	4,878,265	4,878,265
R^2	0.040	0.154	0.430
<i>Panel B: Survey</i>			
$\mathbb{1}\{M_i = 1\}$	-0.196*** (0.0212)	-0.084*** (0.0189)	-0.056*** (0.0183)
N	80,392	80,392	80,392
R^2	0.002	0.205	0.231
Controls			
Age, sex, department, industry, and month	No	Yes	Yes
Firm fixed effects or firm size bins	No	No	Yes

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports the monthly wage gap of formal salaried workers relative to natives, restricting to full-time employees aged 20 to 60. Panel A uses regularized migrants with PEP or PPT with 30 days of employment, and the firm fixed effects come from an AKM model estimated between 2015 and 2019 in the largest connected set, with standard errors two-way clustered by worker and firm. Panel B uses Venezuelan-born workers in urban areas, survey weights, and robust standard errors, and firm size uses the nine GEIH groups. All controls enter as fixed effects, with age groups interacted with sex. Source: PILA and GEIH, 2021.

4.3 Labor Market Assimilation of Regularized Migrants by Cohorts

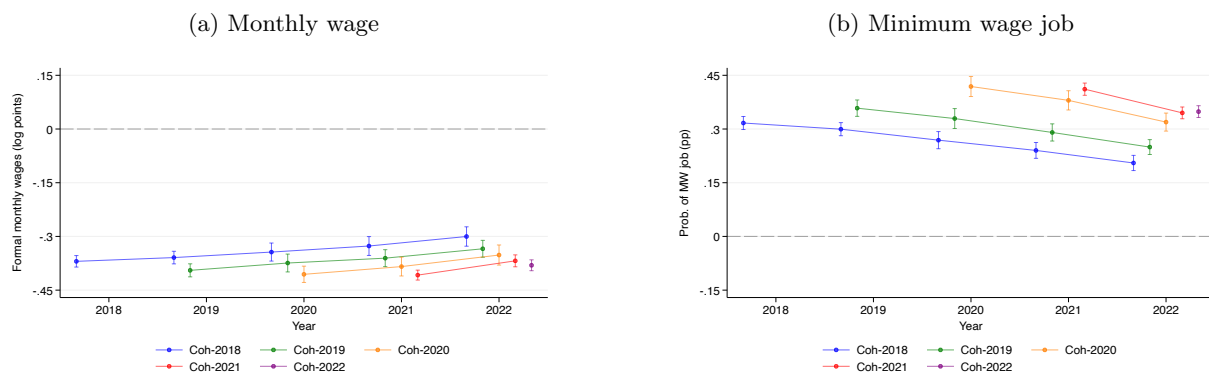
To study assimilation, I define a sample of individuals from baseline, accounting for potential compositional changes arising from continuous migrant inflows. For this analysis, I leverage the panel structure of the administrative data to categorize migrant workers by the year they are first observed in the formal sector and to track the evolution of their outcomes by cohort.²³ This mitigates compositional shifts arising from new, regularized migrant workers entering the formal sector, but does not account for potential selection bias in workers' outflows within each cohort over time (Appendix Table A.4 shows slight positive selection, and Appendix Table A.5 reports attrition by cohort). In 2022, the analysis has a crucial data limitation. Workers previously holding the PEP document are reclassified with a new worker identifier when they change to the PPT document. Hence, the size of the cohorts decreases mechanically that year (see Appendix Figure A.7), which limits the feasibility of future, longer-term analyses.

²³Appendix Figures A.8a and A.8b show that natives consistently earn higher wages and sort into higher-paying firms than regularized migrants across cohorts, with only modest improvements as migrants accumulate formal sector experience. A similar pattern holds for firm size, where natives are employed in larger firms, and earlier migrant cohorts are sorted into slightly larger firms than later ones.

Since most of the analysis period coincides with the COVID-19 pandemic, cohort differences over time may partly reflect the impact of this shock rather than true assimilation patterns. To mitigate this, I conduct an analysis that controls for time, age, and gender effects (see Equation 2). This adjustment helps isolate assimilation dynamics by accounting for economy-wide shocks and differences in the age and gender composition of migrants and natives.

Wages and firm characteristics. In Figure 6a, I first show that as regularized migrants accumulate more time in the formal sector, the formal wage gap with natives diminishes. This reduction is primarily driven by the decrease in the probability of holding a minimum wage job, as shown in Figure 6b. Nevertheless, the disparities persist relative to natives. Five years after the first entry into the formal sector, the wage gap for regularized migrant males and females remains substantial at -0.3 in log points. I also analyze assimilation by age groups and gender for cohort five, five years after the first entry into the formal sector, the one with more time for convergence. Appendix Figure A.9 shows that younger regularized migrants are much closer to wage convergence than their older counterparts, partly explained by the lower difference in firm pay premiums, although the gap in firm size is flat over the life cycle. These findings suggest that the age at which migrants enter the formal sector serves as a proxy for the strength of assimilation, with labor market entrants experiencing higher convergence.

Figure 6: **Relative gap for job characteristics by cohorts**



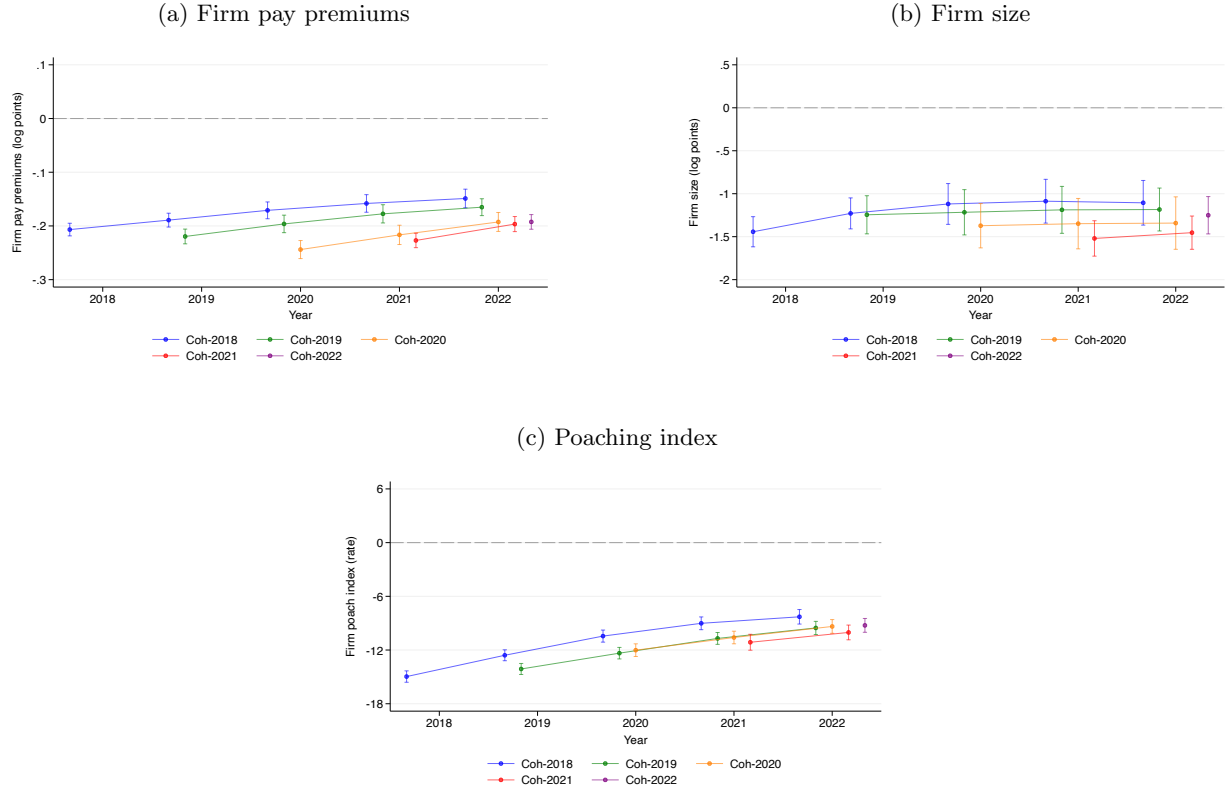
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. I use as control eight age groups interacted with gender dummies. The plotted coefficients come from equation (2). I use a 95% confidence interval with standard errors two-way clustered by worker and firm. Source: PILA, 2018–2022.

Most of the wage differences between regularized migrants and natives are driven by the type of firm they work for. Hence, I turn to evaluate the assimilation of regularized migrants in terms of both their firm pay premiums and the firms' attractiveness. First, focusing on firm pay premiums, there is a persistent lack of convergence: regularized migrants consistently sort into lower-paying firms relative to natives across all cohorts, with differences diminishing over time (see Figure 7a). For the 2018 cohort, the coefficient ranges from -0.21 log points in the first period to -0.15 in the last period, representing approximately half of the 2022 formal wage gap. The initial firm premiums gap for the 2018 and 2019 cohorts is approximately -0.2 log points, similar to estimates for male migrants in Israel but larger than those for female migrants (Arellano-Bover and San 2026). In that context, convergence took nearly three decades, suggesting that, if similar dynamics apply, convergence for regularized migrants may take a substantial amount of time.

I then analyze firm-size assimilation across all cohorts, observing a substantial and consistent gap of at least 1 log point (see Figure 7b). This difference corresponds to firms that are approximately 63% smaller on average.²⁴ Importantly, this measure has no improvement over time, as migrants continue to lag in firm-size assimilation. Recent evidence from Spain suggests that an initial job in larger firms, rather than in small ones, can have positive, long-lasting effects on workers, primarily due to better skill development (Arellano-Bover 2024). Lastly, I leverage the poaching index from Bagger and Lentz (2019) to show that across all cohorts, regularized migrants consistently sort into less desirable firms compared to native workers. However, this gap narrows gradually, suggesting a slow but steady convergence in terms of firm overall quality (see Figure 7c).

²⁴Calculated as $(e^{-1} - 1) \times 100 \approx -63\%$.

Figure 7: **Relative gap for firm characteristics by cohorts**



Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. I use as control eight age groups interacted with gender dummies. For (a), I restrict to workers with non-missing firm fixed effects in the estimation period of 2015 to 2019. For (b), I restrict to workers in firms observed in August 2019. For (c), I restrict to workers from firms observed between 2015 and 2018 in August. The plotted coefficients come from equation (2). I use a 95% confidence interval with standard errors two-way clustered by worker and firm. Source: PILA, 2018–2022.

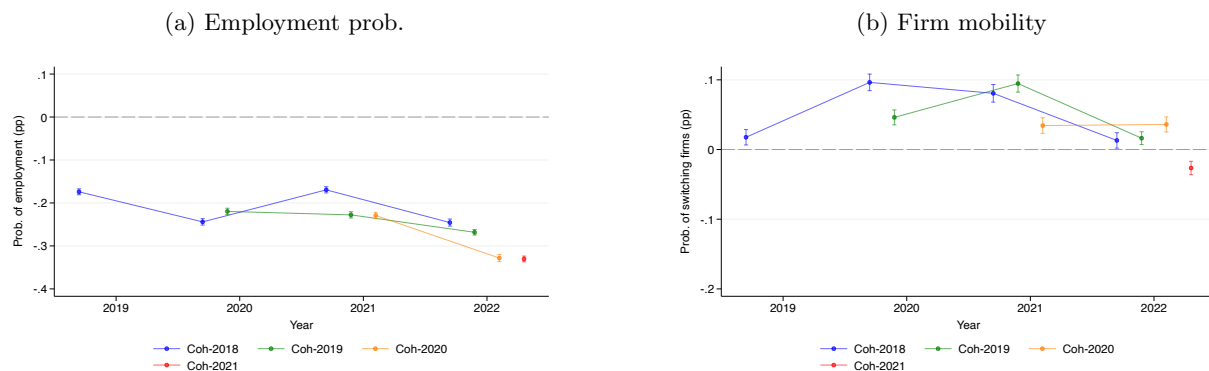
Firm-specific attachment. One way to rationalize the convergence or lack thereof in these outcomes is by measuring job-to-job mobility, which has been documented as key for wage growth (Postel-Vinay and Robin 2002), particularly during the early stages of the labor market entrant’s career (Topel and Ward 1992). For this reason, I use the temporal dimension of the administrative dataset to quantify year-to-year variations in the likelihood of employment, a proxy for attachment to formal jobs, and changes in employers. Across cohorts, regularized migrants exhibit a substantially lower likelihood of sustaining employment in the next year relative to natives, with an estimate that ranges from -17 pp to -25 pp for the cohort of entry in 2018 to -33 pp for the cohort of 2021 (see Figure 8a). Because regularized migrants who remain in the formal sector over time may not be randomly selected, this could suggest that the observed results are partially influenced

by positive selection.

To explore this, Appendix Table A.4 compares the baseline characteristics of regularized migrant workers who drop out versus those who stay employed across cohorts. The analysis reveals that workers who remain employed tend to be slightly younger, more likely to be male, and earn slightly higher wages. However, these differences are modest: baseline wage differences range from 0.02 to 0.04 in log points, and baseline age differences are less than half a year. Consequently, the assimilation coefficients reflect a small degree of positive selection and likely represent an upper bound, indicating that the pace of convergence might be even slower.

Regularized migrants who remain employed in the following year tend to move more across firms than natives, especially in their second year in the formal sector. For instance, the 2018 cohort has a 2020 coefficient around 10 pp higher (see Figure 8b). It can also happen that migrants switch firms more often than natives because they work in more high-turnover firms. Hence, I compare migrants and natives within the same firm and cohort of entry. Appendix Figure A.13 shows that PEP holders are still 5 to 10 pp less likely than natives to remain employed in the next quarter, but they switch firms less. Thus, their higher firm mobility partly reflects that they concentrate in high-turnover firms, but their matches still dissolve faster within firms. In contrast, PPT holders (with a ten-year permit) show smaller gaps in 2022, suggesting longer job matches, although the change of identifier from PEP to PPT during this period is a limitation.

Figure 8: **Relative gap for job characteristics by cohorts**



Note: I restrict the sample to employees between 20 and 60 years old. I use as control eight age groups interacted with gender dummies. I capture the yearly worker's main employer from their yearly highest earning spell. The plotted coefficients come from equation (2). I use a 95% confidence interval with standard errors two-way clustered by worker and firm. Source: PILA, 2018–2022.

Job movers versus stayers. I examine the role of firm mobility more precisely by comparing wage growth among regularized migrants and natives who switch firms with that of those who do not. Specifically, I estimate the following specification:

$$Y_{ikt} = \alpha_{kt} + \beta_k \text{Mov}_{ik} + \theta_k \text{Mov}_{ik} \cdot \mathbb{1}\{t = 2021\} + \gamma_{as} + v_{ikt}, \quad (4)$$

where the interaction term gives the coefficient of interest θ_k . It captures the relative changes in outcomes for workers i who switch firms versus those who do not switch over time. The coefficients vary by origin k , and subtracting them yields the differential impact of moving across firms by origin. Although job mobility may be correlated with other unobservable factors, Column 4 of Table 4 provides suggestive evidence that, in the pre-move period, wage outcomes were trending similarly across origin groups.

Table 4 Column 1 shows that regularized migrant movers experience an average wage increase of 3.6% relative to non-movers, compared to 2.3% for native movers in Column 2. The most significant differences arise at the firm level: migrant movers transition to better-paying firms. On average, they move to firms that pay about 4.3% more, while natives move to firms that pay around 1.2% more. The AKM model predicts that workers transitioning to these firms should experience wage gains approximately that amount, yet migrants are only capturing part of that gain. Migrant movers receive about 84% of the firm premium (3.6/4.3), which suggests differential pay-setting within firms.²⁵ This is a complementary way to detect differential pay-setting within firms beyond the standard dual estimation of AKM models, particularly when data for migrants is limited. Changes in firm size are not significant for either group.

These findings suggest that regularized migrants rely on small, low-paying firms to signal their productivity and enter the formal labor market, while subsequent job-to-job mobility across firms improves longer-term outcomes and helps narrow some disparities with natives. High-ability migrants tend to move over time to better-paying firms, reflecting an effort to climb the job ladder, whereas lower-ability migrants are more likely to exit the formal sector altogether (as shown in Appendix Table A.4). This sorting process implies that lower-paying firms bear the costs of screening,

²⁵Scaling the remaining 16% by the mean firm effect of migrants across the columns of Table 2 gives a within-firm difference of 0.02 to 0.04 log points, which approximates the third term of the wage gap decomposition in Eq. (3). This is in line with the 3% lower salaries proposed to equally qualified Venezuelans in Ecuador using experimental variation (Fabregas and Zanoni 2025).

benefiting the broader market by helping identify productive migrant workers without necessarily retaining them.

Table 4: **Outcome growth of movers by origin**

	(1)	(2)	(3)	(4)
	Regularized migrants	Natives	Diff (1)-(2)	Pre-move diff
$\ln(w_{it})$	0.036*** (0.0061)	0.023*** (0.0061)	0.013 (0.0090)	0.002 (0.0078)
$\hat{\psi}_{J(i,t)}^N$	0.043*** (0.0058)	0.012*** (0.0036)	0.031*** (0.0065)	-0.005 (0.0062)
$\ln(firmsize_{it})$	-0.020 (0.0571)	0.072 (0.0490)	-0.094 (0.0752)	0.061 (0.0767)
N	70,427	599,771	670,198	639,596

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: I restrict the sample to employees between 20 and 60 years old who did not move to another firm in the last two years. I use as controls eight age groups interacted with gender dummies. I identify each worker's main employer by their highest-earning spell each year. Columns (1) and (2) are estimated separately by subgroup. Column (3) presents the coefficient on the triple interaction of migrant, mover, and post using the pooled sample. Column (4) shows the difference in outcome growth between regularized migrants and natives in the pre-move period. Standard errors are two-way clustered by worker and firm. Source: PILA, 2018–2021.

5 Why Is Formalization Not Higher among Regularized Migrants?

Why do regularized migrants not transition more into the formal sector despite having near-universal access to work permits and sharing similar education, language, and culture? I focus on potential explanations from both the supply and demand side of the labor market.

Labor supply. From the worker's perspective, although the formal sector offers substantially higher wages and improved working conditions, such as minimum wages and paid vacations, it also requires higher tax payments. Therefore, I examine how large the formal wage premium is to quantify workers' trade-offs when opting for informal employment. The Colombian labor market has experienced major transformations in recent years, including the sudden absorption of many migrants in the informal sector. These changes have led to negative adjustments in native informal wages and native formal employment over time (Delgado-Prieto 2024). Considering all these adjustments, I first analyze the cross-sectional evolution of the formal wage premium by origin, focusing on workers in urban areas while controlling for time, age, gender, education, and location effects. The formal wage premiums estimated in Appendix Figure A.10a show dynamic

shifts over time: for native workers, the premium rises, whereas for migrant workers, it declines (similarly to when I control for workers' occupation in Appendix Figure A.10b). The estimated premiums are substantial and even exceed those for natives, ranging from 0.6 log points in 2017 to 0.3 in 2021, compared to around 0.4 for natives over the same period.²⁶ These significant premiums do not provide suggestive evidence that migrants are not transitioning to the formal sector after the regularization process due to insufficient wage gains, although migrants may be unaware of those differentials (Bahar et al. 2021). Other pay and non-pay attributes of informal jobs, like lower taxes or schedule flexibility, might compensate for the lower wages, such that migrants perceive a higher job value in the informal versus the formal sector, yet this remains an open question in this context.

Labor demand. The other explanation lies on the labor demand side. Formal employers may be hesitant to hire migrants for several reasons. First, migrants must compete with informal native workers, who already possess country-specific experience and standard documentation. Second, employers might require formal certification of prior education or work experience from migrants (DANE-EPM 2024), which many lack. On top of that, Colombian formal firms face a relatively high minimum wage (Delgado-Prieto 2024), so if migrants cannot credibly signal their skills, they may not seem productive enough to justify paying the mandated minimum wage. Third, employers may not be aware of the regularization program, which grants migrants legal documentation to work formally (Bahar et al. 2021). Fourth, formal employers who can already hire migrants informally may see little incentive to formalize them, as the enforcement costs of informality remain unchanged, unlike in Spain's large-scale regularization, where increased enforcement accompanied the regularization policy (Elias et al. 2025). Fifth, other factors may make hiring migrants less profitable in monetary terms, such as less stable employment matches, or less preferable in non-monetary terms due to migrant discrimination, which influences hiring preferences (Fabregas and Zanoni 2025). Although it is challenging to disentangle these sources, as no such firm-level information is readily available, I use the linked employee-employer data to provide suggestive evidence on a factor that may influence firms' hiring decisions.

The results in the last section reveal lower attachment to formal employment among migrants,

²⁶Note that this is an upper bound, because the labor income information is reported in gross terms and informal workers do not pay contributory health or pension, so formal premiums should be approximately 8% lower.

along with greater firm mobility for those who remain employed. These patterns are consistent with employers being less inclined to hire migrants if they anticipate higher job turnover, reducing the expected returns to on-the-job training as firms bear some of the cost (Becker 1962). I explore this hypothesis descriptively by exploiting the fact that, in some industries, training workers is more costly and time-intensive. Thus, I measure job-to-job mobility rates for natives across industries as a proxy for the relevance of firm-specific human capital and plot them against the distribution of regularized migrants across those industries. Appendix Figures A.11a and A.11b show a strong positive association: industries with higher job turnover, where on-the-job training may be less costly or time-consuming, employ a higher share of regularized migrants, like construction, other services, and commerce.²⁷ Hence, the observed correlation is consistent with employers in some industries valuing workers' attachment to the firm more than others. As migrants' job turnover is generally higher than that of natives, they are less likely to be employed in specific industries that typically pay higher wages.

Another complementary piece of evidence about match duration is the following. I categorize all firms that hired regularized migrants between 2018 and 2019 by the quarter in which they first hired a regularized migrant, and track their migrant hiring behavior over subsequent quarters up to the onset of the COVID-19 pandemic. Notably, Appendix Figure A.12 shows that the share of firms employing regularized migrants declines after the initial hire. After four quarters, only about 60% of the firms that hired regularized migrants continue to hire them. This suggests that when firms acquire private information about regularized migrants, it seems to affect their future hiring choices.

Theoretical predictions. Beyond the descriptive evidence, theory also suggests that uncertain match quality can explain both lower formal hiring and sorting into low-paying firms. I illustrate this with a monopsonistic firm model as in Kline (2025) (see Appendix C for mathematical details). A firm posts a single wage and cannot observe whether applicants are natives or migrants. Migrants accept lower wages, but the firm expects a lower match quality from them, for instance, because their education credentials or work experience are harder to verify. The model predicts that more

²⁷The relationship might be partly mechanical, as regularized migrants often sort into low-paying or high-informality industries, where job mobility rates are higher. Still, the relationship holds even when controlling for average industry pay premiums or the industry's share of informality.

productive firms will post higher wages to improve the composition of their applicant pool and thus hire fewer migrants, which suggests why they end up in low-paying firms, and that the migrant share would rise in high-productivity firms if their expected match quality approaches that of natives. The model abstracts from relevant margins, such as screening through interviews or richer outside options, but it points towards a clear mechanism. If expected match quality plays a role for employers, policies that help employers verify migrants' skills, such as a validation policy for Venezuelan degrees from the Ministry of Education, specific skill certifications from SENA, or the PEPFF permit, could increase migrant formalization and their access to more productive firms. These policies may be particularly relevant in Colombia, as the high minimum wage raises the cost of hiring workers with uncertain productivity.

6 Conclusion

This paper uses a combination of administrative and survey data to analyze the labor market integration of Venezuelan migrants and regularized migrants in a developing country. I document that Venezuelan immigrants disproportionately work in the informal sector, even with access to work permits. In the formal sector, regularized migrants earn substantially less than natives, and between 30% and 50% of this gap is due to their sorting into lower-paying firms, a gap that narrows only slowly with formal experience. Migrant movers reach better-paying firms but capture only part of their premiums, and migrants have lower job match duration than natives, also within the same firm. I discuss how this lower firm attachment, together with labor supply factors, may limit migrants' formalization. Altogether, these findings suggest broader policies beyond regularization to enhance migrants' assimilation into the host country.

References

- Abowd, John M., Francis Kramarz, and David N. Margolis. 1999. "High Wage Workers and High Wage Firms." *Econometrica* 67 (2): 251–333.
- Akgündüz, Yusuf Emre, Yusuf Kenan Bağır, Seyit Mümin Cilasun, and Murat Güray Kırdar. 2023. "Consequences of a Massive Refugee Influx on Firm Performance and Market Structure." *Journal of Development Economics* 162: 103081.
- Aksu, Ege, Refik Erzan, and Murat Güray Kırdar. 2022. "The Impact of Mass Migration of Syrians on the Turkish Labor Market." *Labour Economics* 76: 102183.
- Albert, Christoph, Albrecht Glitz, and Joan Llull. 2026. "Labor Market Competition and the Assimilation of Immigrants." *American Economic Review* 116 (5): 1682–1722.
- Altındağ, Onur, Ozan Bakış, and Sandra V. Rozo. 2020. "Blessing or Burden? Impacts of Refugees on Businesses and the Informal Economy." *Journal of Development Economics* 146: 102490.
- Amior, Michael and Jan Stuhler. 2024. "Immigration, Monopsony and the Distribution of Firm Pay." CEP Discussion Paper 1971, Centre for Economic Performance, LSE.
- Aracı, Doğu Tan, Murat Demirci, and Murat Güray Kırdar. 2022. "Development Level of Hosting Areas and the Impact of Refugees on Natives' Labor Market Outcomes in Turkey." *European Economic Review* 145: 104132.
- Arango, Luis Eduardo, Oscar Iván Ávila-Montealegre, Leonardo Bonilla-Mejía, et al. 2022. "Macroeconomic Effects of the Minimum Wage in Colombia." *Ensayos sobre Política Económica* 103, Banco de la República.
- Arellano-Bover, Jaime. 2024. "Career Consequences of Firm Heterogeneity for Young Workers: First Job and Firm Size." *Journal of Labor Economics* 42 (2): 549–589.
- Arellano-Bover, Jaime and Shmuel San. 2026. "The Role of Firms and Job Mobility in the Assimilation of Immigrants: Former Soviet Union Jews in Israel 1990-2019." *Journal of the European Economic Association*. Forthcoming.
- Bagger, Jesper and Rasmus Lentz. 2019. "An Empirical Model of Wage Dispersion with Sorting." *Review of Economic Studies* 86 (1): 153–190.
- Bahar, Dany, Bo Cowgill, and Jorge Guzman. 2022a. "Legalizing Entrepreneurship." Working paper, National Bureau of Economic Research.
- Bahar, Dany, Bo Cowgill, and Jorge Guzman. 2023. "Refugee Entrepreneurship: The Case of Venezuelans in Colombia." *AEA Papers and Proceedings* 113: 352–356.
- Bahar, Dany, Ana María Ibáñez, and Sandra V. Rozo. 2021. "Give Me Your Tired and Your Poor: Impact of a Large-Scale Amnesty Program for Undocumented Refugees." *Journal of Development Economics* 151: 102652.
- Bahar, Dany, José Morales-Arilla, and Sara Restrepo. 2022b. "Economic Integration of Venezuelan Immigrants in Colombia: A Policy Roadmap." Working paper, Center for Global Development.
- Becker, Gary S. 1962. "Investment in Human Capital: A Theoretical Analysis." *Journal of Political Economy* 70 (5, Part 2): 9–49.
- Berbée, Paul and Jan Stuhler. 2025. "The Integration of Migrants in the German Labour Market: Evidence Over 50 Years." *Economic Policy* 40 (122): 481–549.
- Bonilla-Mejía, Leonardo, Leonardo F. Morales, Didier Hermida, and Luz A. Flórez. 2024. "The Labor Market Effect of South-to-South Migration: Evidence from the Venezuelan Crisis." *International Migration Review* 58 (2): 764–799.
- Borjas, George J. 1985. "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." *Journal of Labor Economics* 3 (4): 463–489.
- Borjas, George J. 2015. "The Slowdown in the Economic Assimilation of Immigrants: Aging and Cohort Effects Revisited Again." *Journal of Human Capital* 9 (4): 483–517.

- Borjas, George J. 2017. "The Labor Supply of Undocumented Immigrants." *Labour Economics* 46: 1–13.
- Borjas, George J. and Anthony Edo. 2026. "Monopsony, Efficiency, and the Regularization of Undocumented Immigrants." *Journal of Human Resources* 61 (5).
- Brell, Courtney, Christian Dustmann, and Ian Preston. 2020. "The Labor Market Integration of Refugee Migrants in High-Income Countries." *Journal of Economic Perspectives* 34 (1): 94–121.
- Busso, Matías, Carolina González-Velosa, Juan S. Muñoz-Morales, Juanita Ruiz, Juan D. Valencia, and Cynthia van der Werf. 2026. "Skill Certifications and Migrant Labor Market Integration: Experimental Evidence from Colombia." *Journal of Development Economics*.
- Card, David, Ana Rute Cardoso, Joerg Heining, and Patrick Kline. 2018. "Firms and Labor Market Inequality: Evidence and Some Theory." *Journal of Labor Economics* 36 (S1): S13–S70.
- Card, David, Ana Rute Cardoso, and Patrick Kline. 2016. "Bargaining, Sorting, and the Gender Wage Gap: Quantifying the Impact of Firms on the Relative Pay of Women." *Quarterly Journal of Economics* 131 (2): 633–686.
- Caruso, German, Christian Gomez Canon, and Valerie Mueller. 2021. "Spillover Effects of the Venezuelan Crisis: Migration Impacts in Colombia." *Oxford Economic Papers* 73 (2): 771–795.
- Chatruc, Marisol Rodríguez and Sandra V. Roza. 2024. "In Someone Else's Shoes: Reducing Prejudice Through Perspective Taking." *Journal of Development Economics* 170: 103309.
- Cole, Matthew, Liza Jabbour, and Ceren Ozgen. 2024. "Firm Sorting and the Economic Assimilation of Refugees." Working paper.
- CONPES. 2022. "Estrategia para la integración de la población migrante como factor de desarrollo para el país." Documento CONPES 4100, Departamento Nacional de Planeación.
- Damas de Matos, Ana. 2017. "Firm Heterogeneity and Immigrant Wage Assimilation." *Applied Economics Letters* 24 (9): 653–657.
- DANE-EPM. 2024. "Departamento Administrativo Nacional de Estadística (DANE). Encuesta Pulso de la Migración (EPM): Resultados de la Séptima Ronda." Consulted on November 25, 2024.
- Delgado-Prieto, Lukas. 2024. "Immigration, Wages, and Employment Under Informal Labor Markets." *Journal of Population Economics* 37 (2): 55.
- Delgado-Prieto, Lukas. 2026. "Worker Responses to Immigration Across Firms: Evidence from Colombia." Rfberlin discussion paper, ROCKWOOL Foundation Berlin.
- Demirci, Murat and Murat Güray Kırdar. 2023. "The Labor Market Integration of Syrian Refugees in Turkey." *World Development* 162: 106138.
- Dostie, Benoit, Jiang Li, David Card, and Daniel Parent. 2023. "Employer Policies and the Immigrant–Native Earnings Gap." *Journal of Econometrics* 233 (2): 544–567.
- Elias, Ferran, Joan Monras, and Javier Vázquez-Grenno. 2025. "Understanding the Effects of Granting Work Permits to Undocumented Immigrants." *Journal of Labor Economics* 43 (3): 763–802.
- Fabregas, Raissa and Wladimir Zanoni. 2025. "The Migrant Penalty in Latin America: Experimental Evidence from Job Recruiters." *Journal of Public Economics* 247: 105393.
- Fasani, Francesco, Tommaso Frattini, and Luigi Minale. 2022. "(The Struggle for) Refugee Integration into the Labour Market: Evidence from Europe." *Journal of Economic Geography* 22 (2): 351–393.
- Gerard, François, Lorenzo Lagos, Edson Severnini, and David Card. 2021. "Assortative Matching or Exclusionary Hiring? The Impact of Employment and Pay Policies on Racial Wage Differences in Brazil." *American Economic Review* 111 (10): 3418–3457.
- Groeger, Andre, Gianmarco León-Ciliotta, and Steven Stillman. 2024. "Immigration, Labor Markets and Discrimination: Evidence from the Venezuelan Exodus in Perú." *World Development*

174: 106437.

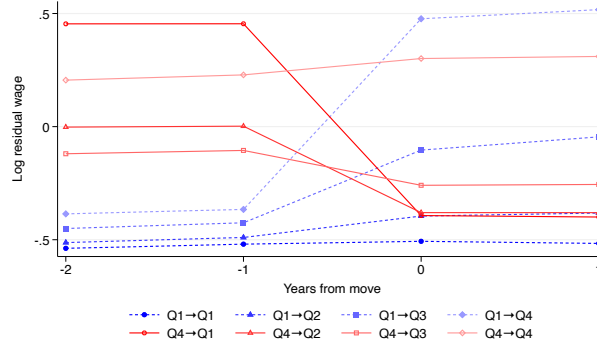
- Gulek, Ahmet, Dany Bahar, and Isabel Di Tella. 2024. "Formal Effects of Informal Labor Supply and Work Permits: Evidence from Venezuelan Refugees in Colombia." Working paper.
- Guo, Naijia, Li Zhang, Rongjie Zhang, and Ben Zou. 2025. "Migration Restrictions and the Migrant-Native Wage Gap: The Roles of Wage Setting and Sorting." *Available at SSRN*.
- Ibáñez, Ana María, Andrés Moya, María Adelaida Ortega, Sandra V. Rozo, and Maria José Urbina. 2025. "Life Out of the Shadows: The Impacts of Regularization Programs on the Lives of Forced Migrants." *Journal of the European Economic Association* 23 (3): 941–982.
- Ibáñez, Ana María, Sandra V. Rozo, Dany Bahar, and María José Urbina. 2026. "Protecting the Vulnerable: How Migrant Regularization Reduces Crime and Empowers Women." *Journal of Development Economics* 179: 103667.
- Kline, Patrick M. 2025. "Labor Market Monopsony: Fundamentals and Frontiers." Working Paper 33467, National Bureau of Economic Research.
- Lebow, Jeremy. 2024. "Immigration and Occupational Downgrading in Colombia." *Journal of Development Economics* 166: 103164.
- Lombardo, Carlo, Julian Martinez-Correa, Leonardo Peñaloza-Pacheco, and Leonardo Gasparini. 2025. "From Displacement to Integration: Mitigating the Distributional Effect of Immigration Through an Amnesty Program." *Journal of Economic Geography* 25 (6): 809–830.
- Migración Colombia. 2021. "Distribución de Venezolanos en Colombia." https://unidad-administrativa-especial-migracion-colombia.micolombiadigital.gov.co/sites/unidad-administrativa-especial-migracion-colombia/content/files/000042/2062_distribucion_venezolanos-en-colombia_enero.pdf.
- Migración Colombia. 2022. "Distribución de Venezolanos en Colombia, febrero 2022." https://unidad-administrativa-especial-migracion-colombia.micolombiadigital.gov.co/sites/unidad-administrativa-especial-migracion-colombia/content/files/000042/2066_distribucion_venezolanos-en-colombia_feb.pdf.
- Migración Colombia. 2023. "Radiografía de Migrantes Venezolanas(os) en Colombia." https://unidad-administrativa-especial-migracion-colombia.micolombiadigital.gov.co/sites/unidad-administrativa-especial-migracion-colombia/content/files/000578/28856_radiografia-de-migrantes-venezolanasos-en-colombia.pdf.
- Postel-Vinay, Fabien and Jean-Marc Robin. 2002. "Equilibrium Wage Dispersion with Worker and Employer Heterogeneity." *Econometrica* 70 (6): 2295–2350.
- Topel, Robert H. and Michael P. Ward. 1992. "Job Mobility and the Careers of Young Men." *Quarterly Journal of Economics* 107 (2): 439–479.
- Tumen, Semih. 2016. "The Economic Impact of Syrian Refugees on Host Countries: Quasi-Experimental Evidence from Turkey." *American Economic Review* 106 (5): 456–460.
- UNHCR. 2023a. "Mid-Year Trends 2023." <https://www.unhcr.org/sites/default/files/2023-10/Mid-year-trends-2023.pdf>.
- UNHCR. 2023b. "Venezuela Situation." <https://www.unhcr.org/venezuela-emergency.html>.
- Urbina, Maria José, Sandra V. Rozo, Andrés Moya, and Ana María Ibáñez. 2023. "Least Protected, Most Affected: Impacts of Migration Regularization Programs on Pandemic Resilience." *AEA Papers and Proceedings* 113: 347–51.

Online Appendix

A Supplementary Results

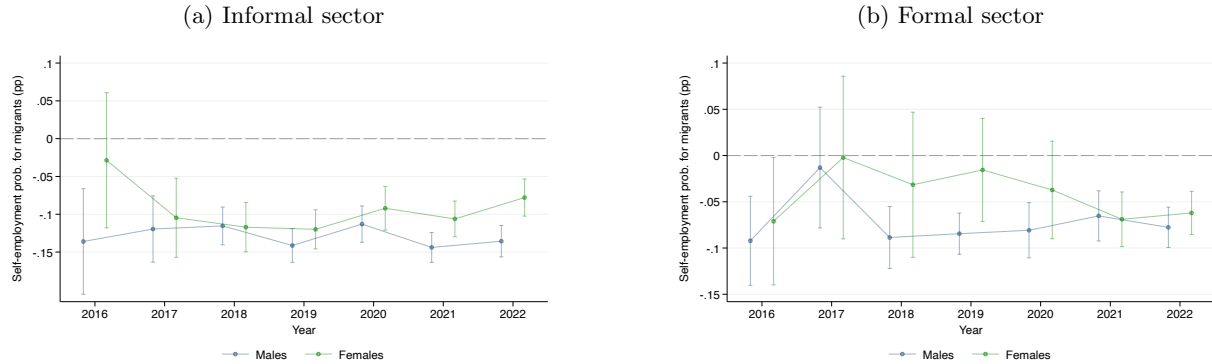
A.1 Figures

Figure A.1: Mean residual wages of movers by type of move



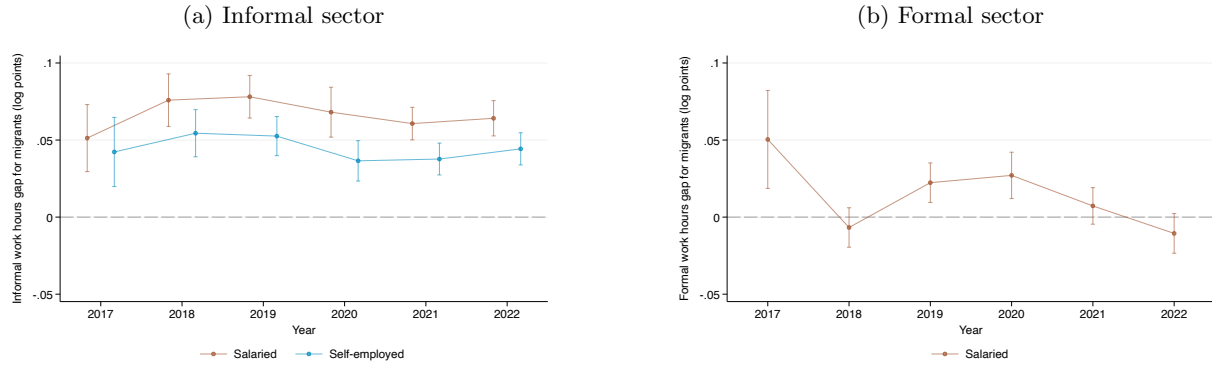
Note: This figure shows the evolution of log residual wages for movers, by type of firm transition. The worker must be employed in the same firm in periods -2 and -1 , and after the move, it must remain in the destination firm in period 1. The sample is restricted to the AKM estimation sample. Residual wages are obtained after controlling for the interaction of age and year fixed effects. Firms are grouped into quartiles based on the estimated AKM firm fixed effects. Source: PILA, August 2015– August 2019.

Figure A.2: Self-employment gaps for migrants by sector



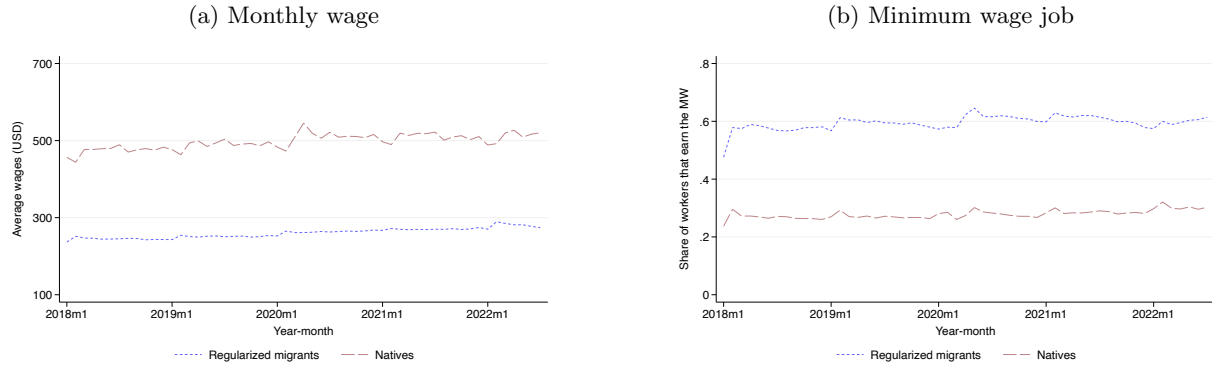
Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). I use as controls three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

Figure A.3: Working hours gap for migrants by type of job and sector



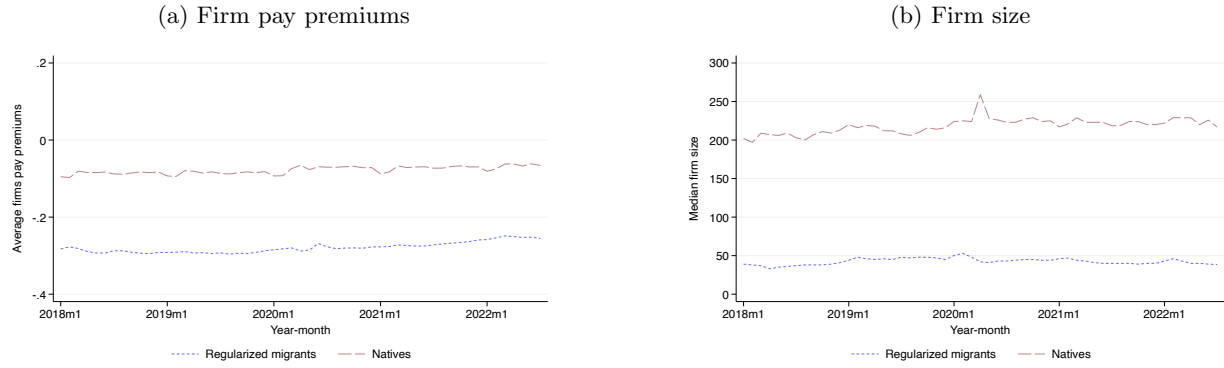
Note: I restrict the sample to full-time workers between 20 and 60 years old. The plotted coefficients come from equation (1). I use as controls sex, three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2017–2022.

Figure A.4: Worker characteristics by origin



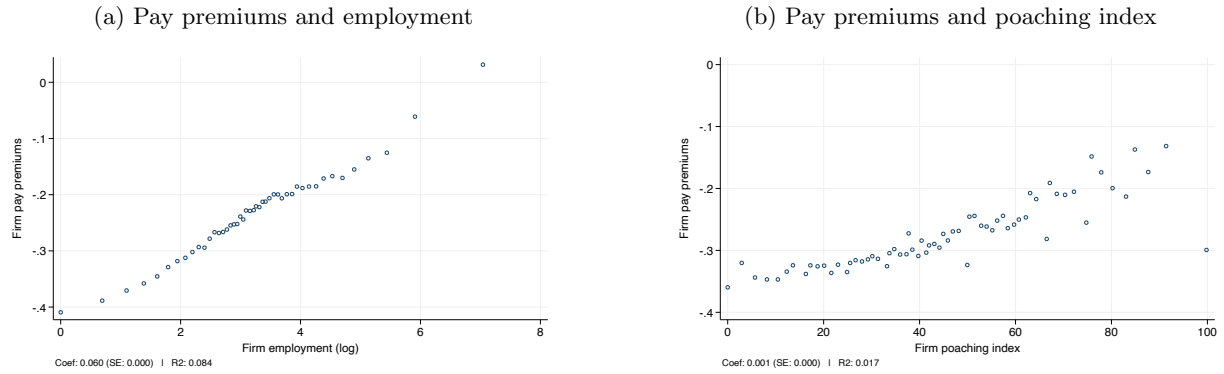
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. I transform nominal Colombian pesos to real USD wages using DANE monthly CPI and the average exchange rate in 2020 from the World Bank. Source: PILA, 2018–2022.

Figure A.5: **Firm characteristics by origin**



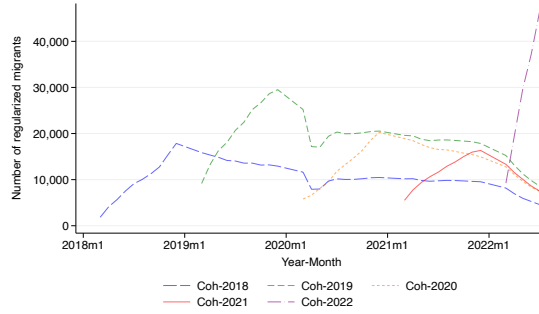
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. For Panel (a), I restrict to workers in firms with non-missing firm fixed effects in the estimation period of 2015 to 2019. For Panel (b), I restrict to workers in firms observed in August 2019. Source: PILA, 2018–2022.

Figure A.6: **Relationship between firm pay premiums, firm size, and poaching index**



Note: I measure firm employment in August 2019. Pay premiums correspond to firm fixed effects from an AKM model estimated over 2015–2019. The poaching index follows [Bagger and Lentz \(2019\)](#) and is averaged over 2017–2019. All variables are averaged at the firm level. The scatter uses 100 bins. Source: PILA, 2015–2019.

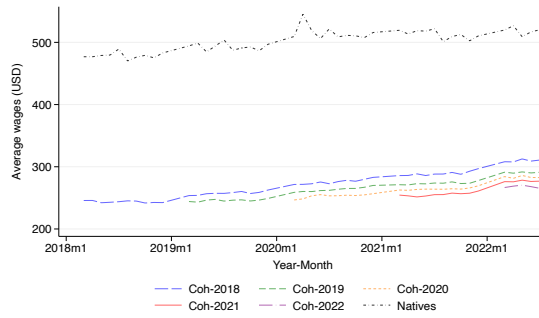
Figure A.7: Number of regularized migrants by cohorts



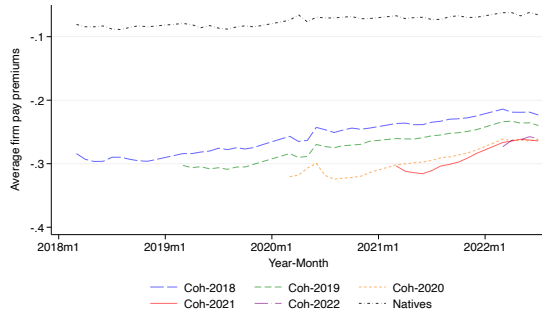
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. Source: PILA, 2018–2022.

Figure A.8: Descriptives by cohorts of entry to the formal sector

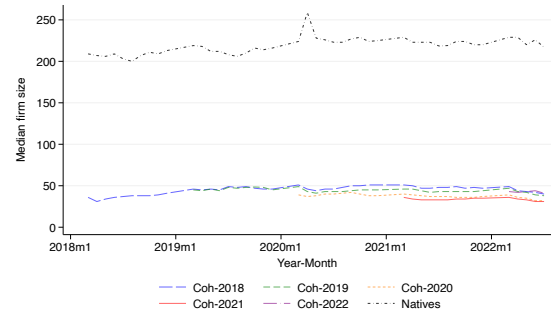
(a) Monthly wage



(b) Firm pay premiums



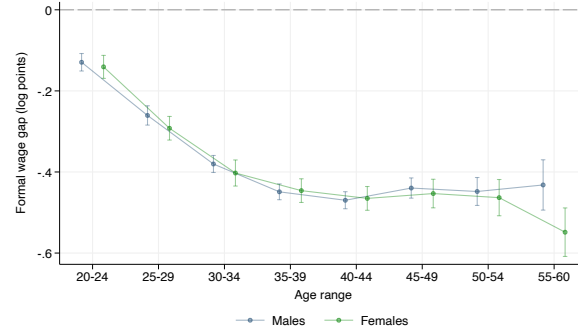
(c) Firm size



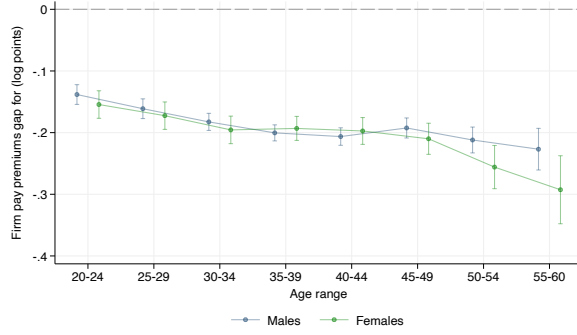
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. For Panel (a), I transform nominal Colombian pesos to real USD wages using DANE monthly CPI and the average exchange rate in 2020 from the World Bank. For Panel (b), I restrict to workers with non-missing firm fixed effects in the estimation period of 2015 to 2019. For (c), I restrict to workers in firms observed in August 2019. Source: PILA, March to December, 2018–2022.

Figure A.9: **Relative gaps over the life cycle for the 2018 cohort**

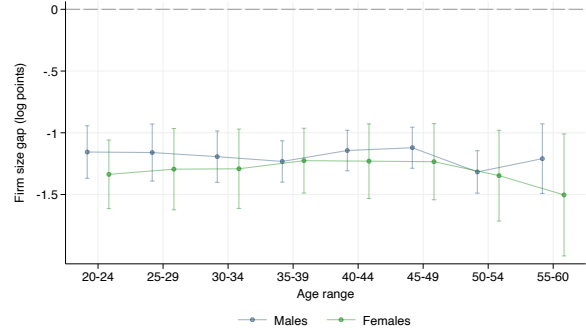
(a) Monthly wage



(b) Firm pay premiums

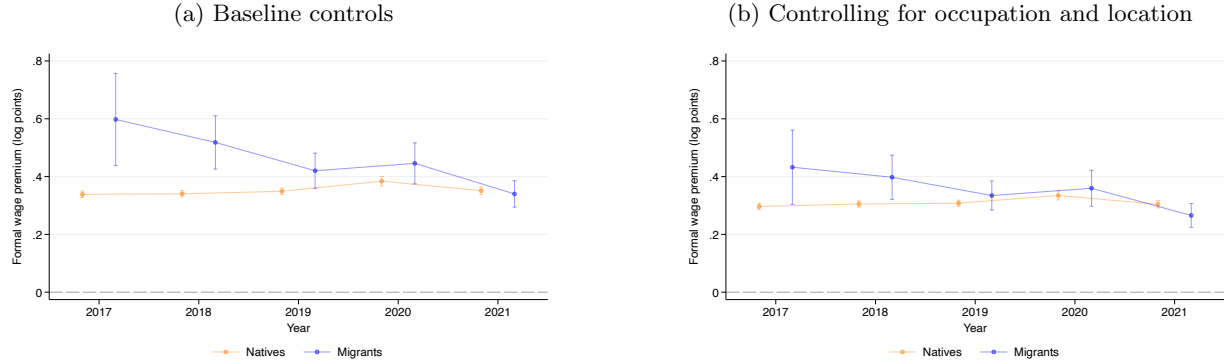


(c) Firm size



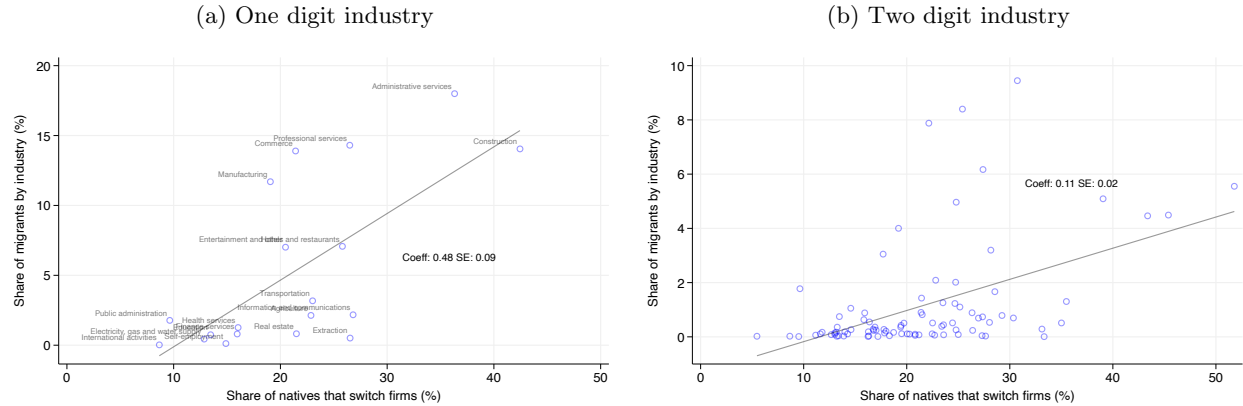
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. I only compare migrants who entered the formal sector in 2018. The plotted coefficients come from equation (2), estimated separately by subgroups in all years. I use time fixed effects as controls and 95% confidence intervals with standard errors two-way clustered by worker and firm. The sample size differs across panels: while Panel (a) includes all migrants, Panels (b) and (c) are based only on migrants in firms observed before 2020. Source: PILA, 2018–2022.

Figure A.10: **Formal wage premium by origin**



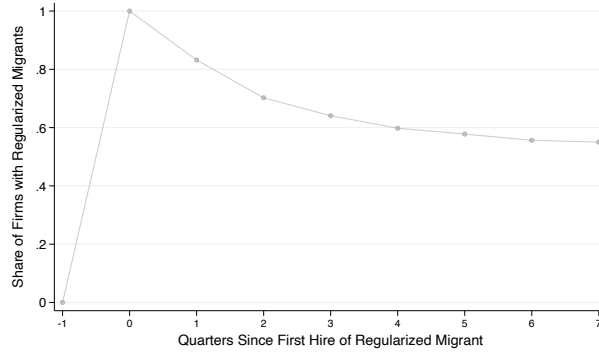
Note: I restrict the sample to full-time salaried workers between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). Both specifications control for education (3 groups), age (8 groups), their interaction, gender dummies, department, and time fixed effects. Panel (b) additionally includes occupation (2-digit) fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2017–2022.

Figure A.11: **Share of regularized migrants and native firm mobility rates by industry**



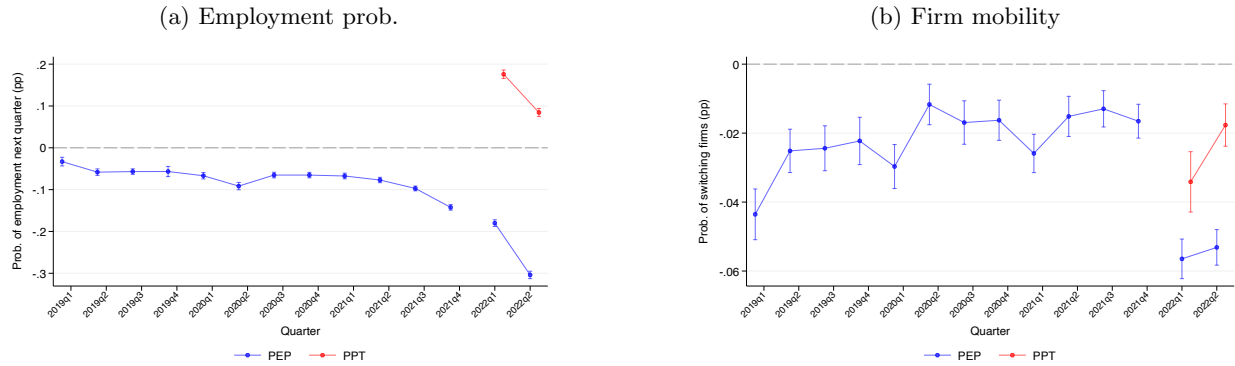
Note: I restrict the sample to workers between 20 and 60 years old. I take each worker's firm in a given year to be the one from their highest-earning spell that year. Source: PILA, 2020–2021.

Figure A.12: Share of firms with regularized migrants since the quarter of first hiring



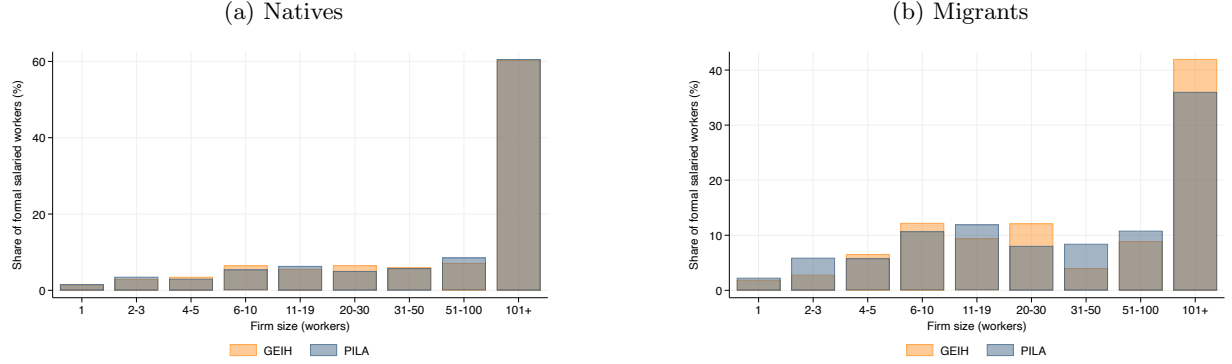
Note: I follow all firms from the first time they hire at least one regularized migrant and measure the share of them that continue to hire any regularized migrant in subsequent quarters, conditional on firm survival. To measure firm employment, I restrict the sample to full-time workers aged 20 to 60. Source: PILA, 2018–2019.

Figure A.13: Employment and firm mobility gaps of regularized migrants within firms



Note: I restrict the sample to employees between 20 and 60 years old in each quarter. The coefficients are the gaps of PEP and PPT holders relative to natives in each quarter, controlling for quarter, age group by sex, cohort of entry into the formal sector, and firm fixed effects. I compare migrants with natives who enter at about the same time, defined as the first year observed in the PILA since 2017. Firm mobility is defined as workers employed in the next quarter. I use 95% confidence intervals with standard errors two-way clustered by worker and firm. Source: PILA, 2019–2022.

Figure A.14: **Firm size distribution of formal salaried workers in the survey and administrative data, 2021**



Note: The bars show the share of formal salaried workers between 20 and 60 years old by number of workers in the firm, using the GEIH firm size groups. In the GEIH, I use formal salaried workers in urban areas, focus on Venezuelan-born migrants, and apply survey weights. In the PILA, I use employees with 30 days of employment, focus on regularized migrants, and use firm size measured in August 2019. Source: GEIH and PILA, 2021.

A.2 Tables

Table A.1: **Informal employment prob. by regions**

	Capital	Caribbean	Central	Oriental	Pacific
2018	0.454*** (0.020)	0.237*** (0.007)	0.398*** (0.018)	0.338*** (0.014)	0.389*** (0.022)
2019	0.489*** (0.015)	0.231*** (0.006)	0.398*** (0.015)	0.363*** (0.009)	0.365*** (0.016)
2020	0.479*** (0.017)	0.212*** (0.007)	0.404*** (0.013)	0.368*** (0.010)	0.368*** (0.016)
2021	0.472*** (0.013)	0.198*** (0.006)	0.389*** (0.010)	0.332*** (0.010)	0.332*** (0.012)
2022	0.489*** (0.016)	0.189*** (0.006)	0.332*** (0.012)	0.343*** (0.013)	0.321*** (0.014)
<i>N</i>	63,652	397,424	364,029	215,210	202,566
<i>R</i> ²	0.192	0.254	0.218	0.216	0.229

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports the coefficients from equation (1). I restrict the sample to individuals between 20 and 60 years old in urban areas. I use as controls three education groups, eight age groups, the interaction between both, gender dummies, and time fixed effects. The regression uses survey weights. Source: GEIH 2018–2022.

Table A.2: **Wage and labor income gap in the informal sector by type of job, 2021**

	(1)	(2)	(3)	(4)
<i>Panel A: Informal salaried</i>				
$\mathbb{1}\{M_i = 1\}$	0.001 (0.0128)	-0.046*** (0.0131)	-0.036*** (0.0129)	-0.049*** (0.0127)
<i>N</i>	27,739	27,738	27,738	27,738
<i>R</i> ²	0.000	0.067	0.091	0.114
<i>Panel B: Informal self-employed</i>				
$\mathbb{1}\{M_i = 1\}$	-0.116*** (0.0156)	-0.102*** (0.0156)	-0.088*** (0.0155)	-0.101*** (0.0155)
<i>N</i>	69,856	69,850	69,850	69,850
<i>R</i> ²	0.002	0.128	0.160	0.176
Age, sex, education, department, and month	No	Yes	Yes	Yes
Industry and occupation	No	No	Yes	Yes
Firm size	No	No	No	Yes

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports the hourly wage gap of informal salaried workers and the hourly labor income gap of informal self-employed workers for Venezuelan-born workers relative to natives. I restrict the sample to full-time workers between 20 and 60 in urban areas. All controls enter as fixed effects, and firm size uses the nine GEIH groups. The regression uses survey weights. Source: GEIH, 2021.

Table A.3: **Descriptive statistics for natives, migrants, and foreigners in the PILA**

(a) Natives

	Male (%)	Age	Wages (USD)	Minimum wage (%)	Firm size	Firm premiums	Poaching index	Workers
2018	0.58	36.8	489	0.27	1,869	-0.08	52.2	503,343
2019	0.58	37.3	504	0.27	1,802	-0.08	53.4	504,863
2020	0.58	38.0	522	0.28	1,845	-0.07	54.2	482,902
2021	0.58	38.1	522	0.29	1,897	-0.06	54.3	523,430
2022	0.58	38.2	520	0.30	1,948	-0.06	54.2	567,700

(b) Regularized migrants

	Male (%)	Age	Wages (USD)	Minimum wage (%)	Firm size	Firm premiums	Poaching index	Workers
2018	0.71	30.8	245	0.57	688	-0.29	36.8	14,915
2019	0.70	31.8	250	0.59	1,038	-0.29	40.0	49,286
2020	0.70	32.6	263	0.62	1,229	-0.28	42.5	56,827
2021	0.65	33.3	270	0.61	1,221	-0.26	43.9	76,103
2022	0.65	33.5	274	0.61	1,153	-0.25	44.9	106,471

(c) Other foreigners

	Male (%)	Age	Wages (USD)	Minimum wage (%)	Firm size	Firm premiums	Poaching index	Workers
2018	0.68	37.7	1,296	0.20	988	-0.01	48.7	30,036
2019	0.67	38.3	1,337	0.19	892	0.01	49.9	31,095
2020	0.66	39.3	1,418	0.18	1,053	0.04	51.5	29,024
2021	0.64	39.9	1,420	0.19	1,168	0.04	53.0	27,366
2022	0.63	40.4	1,421	0.20	1,260	0.06	53.6	25,818

Note: This Table reports the average statistics for natives, regularized migrants with PEP or PPT, and foreigners between 20 and 60 years of age. I transform nominal Colombian pesos to real USD wages using DANE monthly CPI and the average exchange rate in 2020 from the World Bank. The firm premiums are relative to the largest firm in the country and are measured in log points. Source: PILA, 2018–2022, July.

Table A.4: **Comparison of baseline characteristics for migrant workers by employment status and cohorts**

Variable	2018 Cohort			2019 Cohort			2020 Cohort		
	Drop	Stay	Diff	Drop	Stay	Diff	Drop	Stay	Diff
Age (years)	31.13 (0.15)	30.82 (0.06)	0.31*	32.14 (0.11)	31.72 (0.05)	0.42***	32.59 (0.15)	32.28 (0.06)	0.31*
Male proportion	0.66 (0.01)	0.70 (0.00)	-0.04***	0.64 (0.01)	0.68 (0.00)	-0.03***	0.60 (0.01)	0.63 (0.00)	-0.03***
Log monthly wage	5.43 (0.00)	5.45 (0.00)	-0.02***	5.48 (0.00)	5.51 (0.00)	-0.03***	5.51 (0.00)	5.55 (0.00)	-0.04***
<i>N</i>	2,917	16,793		6,049	29,512		3,333	19,135	

Note: This table compares the average characteristics of regularized migrant workers who drop out of formal employment and those who stay formally employed in the next year, using data from the first year of employment to analyze the role of selection. I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. T-tests show the differences in means across these groups. Standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: **Share of each cohort of regularized migrants observed in the formal sector**

Cohort	2019	2020	2021	2022
2018	0.75	0.54	0.47	0.36
2019		0.70	0.55	0.41
2020			0.72	0.47
2021				0.63

Note: The table reports the share of each cohort of regularized migrants between 20 and 60 years old observed in the formal sector in each year, relative to its size in the year of entry. Source: PILA, 2018–2022.

B Employment Gaps by Industry and Occupation

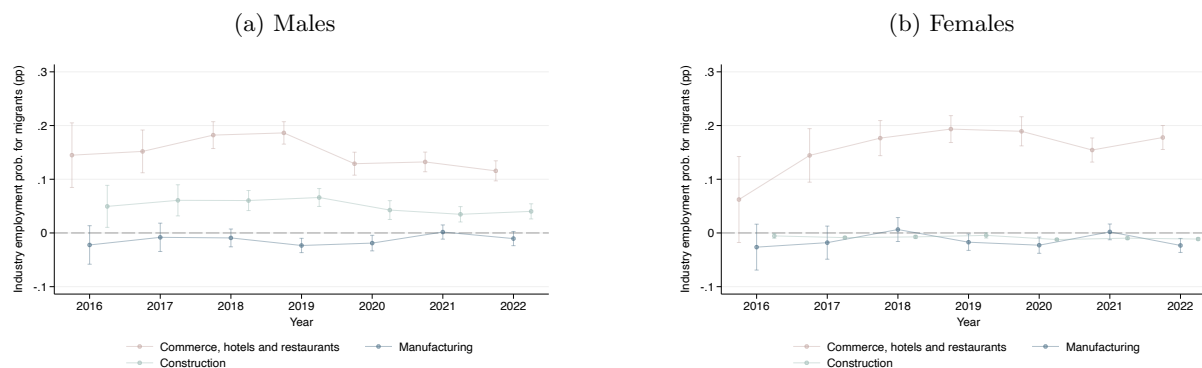
I use the labor force survey to show integration by industry and occupation.^{B.1} Migrants are concentrated in commerce, hotels, and restaurants (CHR), an industry with high informality. Migrant males are more likely than native males to work in CHR and construction, and migrant females in CHR. The CHR gap for males falls from 18 pp in 2018 to 12 pp in 2022 (see Appendix Figure B.1a), while for females it remains at 18 pp (see Appendix Figure B.1b). In manufacturing, there are no large differences.

By occupation, street vendors and delivery workers are the most common among migrants, followed by restaurant workers (see Appendix Figure B.2). Figure B.3a shows a positive and stable gap in street vending and delivery since 2017 for males and 2018 for females, with a peak for females in 2020, when this occupation served as a cushion against job loss during the COVID-19 pandemic.

^{B.1}For the classification of sectors, I use the ISIC revisions 3 and 4 of economic activities for Colombia.

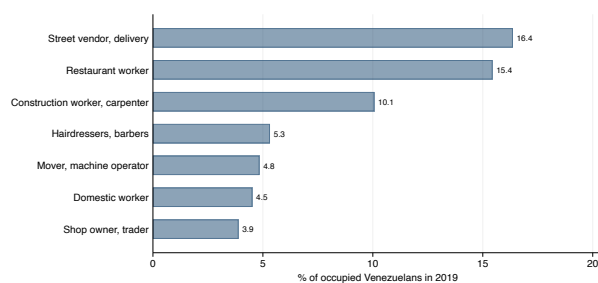
In domestic work, migrant females were initially overrepresented relative to natives, but the gap has declined over time (see Appendix Figure B.3b).^{B.2}

Figure B.1: **Employment gaps for migrants by industry**



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). I use as controls three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

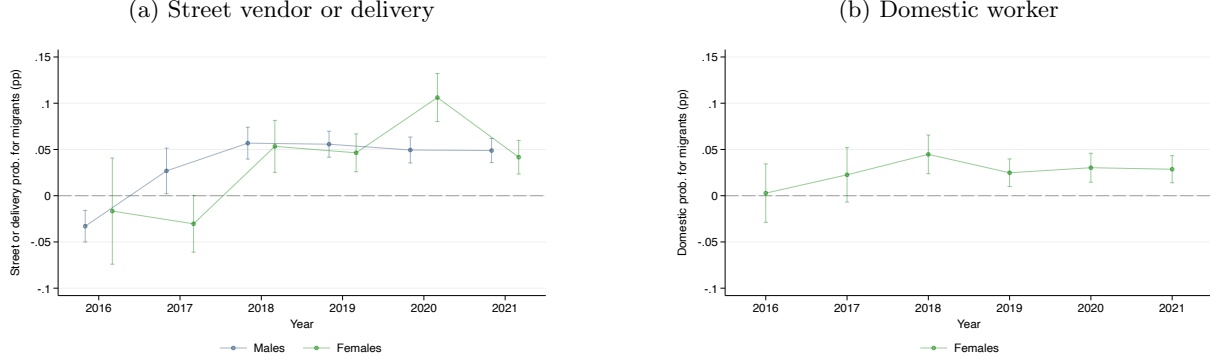
Figure B.2: **Occupation of Venezuelan workers in the GEIH survey**



Note: I use survey weights to aggregate all employed Venezuelans into different occupations. Source: GEIH, 2019.

^{B.2}I exclude males, given the low number of migrants and natives in this occupation.

Figure B.3: **Employment gaps for migrants by occupation**



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (1). I use as controls three education groups, eight age groups, the interaction between both, and department and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

C Theoretical Framework

This appendix presents the labor demand model discussed in Section 5, which builds on Kline (2025). I consider a firm and a unit mass of workers, comprising natives and migrants, with idiosyncratic outside options $b \sim F$, $b \in [\underline{b}, \bar{b}]$, where F is log-concave. Migrants face systematically worse outside options than natives due to factors such as weaker labor market networks or employment barriers, captured by a shift parameter $\delta > 0$: a migrant accepts a wage offer w whenever $w + \delta \geq b$, so their effective acceptance threshold is lower than that of natives.^{C.1} The firm posts a single wage, w , for all applicants and does not observe worker type ex ante. It knows only the distribution F , and that migrants have systematically lower outside options.

I incorporate a wage-screening mechanism into this model that endogenously determines workforce composition. The expected match quality for the firm $\bar{q}(w) = q_N s_N(w) + q_M s_M(w)$ depends on pool composition. Given information frictions, such as difficulty verifying foreign credentials, the firm faces uncertainty about migrants' productivity and match duration, leading it to assign a lower expected value to them, $q_N > q_M$. Assuming a Pareto distribution, $F(w) = (w/\bar{b})^\eta$ with shape parameter $\eta > 0$, the migrant and native formal employment shares are given by $s_M(w) = \frac{\lambda(w+\delta)^\eta}{\lambda(w+\delta)^\eta + (1-\lambda)w^\eta}$ and $s_N(w) = \frac{(1-\lambda)w^\eta}{\lambda(w+\delta)^\eta + (1-\lambda)w^\eta}$, where $\lambda \in (0, 1)$ is the population share of migrants allowed to work formally.^{C.2} Firms posting higher wages attract a pool with a larger native share and higher average match quality, $s'_M(w) < 0$.

^{C.1}Differences in reservation wages across worker types as a source of labor market sorting are shown in Amior and Stuhler (2024).

^{C.2}If λ rises, due to regularization policies, average match quality deteriorates ($\frac{\partial \bar{q}(w)}{\partial \lambda} = -(q_N - q_M) \frac{\partial s_M(w)}{\partial \lambda} < 0$), lowering formal wages and displacing natives with outside options closest to w^* . This model focuses on the cross-sectional comparison, holding λ fixed, in which more productive firms pay higher wages and attract a disproportionately larger share of natives.

The firm chooses w to maximize expected profit:

$$\Pi(w) = F(w) [\bar{q}(w)p - w] \quad (\text{C.1})$$

where p is firm-level productivity and $\bar{q}(w)p$ is the expected marginal product of the hired workers. Under the Pareto distribution, η is the elasticity of labor supply to the firm and $\mu = \frac{\eta}{\eta+1}$ is the wage markdown, so the optimal wage satisfies $w^* = \frac{\eta}{\eta+1} \left[\bar{q}(w^*)p + \frac{w^*}{\eta} \bar{q}'(w^*)p \right]$. The term $\frac{w^*}{\eta} \bar{q}'(w^*)p$ represents a premium paid to improve the applicant pool (similar to the Section 4.3 model in [Kline \(2025\)](#)).

Comparative statics. I examine how the firm's optimal wage choice and workforce composition vary across firms with different primitives.

1. *Higher productivity.* More productive firms post higher wages ($\frac{\partial w^*}{\partial p} > 0$) and, through the screening channel, attract a workforce with a lower migrant share ($\frac{\partial s_M(w^*)}{\partial p} < 0$).^{C.3} This suggests a stronger sorting of migrants into lower-productivity firms, with sorting intensity increasing in $q_N - q_M$ and δ .
2. *Higher migrant match quality.* As the quality gap $q_N - q_M$ narrows, for instance through credential recognition policies, the composition gain from raising w diminishes. Holding p fixed, firms post lower wages ($\frac{\partial w^*}{\partial q_M} < 0$) and the migrant share rises ($\frac{\partial s_M(w^*)}{\partial q_M} > 0$), making formal firms more accessible to migrants, especially the high-productivity ones.^{C.4}

^{C.3}Differentiating the first-order condition (FOC) with respect to p gives $\frac{\partial w^*}{\partial p} = -\frac{f(w)\bar{q}(w)+F(w)\bar{q}'(w)}{\partial^2 \Pi / \partial w^2} > 0$, since the numerator is positive and the denominator negative at an interior solution. The result then follows from $\frac{\partial s_M}{\partial p} = s'_M(w^*) \cdot \frac{\partial w^*}{\partial p} < 0$, where $s'_M(w^*) = -\frac{\lambda(1-\lambda)\eta\delta(w^*)^{\eta-1}(w^*+\delta)^{\eta-1}}{[\lambda(w^*+\delta)^\eta + (1-\lambda)(w^*)^\eta]^2} < 0$.

^{C.4}Differentiating the FOC with respect to q_M gives $\frac{\partial w^*}{\partial q_M} = -\frac{[f(w)s_M(w)+F(w)s'_M(w)]p}{\partial^2 \Pi / \partial w^2} < 0$ under log-concavity of F . The result then follows from $\frac{\partial s_M}{\partial q_M} = s'_M(w^*) \cdot \frac{\partial w^*}{\partial q_M} > 0$, where $s'_M(w^*)$ is as defined above.