Firms, Regularization, and the Labor Market Integration of Migrants*

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May, 2025

Abstract

This paper examines the labor market integration of migrants in Colombia up to seven years post-arrival and during a large-scale regularization process. Using matched employee-employer panel data for the universe of regularized migrants in the formal sector, along with household survey data covering the informal sector, I uncover substantial disparities. The most pronounced one is related to informality: migrants are nearly twice as likely to work informally as their comparable natives. Despite regularization amnesties intended to promote formality, only 10% of regularized migrants had formal jobs by 2021. Those entering the formal sector typically work in minimum-wage jobs and within small, low-paying firms, earning around half of the formal wages of natives. Close to 50% of the overall formal wage gap between regularized migrants and natives is due to the differential migrant sorting into firms with lower pay policies. While there are some improvements as they gain formal sector experience, a persistent gap remains with natives across various job and firm characteristics. Finally, I discuss why formalization rates remain low despite migrants' similar language, culture, education, and access to work permits. Regularized migrants have lower attachment to formal employment and higher firm mobility, which may reduce employers' incentives to hire them.

Keywords: Labor market integration, immigration, formal sector.

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

*I am thankful to Jan Stuhler for his support and to Jaime Arellano-Bover, Jesús Fernández-Huertas, and Joan Monras for their comments. I am indebted to Colombia's Ministry of Health and Social Protection for providing access to their data.

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1 Introduction

The process of migrants' assimilation into host labor markets is a question that has drawn much attention in high-income countries for decades (e.g., see Borjas (1985) for earlier and Borjas (2015) for more recent evidence in the United States). This question, however, lacks empirical evidence in developing countries where many migrants and refugees also settle. For instance, in the past decade, millions of individuals from countries such as Syria or Venezuela have relocated to neighboring low- and middle-income countries (UNHCR, 2023).[1] Measuring the initial and subsequent labor market gaps of migrants in these contexts where the informal sector serves as a stepping stone for short-term and often longer-term employment gains relevance. In particular, to elaborate better and more efficient policies to integrate migrants, reduce misallocation, and benefit the receiving economies more profoundly.

In this paper, I examine the labor market integration of millions of Venezuelan immigrants in Colombia, focusing on the convergence over time in multiple dimensions, from access to formal employment and wage gaps across sectors, to uncover the relevant role of firms in explaining wage differentials.[2] To realize the scale of the immigration event I am studying, Venezuela's severe economic and political crisis has forced more than one-fifth of its entire population to flee, with Colombia as the primary destination (UNHCR, 2023). Figure 1a illustrates the growth of the migrant working-age population in Colombia, which surged from less than 1% in 2016 to approximately 7% by 2021. As of August 2023, administrative sources estimate the Venezuelan migrant population in Colombia at around 2.9 million (Migración Colombia, 2023).

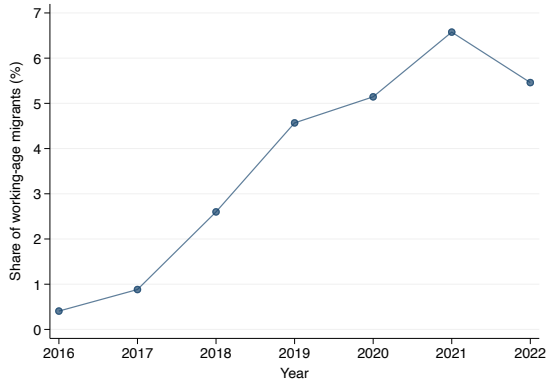
During this time, the government also enacted one of the most extensive regularization amnesties in history to enhance the integration of Venezuelans into Colombian society, allowing them to obtain more formal jobs.[3] Figure 1b shows that as of July 2022, there were around 120,000 regularized migrant workers in the formal sector, which only represented around 1.2% of all formal workers. The massive migrant influx, combined with concurrent regularization policies, motivates a detailed analysis of Venezuelan immigrants' labor market integration patterns, as it represents a unique combination of one of the most substantial immigration shocks in recent history with a rapid and

[1] Recently, Demirci and Kırdar (2023) documented Syrians' integration patterns in the Turkish labor market.
[2] Venezuelan immigrants in this context can be either refugees or voluntary migrants.
[3] Formal employment throughout the paper is defined as workers contributing to the health or pension system.

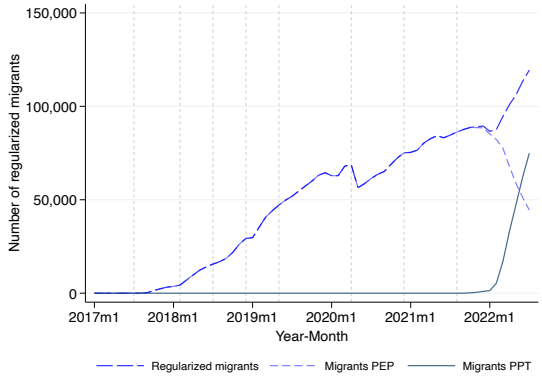
long-term government response to integrate them (CONPES, 2022).

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

(a) Share of Venezuelan migrants



(b) Number of formal regularized workers



Note: In (a), I show the share of migrants as the population aged 20 to 60 born in Venezuela over the total population aged 20 to 60, using national survey weights. Source: GEIH, 2016–2022. In (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.

By obtaining information from all regularized migrants in the social security data with household survey data on migrants in the informal sector, I provide the first comprehensive analysis of migrant integration in Colombia, examining up to seven years post-arrival that include a massive regularization amnesty. With the multiple data sources, I can study not only the cross-sectional descriptive dynamics of integration but also, as I can track regularized migrants over time with the matched employee-employer dataset, I quantify assimilation patterns to analyze if regularized migrants improve relative to native workers across various dimensions, such as types of firms (e.g., firm size, firm pay premiums, or firm desirability) that ultimately shape their labor market outcomes.[4] Unlike previous studies, which focus on the short-term effects of the initial stages of the regularization amnesties of Venezuelans in Colombia on migrants' labor market outcomes (Ibanez et al., 2022) or resilience during the COVID-19 pandemic (Urbina et al., 2023), my analysis covers multiple stages of the regularization program between 2018 to 2022, incorporating firm-level factors to provide broader insights on the labor market integration of migrants in developing countries.

The first set of results from the household survey shows that Venezuelan immigrants are dispro-

[4]This dataset also allows me to minimize compositional biases of the migrant population due to continuous migrant arrivals.

portionally employed in the informal sector after controlling for time, age, and education effects. Specifically, in 2019, migrant males are about 36 percentage points (pp) more likely to work informally than natives, who have an informality share of about 50%, whereas migrant females have a 39 pp difference. This aggregate trend slightly decreased for migrants after 2018, when the regularization program allowed undocumented migrants to work formally, reaching a 33 pp difference for both genders in 2022. Regarding returns to labor, I document a negative hourly wage gap between informally employed migrants and natives, gradually closing over time.

The second set of results focuses on the social security data, revealing that despite the large-scale regularization program, only about 10% of regularized migrants had entered the formal sector by January 2021. Nonetheless, the number of regularized migrants in the formal sector is gradually increasing over time. Among those who manage to enter the formal sector, they face significant disparities compared to natives. On average, regularized migrants earn about half the wages of comparable natives and are employed in smaller, lower-paying firms. Furthermore, around 60% of regularized migrants occupy minimum-wage jobs, compared to just 30% of natives. These wage disparities and employment concentration in lower-paying firms show minor improvements five years after migrants enter the formal labor market, indicating that initial labor market outcomes are persistent.

Focusing on the role of firms in explaining wage differentials, I examine how much of the overall formal wage gap is driven by worker sorting *between* firms, as recent studies in developed economies suggest it explains an important part. In Colombia, this sorting contributes to approximately 50% of the overall formal wage gap, a significantly higher contribution compared to Canada, Netherlands, or Israel, where firm effects explain around 15% to 20% of the wage gap (Arellano-Bover and San, 2023; Cole et al., 2024; Dostie et al., 2021), 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 segregation in the labor market (Amior and Stuhler, 2022). The importance of firm heterogeneity in the Colombian context is also emphasized in Delgado-Prieto (2023), examining the labor market impacts of the Venezuelan immigration in the formal sector. This paper shows that the impacts of immigration on native formal workers are more pronounced in small formal firms, as they are closely linked to the informal

sector and can more easily employ lower-cost informal workers.

Finally, I explore why formal employers may hesitate to hire more regularized migrants by examining their firm-specific attachment. The panel data reveal that regularized migrants are much more likely to exit formal employment, and if they maintain employment, they are more prone to switch to other formal firms relative to natives. This suggests that formalization rates remain low, even with work permits, partly because employers might anticipate lower job tenure with migrants, and as this would decrease the expected returns of on-the-job training investments, they keep hiring natives. This evidence points to a simple demand-side explanation for the low formalization rates of regularized migrants in Colombia despite their cultural, linguistic, and educational similarities with natives.

Altogether, these findings highlight the need for complementary strategies to support the broad regularization policies for Venezuelan immigrants, as granting work permits does not necessarily translate into formality. In particular, labor market policies focused on boosting and sustaining formal employment among migrants, such as targeted training programs depending on origin qualifications or industry-specific reskilling, can become relevant for improving their economic prospects in the long term. This is particularly salient as a representative migrant survey indicates that four out of five migrants intend to settle permanently in Colombia (DANE-EPM, 2024). Moreover, such policies could also benefit the Colombian government, as increasing the integration of migrants into the formal economy enhances tax revenues and social security contributions.[5]

Related Literature. Migrants from lower-income countries frequently relocate to higher-income economies. Thus, most existing literature focuses on the evolution of labor market patterns within these contexts. For instance, early evidence from the United States documented a substantial earnings gap between migrants 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., 2021). Relatedly, Berbée and Stuhler (2023) conducts a comprehensive study 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)

[5]In an accounting exercise, I document that regularized migrants formally employed from January 2017 to July 2022 generated health and pension tax contributions amounting to around 0.1% of Colombia's 2018 GDP.

focused on labor market integration in high-income countries, finding that fewer than 20 percent are 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. Governments enact labor market policies such as regularization amnesties to improve these integration patterns and benefit the receiving economies. In Spain, Elias et al. (2022) examined the 2004 immigrant regularization, finding it boosted immigrant formal employment without negatively affecting natives or increasing public costs.

Massive population outflows from Afghanistan, Syria, Ukraine, and Venezuela in the past decade toward middle-income countries have gradually shifted the focus to other contexts. The conditions in which migrants or refugees initially enter these labor markets and whether they assimilate have become an increasingly important question to study, yet evidence remains limited. An exception is Demirci and Kırdar (2023), which examines the labor market integration of the world's largest population of refugees: the Syrians in Turkey. Using a single cross-sectional survey, the study reveals that employment rate gaps between refugees and native men are less pronounced than in developed economies, with integration improving over time. In Colombia, Bahar et al. (2022) 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. In the same context, Bahar et al. (2021) examines the causal impacts of the Colombian regularization amnesty and finds insignificant or negligible effects on various native labor market outcomes using labor force survey data.[6] The slow transition I observe towards formality among regularized migrants helps explain the limited effects.

While previous literature has emphasized migrant characteristics or host-country policies for assimilation, recent studies highlight the critical role of firms and job mobility in shaping labor market integration for migrants. For instance, in developed economies, firm-specific pay policies

[6]Although 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.

account for a significant portion of wage differentials between migrants and natives, though the magnitude varies. In Portugal, reallocation into higher-paying firms explains approximately 30% of migrants' initial wage growth (Damas de Matos, 2017), whereas in Canada, the Netherlands, and Israel, firm wage premiums explain around 15% to 20% of the overall native-migrant wage gap (Arellano-Bover and San, 2023; Cole et al., 2024; Dostie et al., 2021). Building on this evidence, I examine the role of firms in migrant assimilation in a developing country context, specifically documenting that firm sorting explains substantially more, roughly 50%, of the wage gap. I also explore, using matched employee-employer data, certain demand factors that contribute to migrants' low formalization rates, even with access to work permits. These findings provide crucial evidence to other Latin American and middle-income countries facing similar migrant inflows, indicating the importance and potential limitations of regularization policies as the only tool for the labor market integration of migrants.

The rest of the paper is structured as follows. Section 2 discusses Venezuelan immigration and regularization programs. Section 3 describes the data and empirical strategy. Section 4 presents results from administrative and survey data. Section 5 explores various hypotheses for the low formalization rates of regularized migrants. Finally, 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 of regularization and legalization for irregular Venezuelans started with the introduction of the *Permiso Especial de Permanencia* (PEP), one of the largest amnesty programs offered in the world. Despite the possible controversies, it granted legal residence and native rights, including access to public health and education, but excluded voting rights for two years with the possibility of renewal. The initial rounds of PEP, announced in July 2017 and February 2018, were designed explicitly for Venezuelans with formal entry into Colombia.[7] 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

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

had a regular status in the country due to the PEP, while 980 thousand Venezuelans still were irregular (Migración Colombia, 2021).[8]

To address the challenges Venezuelan migrants face due to documentation renewal and provide a longer-term solution, the Colombian government introduced a Temporary Protection Statute in May 2021, encompassing 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.[9] 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 become necessary for accessing formal employment, which provides a range of benefits relative to 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 around 10% 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).[10] The formalization has grown over time. For the latest period available, July 2022, the administrative dataset shows the presence of nearly 120,000 regularized migrant workers holding either PEP or PPT documentation in the formal sector (or 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

[8] From 2020, undocumented migrants can also be granted regulatory status whenever they receive a formal job offer using a specific program that targets formalization (PEPFF, by its acronym in Spanish).

[9] Note all 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.

[10] The exact percentage is $9.9\% = 75,350/759,584$.

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. Still, despite the massive regularization program that granted many migrants the right to work, most of them encountered barriers to entry into the formal sector. In the last section of this paper, I provide a potential explanation for why the formalization rates remain low: the lack of incentives to hire regularized migrants from the employers' perspective. This, however, does not mean the program does not strongly promote formalization, as Ibanez et al. (2022) shows a high formalization effect for undocumented migrants in the initial stages of the PEP program relative to similar peers.

With detailed information on the universe of contributions to social security from regularized migrants, I perform back-of-the-envelope calculations on the additional revenue generated for the government. Using the rule that employees pay 8% of their reported income towards health and pension, I sum all contributions made by migrants with PEP or PPT from January 2017 to July 2022. I then transform the nominal to real terms with the yearly CPI to make accurate comparisons over time. In this accounting exercise, all contributions sum up to 67 million USD or around 0.1% of the Colombian GDP in 2018.[11] This exercise can be taken 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. This positive impact on Colombian revenues could be significantly higher if the formalization rates of migrants were comparable to those of natives, which would help offset the additional fiscal costs associated with the increased demand for public services, such as health or education, from migrants. This is especially important as most of them are employed in the informal sector and, therefore, contribute relatively little in taxes.

3 Data

In this paper, I exploit a context of migrant-friendly policies by the government that facilitated the accurate enumeration of migrants. Specifically, I first employ the *Gran Encuesta Integrada de Hogares* (GEIH), a comprehensive household survey that includes questions about birthplace

[11] I used the average USD exchange rate of 3,250 in 2019. For the GDP, I used the constant prices of 2018.

and arrival time in Colombia for recent migrants, that allows the characterization of the migrant population. Unlike certain countries, such as Turkey (Demirci and Kırdar, 2023), that often restrict the inclusion of migrants in labor force surveys, the GEIH survey enables a detailed exploration of the integration patterns for migrants compared 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.[12] I exclude rural areas as their labor markets behave much differently from urban ones, and most immigrants reside in urban areas.

Because survey-based estimates may be influenced by measurement error in the migrant information, my main focus is on the *Planilla Integrada de Liquidación de Aportes* (PILA), a dataset with administrative records from the Colombian social security system. The PILA dataset contains the universe of formal workers within tax-registered companies, excluding those engaged in informal work or informal firms while having self-employed formal workers. This dataset is based on the monthly contributions to the health system in Colombia, based on reported income, which provides a comprehensive overview of formal employment. The PILA is constructed at the contribution level, yet workers with multiple contracts have multiple contributions. To transform at the worker level, I use the highest observed income for workers with multiple contracts and leave the characteristics for the job 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 type of document of the worker, allows for a dynamic examination of trajectories over time for all migrant holders with PEP or PPT in the formal sector relative to natives through frequent, month-to-month changes.

As 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.[13] Hence, after restricting the sample to workers between 20 and 60 years old between 2018 and 2022, I have 28,299,039 observations for natives, 2,999,688

[12] Note that before 2018, Venezuelans were not statistically representative in the survey.

[13] Precisely, I take a 4% random sample of natives observed anywhere from January to July 2017 and trace them until 2022. I then do a parallel process from January to July 2022 to take an additional 4% random sample of natives and trace them backward up to 2017. Last, I include in this data all migrants and foreigners observed throughout the period.

observations for regularized migrants, and 1,588,671 observations for other foreigners in the PILA.

It is important to define the migrants observed in the survey and administrative data differently. On the one hand, in the PILA, I only identify Venezuelans who enrolled in the regularization program, so I refer to them as *regularized migrants* throughout the paper. On the other hand, in the GEIH, all Venezuelans are surveyed, including those undocumented or with documentation apart from the regularization, so I refer to them as *migrants* throughout the paper.

Firm 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 (Arellano-Bover and San, 2023; Dostie et al., 2021). In this aspect, I lay down several comparisons relative to natives, focusing on constant measures of firm variables, mostly before the COVID-19 pandemic, to understand these patterns without additional noise from specific pandemic dynamics. For all the firm outcomes, I use the whole sample of workers in the PILA, and then I merge the resulting firm-level constant measure with all the 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) for constructing a proxy of firm-specific pay premiums, employing the estimation methodology outlined in Card et al. (2016). The regression model takes the following form:

$$ln(w_{it}) = \alpha_i + \psi_{j(i,t)} + X'_{it}\gamma + \upsilon_{it}, \tag{1}$$

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 it's 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 effects. Appendix Figure A.1 shows flat trends in residual wages before and after the move for workers, while during the transition, they experience either wage gains or losses depending on the pair origin-destination firm. The pattern of constant wage pre-trends for movers is consistent with evidence from other

countries, such as Brazil (Gerard et al., 2021) and Portugal (Card et al., 2016), suggesting that the underlying mobility assumption is likely to hold.

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. The final estimation sample contains 27,618,016 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. For this analysis, I do not estimate separate AKM models by origin status as the share of migrants is consistently below 1.2% in all periods, which substantially reduces the number of connected firms as they need to have both native and migrant movers. So, I will not measure the degree of differential pay setting *within* firms. In support of this, Amior and Stuhler (2022) documents for Germany and Cole et al. (2024) for the Netherlands show that the differential pay-setting channel within firms for migrants is negligible.

Finally, I use 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.[14] I construct the average poaching index by considering data from 2015 to 2018 for February and August.[15]

4 Results

4.1 Employment and Wage Gaps in the Informal and Formal Sectors

First, I analyze cross-sectional dynamics, mainly focusing on the GEIH survey, by estimating the following regression model separately for each sex:

$$Y_{it} = \alpha + \sum_{y} \beta_y T_y * M_i + \gamma_y + \gamma_m + \gamma_{ae} + \epsilon_{it}. \tag{2}$$

Here, the individual outcome Y_{it} represents either the logarithm of hourly wages or employment indicators for the formal or informal sectors in period t. The interaction of migrant dummies M_i

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

with year dummies T_y produces the dynamic assimilation coefficients β_y. Additionally, I control for year and month fixed effects (γ_y and γ_m) for any seasonal and yearly changes concerning all workers and the interaction of age and education fixed effects (γ_{ae}) to control non-parametrically for varying returns to education with experience. 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 sample, I use national survey weights.

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 gap, aligning with previous literature that points to higher migrant employability due to their lower reservation wages and more inelastic labor supply (Borjas, 2017). In contrast, migrant females initially lag behind native females in employment during the early years of the immigration shock, suggesting they have higher labor supply elasticities relative to native females. However, after 2017, they began to converge, and starting in 2021, they are slightly more likely to be employed.[16]

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, with migrants being 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.[17] Notably, the different regularization amnesties aimed at promoting formal employment, among other objectives, seem to have a minor impact on these aggregate trends, at least from the survey data. I then investigate the relationship between local economic development and informality gaps, breaking down this gap into five large regions. Interestingly, the region with the highest economic development, Bogotá, showcases the most negative gap that also increases over time (reaching nearly 50 pp in 2022). This gap is declining for the rest of the regions, with the Caribbean region

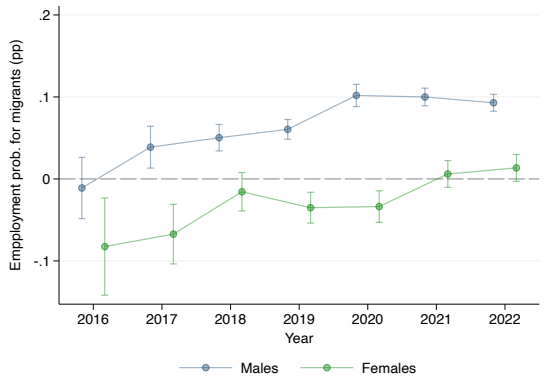
[16] For those employed, the likelihood of being self-employed is notably lower among migrant males and females, regardless of whether they work in the formal or informal sectors. Appendix Figures A.2a and A.2b show that migrants have lower self-employment rates than their native counterparts. In the formal sector, the gaps are -6.7 pp for females and -7.9 pp for males. In the informal sector, it is -7.5 pp for females and -13.8 pp for males (as of 2022). Contrary to the popular view that migrants are overrepresented in self-employment, these results suggest that migrants are less involved in self-employment than natives when divided by their formal status.

[17] Because the share of informality is around 50% for natives in my period of analysis, migrants are almost twice as likely to work informally.

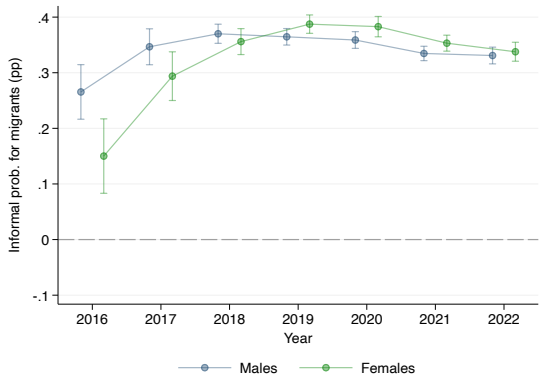
registering the smallest informal gap in 2022 at 18 pp (see Appendix Table A.1).

Figure 2: **Employment gaps for migrants by sex**

(a) Employment prob.



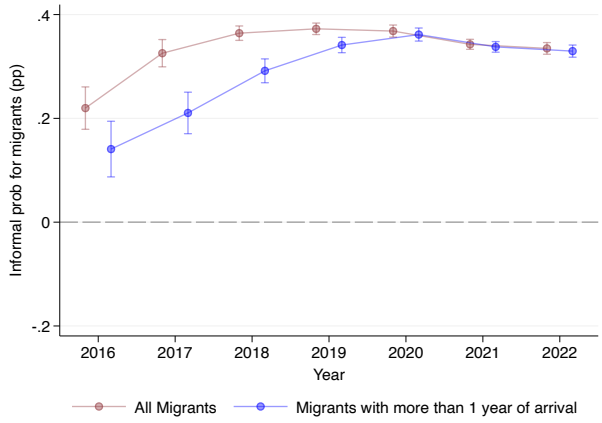
(b) Informal employment prob.



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

I can also identify with 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 by their duration of stay in Colombia. Figure 3 illustrates that migrants who have been for over a year are less likely to work informally, while newer arrivals are more likely to work informally, 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.

Figure 3: **Informal employment prob. by arrival**



Note: restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

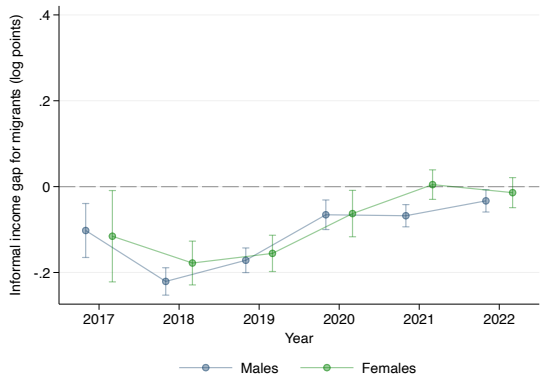
Another relevant measure of integration is the wage or labor income gap between migrants and natives. Focusing on the informal sector, Figure 4a highlights a negative hourly income gap that began to narrow in recent years. For 2022, it is insignificant for migrant females, while it is –3.3% for migrant males. The reduction in the informal income gap over time is partly driven by the decrease in informal native income caused by the Venezuelan immigration (Delgado-Prieto, 2024). Next, I analyze the hourly formal wage gap, noting that as the sample size of migrants formally employed is substantially smaller and are likely positively selected, the results should be interpreted cautiously. Figure 4b shows that during the initial stages of the immigration shock, the estimates were quite noisy, while after 2018, the estimates show a more negative differential.[18] Furthermore, Appendix Table A.2 shows that further controlling for the workers' industry and occupation does not reduce the informal income gap, while these controls significantly reduce the formal wage gap.[19]

[18] Working hours contribute to the conditional earnings gap between migrants and natives. Appendix Figure A.3a shows that in the informal sector, migrant males worked approximately 7.5% more weekly hours than natives in 2022, and migrant females 5.7% more, numbers that have remained relatively stable over time. In contrast, estimates in the formal sector are noisier and more volatile, but suggest differences close to zero for males and slightly positive for females (see Appendix Figure A.3b).

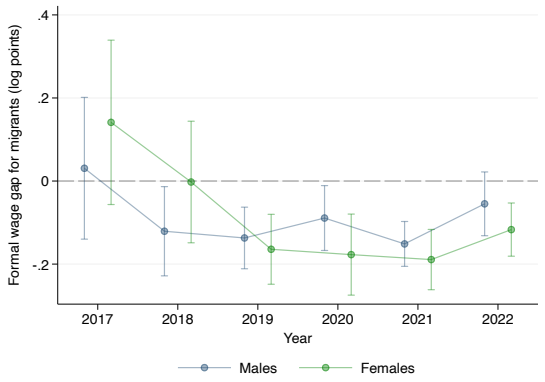
[19] Appendix B shows integration patterns by industry and occupation over time. Importantly, migrants are over-represented in the commerce, hotels, and restaurant industries, where informality is higher. By occupation, they are more likely to work as street vendors or delivery personnel.

Figure 4: **Hourly wage gap for migrants by sex and sector**

(a) Informal sector



(b) Formal sector



Note: I restrict the sample to full-time workers between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2017–2022.

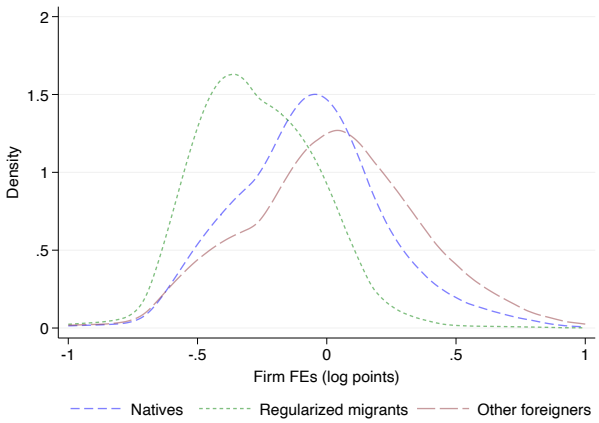
4.2 Labor Market Gaps of Regularized Migrants

Examining worker and firm variables with a matched employee-employer dataset that identifies all regularized migrants and natives is novel in developing countries. Hence, I start presenting a descriptive comparison of various worker and firm variables over time in Appendix Tables A.4a, A.4b, and A.4c, introducing another comparison group: other foreigners. The inclusion of this group is motivated by the possibility that Venezuelans may have entered the formal sector with alternative documentation distinct from PEP or PPT.

First, the proportion of males among native workers (58%) is consistently below that of regularized migrants and other foreigners across all years. Regularized migrants also exhibit a younger age profile, with an average age below 34 in all years, while natives and other foreigners are older. Regarding wages, regularized migrants earn considerably lower wages than natives, as they often earn the minimum wage (approximately 60% of them). In contrast, other foreigners earn substantially higher wages than both groups, suggesting they are high-skill workers, possibly with managerial roles. By firm size, natives tend to work in significantly larger firms compared to other foreigners and regularized migrants. However, when it comes to firm-specific pay premiums, I find the largest differences, as other foreigners sort into higher-paying firms than natives and regularized migrants. Figure 5 shows this clearly by displaying the distribution of workers across firm fixed effects. The

figure reveals the sorting patterns across worker groups: regularized migrants are disproportionately concentrated in the lower end of the firm pay distribution, natives are more evenly spread but skewed to the right, and other foreigners are located even more in the upper tail. These patterns suggest systematic differences in the types of firms in which each type of worker is employed. Lastly, regarding firms' desirability index or poaching index, regularized migrants tend to be associated with less desirable firms than natives.

Figure 5: **Distribution of firm fixed effects by origin**



Note: I restrict the sample to workers between 20 and 60 years old who have been employed for at least 30 days in the month. Firm fixed effects are estimated from the AKM equation from 2015 to 2019. Source: PILA, 2018–2022 for July.

In the following analysis, I focus solely on the group of natives and regularized migrants, as the group of other foreigners is unclear in terms of their arrival in Colombia and their origin, while their numbers have been decreasing in recent years. On average, regularized migrants earn substantially lower real wages than natives, according to Appendix Figure A.4a, primarily because they are overrepresented in minimum-wage jobs. Between 2018 and 2022, the likelihood of having a minimum-wage job for regularized migrants nearly doubles that of natives, and it does not change much over time, hovering around 60% of all migrant employment relative to 30% for natives (see Appendix Figure A.4b). The relatively high minimum wage in the Colombian labor market, which binds for most regularized migrants, makes them more vulnerable to fluctuations in the labor market. Still, even in these conditions, regularized migrants earn higher wages than those working in the informal sector, as shown in Appendix Figure A.9a, apart from all the non-pecuniary benefits of formality.

Not only are regularized migrants more likely to occupy minimum-wage jobs, but they also tend to work in smaller and lower-paying firms than natives. Appendix Figure A.5a shows that the typical regularized migrant works in a firm with around 50 workers while the typical firm of natives is around 200. This aligns with recent evidence indicating migrants often concentrate in smaller firms upon arrival, as documented by (Amior and Stuhler, 2022) for Germany and Arellano-Bover and San (2023) for Israel. Furthermore, regularized migrants are sorted into lower-paying firms relative to natives (see Appendix Figure A.5b). This pattern explains why migrants consistently earn significantly lower wages than their native counterparts, as they are, for instance, more likely to work in firms that pay the minimum wage to their workers.

To quantify this contribution more precisely, I perform a Blinder-Oaxaca decomposition outlined in Card et al. (2016) and Dostie et al. (2021) 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. The gap decomposition coming from the AKM model in Equation (1), omitting the time-varying controls, takes the following form:

$$\begin{aligned} E[\ln(w_{it})|N=1] - E[\ln(w_{it})|M=1] = & \underbrace{E[\alpha_i|N=1] - E[\alpha_i|M=1]}_{\text{Skill differences}} \\ & + \underbrace{E[\hat{\psi}^N_{J(i,t)}|N=1] - E[\hat{\psi}^N_{J(i,t)}|M=1]}_{\text{Differential sorting}} \\ & + \underbrace{E[\hat{\psi}^N_{J(i,t)} - \hat{\psi}^M_{J(i,t)}|M=1]}_{\text{Differential pay-setting}}. \end{aligned} \tag{3}$$

I focus on the second term, as the first (measuring constant ability differences) and third (within-firm pay differentials) require estimating separate AKM models by migrant status. However, given the limited sample size of migrants discussed above, the primary analysis is on the sorting component.[20] This term captures the average difference in native firm fixed effects between natives and regularized migrants. The ratio of the difference in mean log wages to the difference in mean firm effects indicates that sorting explains 49.4%, or roughly half of the overall formal wage gap between these groups from January 2018 to July 2022. Compared to recent findings in Canada (Dostie et al., 2021) and Israel (Arellano-Bover and San, 2023), which document that firm effects explain around

[20] There is also evidence that indicates the pay-setting channel does not contribute much to the migrant wage gap in other contexts (Amior and Stuhler, 2022; Dostie et al., 2021).

20% of the wage gap, these results are substantially larger. Moreover, when 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.

The stronger role of firms in Colombia may be systematic to its labor market, so I decompose how much of the formal wage variance of all workers is explained by the variance of firm fixed effects. In Table 1, I show it explains 19.5% of the wage variance, which similarly aligns with the evidence in Card et al. (2018) for other countries. This suggests that the labor market context does not necessarily explain the differences in the sorting component across countries and that the type of immigrants may be more relevant. In this context, most regularized migrants are refugees lacking formal documentation of their educational backgrounds or work histories, 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-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 other factors, besides the lack of formal documentation, such as the relatively high minimum wage and large informal sector in this context, may also increase the sorting among low-paying formal firms.

Table 1: **Variance decomposition of** lnw_{it}

Component	Value	Share of $Var(lnw_{it})$
$Var(\alpha_i)$	0.231	56.3%
$Var(\psi_{j(i)})$	0.081	19.7%
$2 * Cov(\alpha_i, \psi_{j(i)})$	0.069	16.8%
$Var(lnw_{it})$	0.411	100%
$Corr(\alpha_i, \psi_{j(i)})$	0.252	

Note: This Table reports the variance decomposition of wages in the formal sector in Colombia using the largest connected set of workers and firms with the method proposed in Card et al. (2016) with year FEs as the control variable. The full decomposition is: $Var(lnw_{it}) = Var(\alpha_i) + Var(\psi_{j(i)}) + Var(X'_{it}\gamma) + Var(\upsilon_{it}) + 2 * Cov(\alpha_i, \psi_{j(i)}) + 2 * Cov(\alpha_i, X'_{it}\gamma) + 2 * Cov(\psi_{j(i)}, X'_{it}\gamma)$, and I focus only on the most relevant terms in this table. Source: PILA, August 2015–August 2019.

[21] A theoretical explanation for 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, 2022).

I then focus on 2021 to quantify more precisely the different components of the wage gap between regularized migrants and natives. Table 2 column (1) shows that the raw wage gap between them is 0.42 log points. This gap diminishes to 0.33 log points in column (2) after controlling for observable worker characteristics, such as age and sex, department and industry constant characteristics, and time fixed effects. The introduction of firm fixed effects (estimated in a previous step only for natives) in column (3) as a control leads to a substantial reduction in the wage gap to 0.13 log points, again consistent with the story that firms explain most of the overall wage gap. The residual gap, unexplained by observable worker factors or firm effects, can be attributed to variables such as the worker's education or occupation, which are not captured in the administrative dataset. Last, comparing survey-based estimates of the formal wage gap in Appendix Table A.2 with ones from the administrative data reveals substantial attenuation using the survey, as the gap is almost half the size with or without controls.[22] This highlights the potential limitations of using only survey data to analyze formal migrant outcomes, as in Bahar et al. (2024), since such data may misrepresent the actual population (Aydemir and Borjas, 2011), and are also prone to measurement error (Bound et al., 2001) and non-response bias (Dutz et al., 2021).

Table 2: **Formal wage gap with different controls, 2021**

	(1)	(2)	(3)
	$ln(w_{it})$	$ln(w_{it})$	$ln(w_{it})$
$\mathbb{1}\{M_i = 1\}$	-0.420***	-0.334***	-0.127***
	(0.0005)	(0.0006)	(0.0005)
Constant	14.294***	14.285***	14.378***
	(0.0003)	(0.0003)	(0.0003)
Controls			
Age, sex, department, industry, and month fixed effects	No	Yes	Yes
Firm fixed effects	No	No	Yes
N	4,877,969	4,877,969	4,877,969
R^2	0.040	0.154	0.430

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Note: This Table reports the formal wage gap for regularized migrants with PEP or PPT relative to natives. The firm fixed effects are constructed in a previous step using an AKM model specification between 2015 and 2019 using the largest connected set of firms. I restrict the sample to full-time employees between 20 and 60 years of age with 30 days of employment in the PILA. Source: PILA, 2021.

[22] There may be hourly differences between both estimates because I am comparing hourly and monthly wage gaps. Yet, Appendix Figure A.3b shows no significant differences in hours worked in the formal sector. Also, the survey covers Venezuelans apart from the regularized ones in the formal sector, but their relative size is arguably small, and their influence should be limited.

4.3 Labor Market Assimilation by Cohorts of Entry into Formality

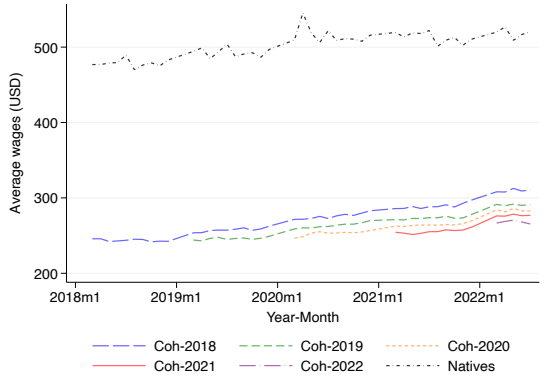
To study assimilation, I analyze a defined sample of individuals over time, addressing potential compositional changes caused by continuous migrant inflows. For this analysis, I leverage the panel structure of the administrative data to categorize migrant workers based on the year of their first entry into the formal sector and track the evolution of their outcomes by cohorts. This mitigates compositional shifts arising from new regularized migrant workers entering the formal sector but does not account for potential selection bias in the outflows of workers in each cohort over time (Appendix Table A.3 shows evidence there is a small positive selection). Moreover, the analysis of 2022 has a data limitation worth discussing. 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), limiting the feasibility of future longer-term analysis as more data becomes available.

To start, Figure 6a shows that natives earn higher real wages than all cohorts of regularized migrants, with minor improvements as they gain more formal sector experience, yet the gaps remain substantial.[23] In the previous section, I find firm fixed effects explain half of the wage gap. Thus, I analyze the sorting patterns of regularized migrants across firms by cohorts and over time. Figure 6b shows that natives generally sort into higher-paying firms compared to regularized migrants in all cohorts. Interestingly, earlier cohorts of regularized migrants tend to sort into higher-paying firms over time compared to the subsequent cohorts. This suggests that accumulating experience in the formal sector is important for entering better-paying firms. I then perform a similar analysis for firm size in Figure 6c. Once again, the median firm size is consistently higher for natives than regularized migrants in all cohorts and periods, with the initial cohorts sorting into slightly larger firms relative to the subsequent cohorts. Recent evidence from Spain suggests that an initial job in larger firms rather than small ones can have positive, long-lasting effects on workers, primarily due to better skill development (Arellano-Bover, 2020).

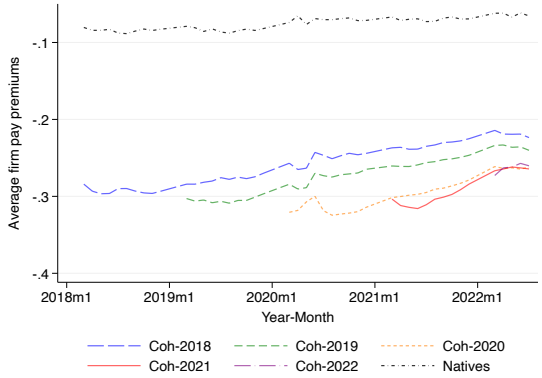
[23] I exclude January and February in the descriptive figures because they contain a spike in the variables due to the annual adjustment of the minimum wage, typically announced in January and implemented in February.

Figure 6: **Patterns by cohorts of entry to the formal sector**

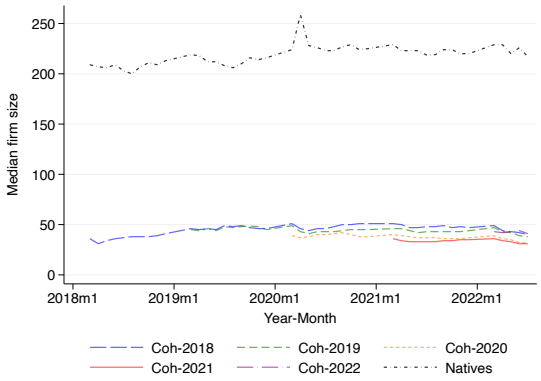
(a) Monthly Wages



(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 (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 (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.

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 potential bias, I conduct an analysis that controls for time, age, and gender effects. This adjustment helps isolate assimilation dynamics by accounting for economy-wide shocks as well as differences in the age and gender composition of migrants and natives.

In the following figures, I compare the outcomes of migrants based on the year of first entry into the formal sector. This serves as a metric for measuring assimilation over time.[24] More formally, I

[24]The first year of entry for migrants is tracked from 2017 onward when migrants with PEP or PPT first appeared

estimate the following regression model separately by year:

$$Y_{it} = \alpha_t + \sum_g \beta_g * \mathbb{1}\{M_i = 1, G = g\} + \gamma_m + \gamma_{as} + \upsilon_{it}. \quad (4)$$

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 $G = \{2018, ..., 2022\}$. 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 PILA. The error term is denoted as υ_{it}.

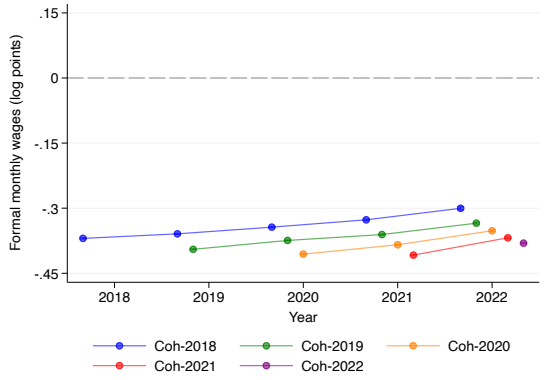
In Figure 7a, I first show that as regularized migrants accumulate more time since the first entry into the formal sector, the formal wage gap with natives diminishes. This reduction is primarily driven by the decrease in the probability of holding a minimum wage job, as shown in Figure 7b. Nevertheless, 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 log points.[25]

in the PILA.

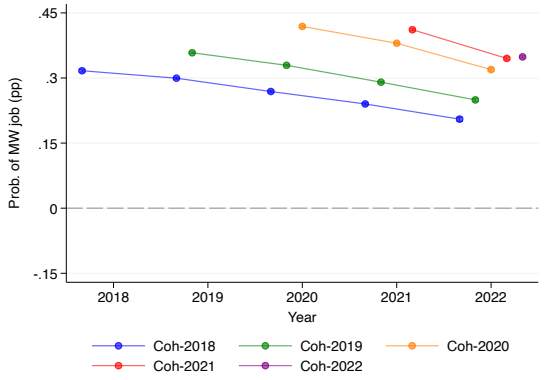
[25] I also analyze the assimilation patterns by age groups for the cohort five years since the first entry into the formal sector, the one with more time for convergence. Appendix Figure A.8 shows that younger regularized migrants are much closer to convergence than their older counterparts. This observation implies that the age at which migrants enter the formal sector is a proxy for their integration, with labor market entrants having lower formal wage gaps. The distinct patterns across age groups and cohorts highlight different angles of the analysis, where the duration and timing of entry into the formal sector during the life cycle significantly influence convergence.

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

(a) Formal wage



(b) Mininum wage job



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 (4). I use a 95% confidence interval. Source: PILA, 2018–2022.

Most of the wage differences between regularized migrants and natives are driven by the type of firm they work, as shown below. Hence, I turn to evaluate the assimilation of regularized migrants in terms of both their firm pay premiums and the attractiveness of the firm. First, focusing on firm pay premiums, there is a persistent lack of convergence, as regularized migrants consistently sort into lower-paying firms relative to natives in all cohorts, yet the differences diminish over time (see Figure 8a). For the cohort of 2018, the coefficient ranges from -0.21 log points in the first period to -0.15 log points in the last period, which represents around half of the formal wage gap in 2022. The difference in the first year of entry for the 2018 and 2019 cohort is approximately 0.2 log points, similar to the findings in Israel of migrant males but more negative than their findings for migrant females (Arellano-Bover and San, 2023). In the Israeli context, the convergence took approximately 29 years, suggesting a considerable duration before regularized migrants exhibit convergence if they follow a similar trajectory.

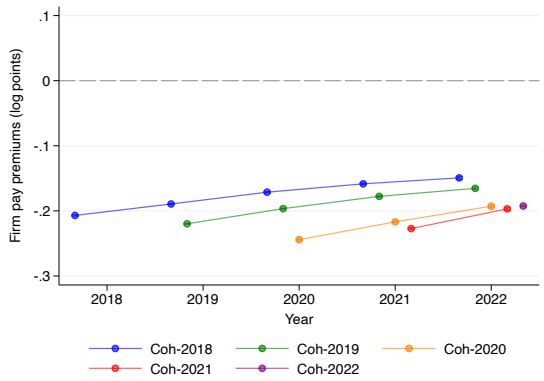
I then analyze patterns of firm size assimilation across all cohorts, observing a substantial and consistent gap each year of at least one log point (see Figure 8b). This difference corresponds to approximately a 172% lower firm size.[26] Importantly, this measure has no improvement over time, as migrants continue to lag in firm-size assimilation. Lastly, I leverage the poaching index from

[26] Calculated as $(e^1 - 1) \times 100 = 172\%$.

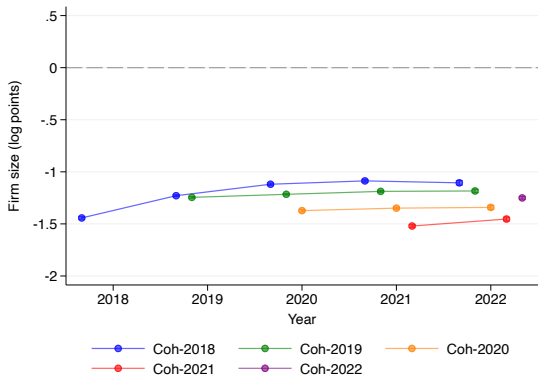
Bagger and Lentz (2019) to show that across all cohorts, regularized migrants consistently sort into less desirable firms compared to native workers. However, this gap narrows gradually, suggesting a slow but steady convergence in terms of firm overall quality (see Figure 8c).

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

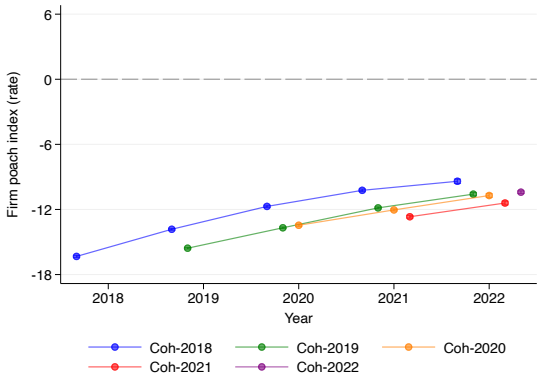
(a) Firm pay premiums



(b) Firm size



(c) Poaching index



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 oberved between 2015 and 2018 in August. The plotted coefficients come from equation (4). I use a 95% confidence interval. Source: PILA, 2018–2022.

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 that reason, I exploit the temporal dimension of the administrative dataset to quantify year-to-year variations in the likelihood of employment, a proxy of attachment to formal employment, and

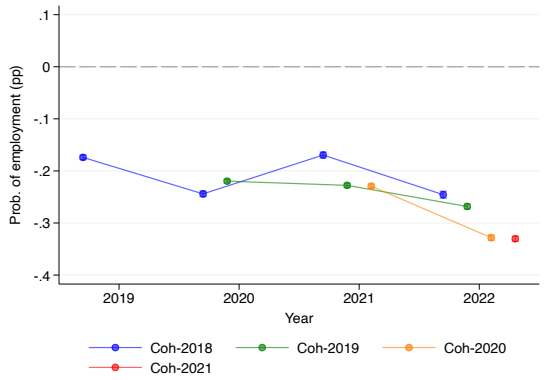
of changing employers. Across cohorts, regularized migrants exhibit a substantially lower likelihood of sustaining employment in the next year relative to natives, with an estimate that ranges from -17 pp to -25 pp for the cohort of entry in 2018 to -33 pp for the cohort of 2021 (see Figure 9a). Because 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.3 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 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.

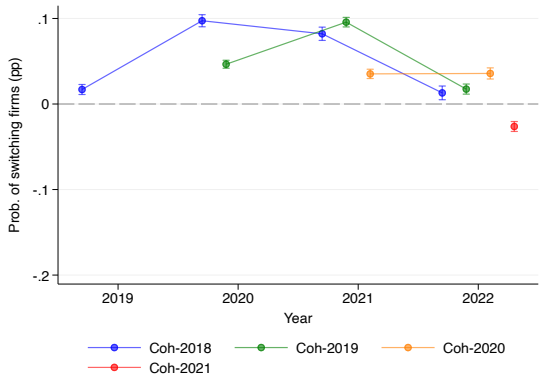
Regularized migrants who remain employed in the next year tend to move more across firms relative to natives, especially in their second year in the formal sector. For instance, the cohort of 2018 has a coefficient in 2020 that is around 10 pp higher (see Figure 9b).[27] These two patterns can explain some of the conditional gap reductions over time and are the starting point for the discussion in the next section on why formalization rates remain low among regularized migrants.

Figure 9: **Relative gap for job characteristics by cohorts**

(a) Employment prob.



(b) Firm mobility



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 (4). I use a 95% confidence interval. Source: PILA, 2018–2022.

[27] The cohort of 2022 is missing in this analysis as I do not observe their employment status in 2023.

Lastly, I examine the role of firm mobility by comparing the outcome growth of regularized migrants who switch firms to those who do not, using natives as a benchmark. Table 3 shows that regularized migrant movers experience an average wage increase of 1.6% relative to non-movers, though this is lower than the 2.9% growth observed for native movers. However, the most significant differences arise at the firm level: migrant movers transition to better-paying and much larger firms, with the largest contrast being firm size. On average, migrant movers shift to firms 0.34 log points larger than their initial firm, while native movers see no significant change in firm size.

These findings highlight that, although mobility could be correlated with other unobservable factors, their movement to larger and better-paying firms can reflect an effort to climb the job ladder, as they start in substantially lower-quality firms than natives. In that sense, once regularized migrants can signal their productivity within the formal sector, especially the highest-ability ones, firm mobility may improve their long-term trajectories and help them to narrow disparities with natives over time.

Table 3: **Outcome growth of movers by origin, 2021–2022**

	(1) Regularized migrants	(2) Natives
$ln(w_{it})$	0.016*	0.024***
	(0.0068)	(0.0041)
$\hat{\psi}^{N}_{J(i,t)}$	0.027***	0.016***
	(0.0054)	(0.0018)
$ln(firmsize_{it})$	0.336***	0.005
	(0.0534)	(0.0163)
N	46,049	678,719

Note: The equation I estimate for this table is: $Y_{it} = \alpha_t + \beta Mov_i + \theta Mov_i * T_t + \gamma_{as} + \upsilon_{it}$. The interaction term $\theta Mov_i * T_t$ captures the relative changes in outcomes for workers who switch firms versus non-movers. I restrict the sample to employees between 20 and 60 years old who did not move to another firm in the last year. I use as controls eight age groups interacted with gender dummies. I capture the yearly worker's main employer from their yearly highest earning spell. Source: PILA, 2019–2022.

5 Low Formalization of Migrants: Potential Explanations

A relevant question remains from the previous analysis: why do more regularized migrants not transition into the formal sector despite having access to work permits and sharing similar education, language, and culture? Two potential explanations from the supply and demand side of the labor market could rationalize this. From the worker's perspective, although the formal sector of-

fers substantially higher wages and improved working conditions such as minimum wages and paid vacations, it also requires higher tax payments. Therefore, I first examine how large the formal wage premium is over time to quantify workers' trade-offs when opting for informal employment.

The Colombian labor market has experienced major transformations in recent years, including a marked concentration of 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 to the immigration shock, 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, and education effects. Appendix Figure A.9a shows the dynamic shifts in the formal wage premium over time: for native workers, it shows an upward trajectory, whereas for migrant workers, it has been declining.[28] The data shows that the premiums are substantial and even higher than for natives. Specifically, for migrants, the premium ranges from 0.61 log points in 2017 to 0.34 in 2021, compared to a range of 0.36 to 0.38 for natives during the same period. As discussed above, the migrant survey data may have limitations. Still, these significant premiums give less evidence to the hypothesis that migrants do not transition to the formal sector after the regularization process due to insufficient wage differentials between the two sectors.[29] This descriptive evidence suggests that labor supply factors may not fully explain low formalization rates among migrants as long as other non-pay attributes of informal jobs, like flexibility or autonomy, or lower taxes do not fully compensate for the lower wages, such that migrants perceive a higher job value in the informal versus the formal sector.

The other explanation lies in 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, for formal jobs. Second, employers sometimes require formal certification of previous education or experience from migrants (DANE-EPM, 2024), which many of them 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 as productive enough to justify the mandated minimum wage. Third, employers may not know about the regularization program and that it grants migrants legal doc-

[28] In Appendix Figure A.9b, I further control for two-digit occupations and location, to show that the premium decreases, but it is still wide.

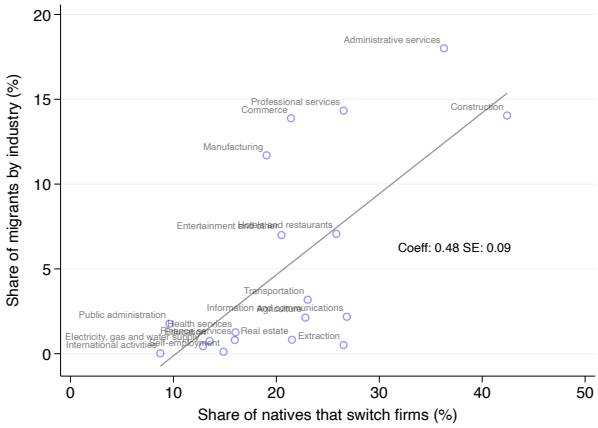
[29] Bahar et al. (2021) also suggests that migrants may be unaware of those differentials.

umentation to work formally (Bahar et al., 2021). Fourth, formal employers who can already hire migrants informally may see little incentive to formalize these workers, as the enforcement costs of informality remain unchanged, unlike in Spain's large regularization, where increased enforcement accompanied the regularization policy (Elias et al., 2022). Fifth, other factors may make hiring migrants less profitable in monetary terms (due to less stable employment matches) or less preferable in non-monetary terms (due to migrant discrimination). Although it is challenging to disentangle these sources as no such firm-level information is available, I use the linked employee-employer data to provide descriptive evidence on one of these factors that can make firms hire natives over migrants.

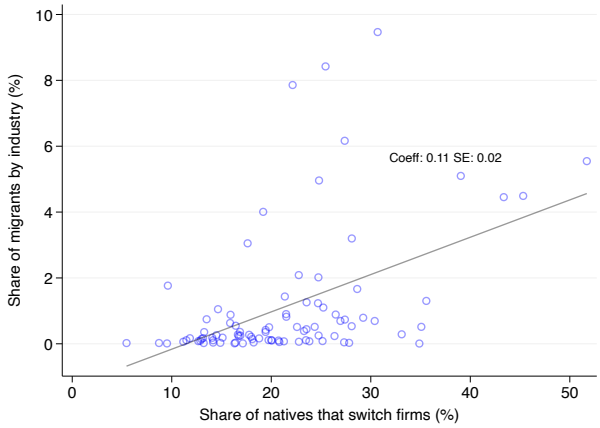
The results from the previous section reveal lower attachment to formal employment among migrants, along with greater firm mobility for those who remain employed (see Figures 9a and 9b). These patterns suggest employers may be less inclined to hire migrants, even when they hold work permits, as they might anticipate a lower job tenure. This reduces the expected returns on employer investments in on-the-job training, which can be costly and time-intensive in some industries. It is challenging to measure this response causally, but I further explore this hypothesis descriptively. I divide industries into more or less detailed categories to measure native firm mobility rates and plot them against the distribution of regularized migrants across those industries. Figures 10a and 10b show a strong positive association: industries with higher native firm mobility, 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. The relationship might be partly mechanical as regularized migrants often sort into low-paying or high-informality industries with higher firm mobility rates. However, the relationship holds even when controlling for average industry pay premiums or the informality share of the industry. Hence, the observed correlation supports the idea that employers in some industries value workers' attachment to the firm more than others, and as migrants' attachment is generally lower than that of natives, they are less likely to be employed in specific industries that usually pay higher wages.

Figure 10: **Share of regularized migrants and native firm mobility rates by industry**

(a) 1D Industry



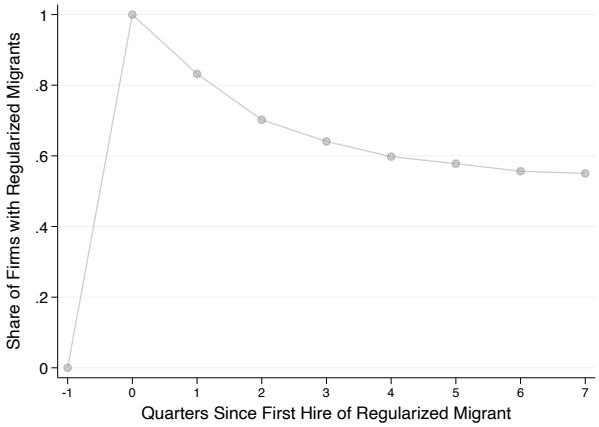
(b) 2D Industry



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

Another piece of evidence from the administrative data further supports this explanation. I categorize all firms between 2018 and 2019 that hire regularized migrants by the quarter in which they first hire a regularized migrant and track their migrant hiring behavior over subsequent quarters up to the onset of the COVID-19 pandemic. Notably, 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, likely reflecting improved information about regularized migrants within firms. This suggests that factors such as lower migrant attachment to firms or greater mobility among migrants can influence firms' decisions, leading some to stop hiring regularized migrants entirely. Altogether, this demand-side perspective provides insights into one factor of why the regularization program for undocumented Venezuelans in Colombia has not led to higher formal employment rates.

Figure 11: **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 to the population of full-time workers between 20 and 60 years old. Source: PILA, 2018–2019.

6 Conclusion

This paper uses a unique combination of administrative and survey data to provide a comprehensive analysis of the economic integration patterns of migrants and regularized migrants in a developing country for the first time. I document that Venezuelan immigrants, despite being eligible for work permits, disproportionately work in the informal sector. This raises questions about the efficacy of existing regularization programs in Colombia. Furthermore, I analyze wage differentials with natives in the formal sector to document that regularized migrants consistently sort into lower-paying firms and thus earn around half their wages. I also show a lower firm attachment among migrants and discuss how this can lead to lower formality rates. Altogether, these findings suggest broader policies beyond regularization to enhance the assimilation of migrants into the host country.

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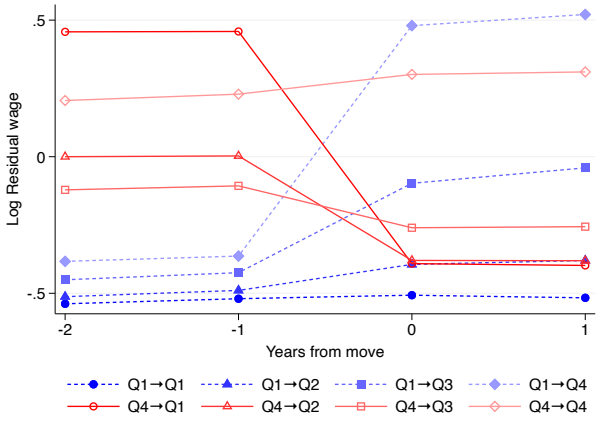
Online Appendix

A Supplementary Results

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.

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

	Capital	Caribbean	Central	Oriental	Pacific
2018	0.454***	0.233***	0.369***	0.355***	0.360***
	(0.020)	(0.007)	(0.017)	(0.014)	(0.022)
2019	0.489***	0.227***	0.367***	0.388***	0.338***
	(0.015)	(0.006)	(0.015)	(0.009)	(0.016)
2020	0.479***	0.211***	0.377***	0.382***	0.344***
	(0.017)	(0.006)	(0.013)	(0.010)	(0.016)
2021	0.472***	0.199***	0.361***	0.341***	0.301***
	(0.013)	(0.006)	(0.010)	(0.010)	(0.012)
2022	0.489***	0.183***	0.311***	0.358***	0.300***
	(0.016)	(0.006)	(0.012)	(0.013)	(0.014)
N	63,652	397,424	364,029	215,210	202,256
R^2	0.188	0.244	0.196	0.224	0.224

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports the coefficients from equation (2). 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: **Hourly wage gap in GEIH with different controls, 2021**

	(1)	(2)	(3)
	Log wage	Log wage	Log wage
Panel A: Formal sector			
$\mathbb{1}\{M_i = 1\}$	-0.218***	-0.167***	-0.071***
	(0.0236)	(0.0218)	(0.0182)
N	94,068	94,068	94,068
R^2	0.002	0.257	0.401
Panel B: Informal sector			
$\mathbb{1}\{M_i = 1\}$	-0.020	-0.043***	-0.046***
	(0.0106)	(0.0106)	(0.0106)
N	97,595	97,588	97,588
R^2	0.000	0.076	0.115
Controls			
Age, sex, education and month fixed effects	No	Yes	Yes
Industry and occupation fixed effects	No	No	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This Table reports the wage gap for Venezuelan migrants relative to natives. I restrict the sample to workers between 20 and 60 in urban areas. The regression uses survey weights Source: GEIH, 2021.

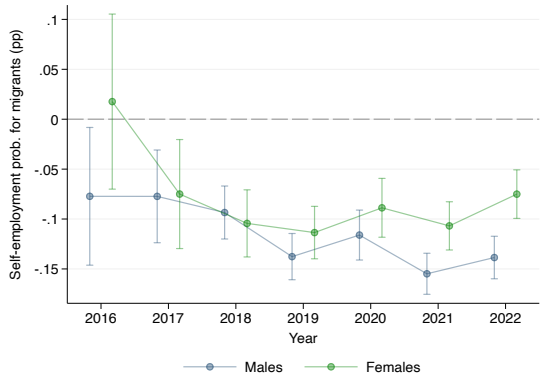
Table A.3: **Comparison of baseline characteristics for migrant workers by employment status and cohorts**

	2018 Cohort			2019 Cohort			2020 Cohort		
Variable	Drop	Stay	Diff	Drop	Stay	Diff	Drop	Stay	Diff
Age (Years)	31.05	30.79	0.26*	32.60	32.31	0.29*	32.15	31.73	0.43***
	(0.15)	(0.06)		(0.15)	(0.06)		(0.11)	(0.05)	
Male Proportion	0.67	0.70	-0.03***	0.60	0.63	-0.03***	0.64	0.67	-0.03***
	(0.01)	(0.00)		(0.01)	(0.00)		(0.01)	(0.00)	
Log Monthly Wages	5.42	5.45	-0.03***	5.51	5.55	-0.04***	5.48	5.50	-0.02***
	(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)	
Sample Size (N)	2,932	16,801		3,322	19,201		6,044	29,399	

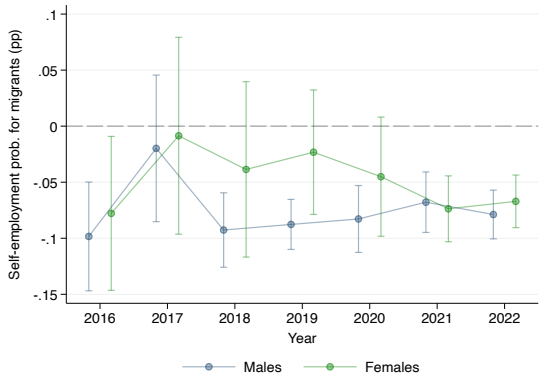
Note: This table compares the average characteristics of regularized migrant workers who drop out of formal employment and those who stay formally employed in the next year, using data from the first year of employment to analyze the role of selection. I restrict the sample to full-time employees between 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. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

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

(a) Informal sector



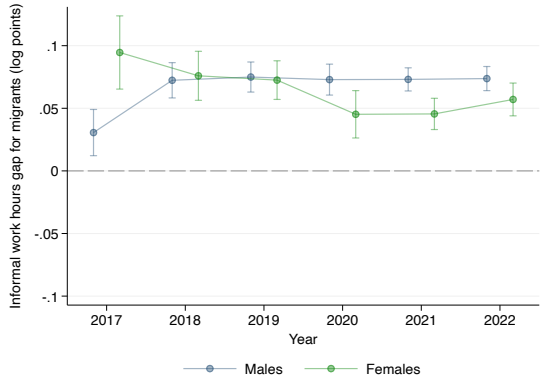
(b) Formal sector



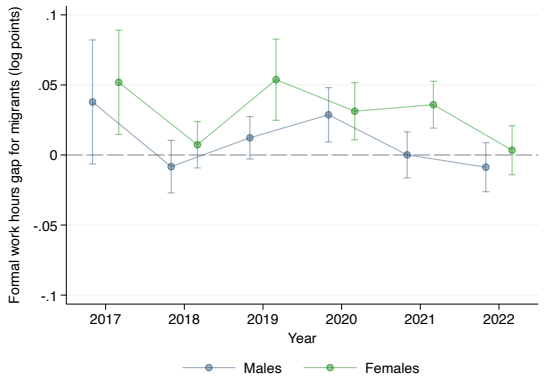
Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

Figure A.3: **Working hours gap for migrants by sex and sector**

(a) Informal sector



(b) Formal sector



Note: I restrict the sample to full-time workers between 20 and 60 years old. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2017–2022.

Table A.4: **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	51.7	503,343
2019	0.58	37.3	504	0.27	1,802	-0.08	52.9	504,863
2020	0.58	38.0	522	0.28	1,845	-0.07	53.8	482,902
2021	0.58	38.1	522	0.29	1,897	-0.06	53.8	523,430
2022	0.58	38.2	520	0.30	1,948	-0.06	53.7	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	34.8	14,915
2019	0.70	31.8	250	0.59	1,038	-0.29	38.0	49,286
2020	0.70	32.6	263	0.62	1,229	-0.28	40.6	56,827
2021	0.65	33.3	270	0.61	1,221	-0.26	42.1	76,103
2022	0.65	33.5	274	0.61	1,153	-0.25	43.2	106,471

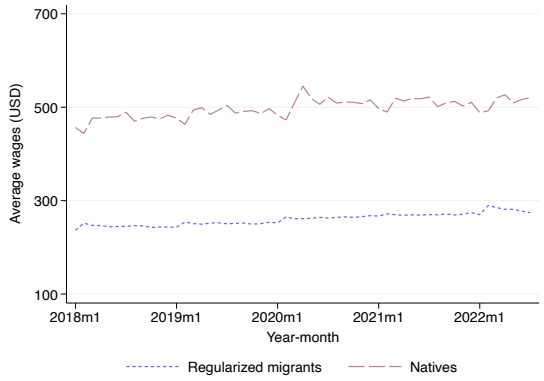
(c) Other foreigners

	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	46.7	30,036
2019	0.67	38.3	1,337	0.19	892	0.01	48.0	31,095
2020	0.66	39.3	1,418	0.18	1,053	0.04	49.4	29,024
2021	0.64	39.9	1,420	0.19	1,168	0.04	51.2	27,366
2022	0.63	40.4	1,421	0.20	1,260	0.06	51.9	25,818

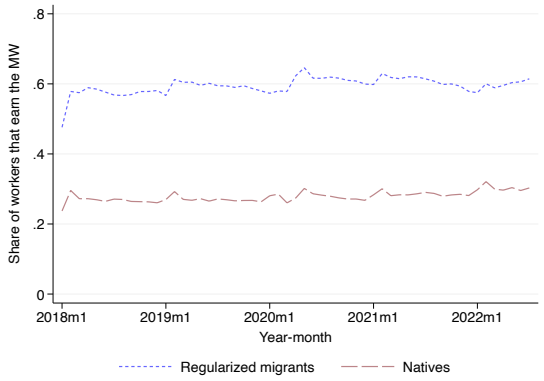
Note: This Table reports the average statistics for natives, regularized migrants with PEP or PPT, and foreigners between 20 and 60 years of age. I transform nominal Colombian pesos to real USD wages using DANE monthly CPI and the average exchange rate in 2020 from the World Bank. The firm premiums are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

Figure A.4: **Average worker characteristics by origin**

(a) Average real wages



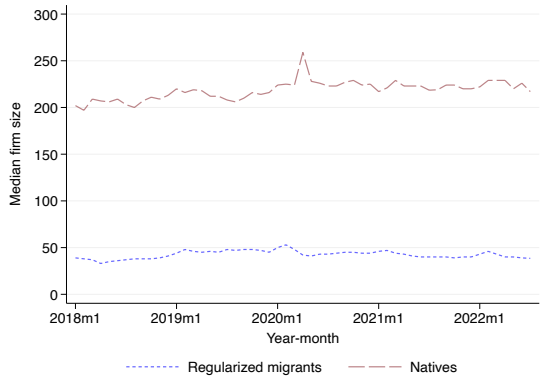
(b) Minimum wage earners



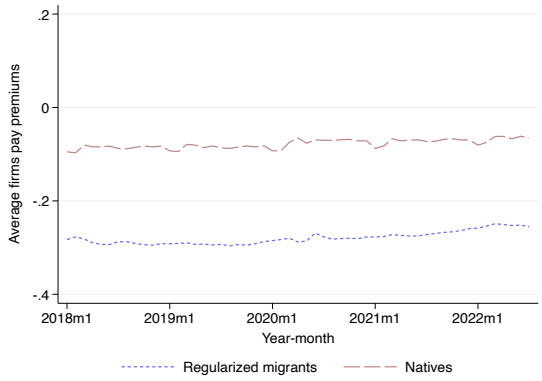
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. I transform nominal Colombian pesos to real USD wages using DANE monthly CPI and the average exchange rate in 2020 from the World Bank. Source: PILA, 2018–2022.

Figure A.5: **Average firm characteristics by origin**

(a) Firm size



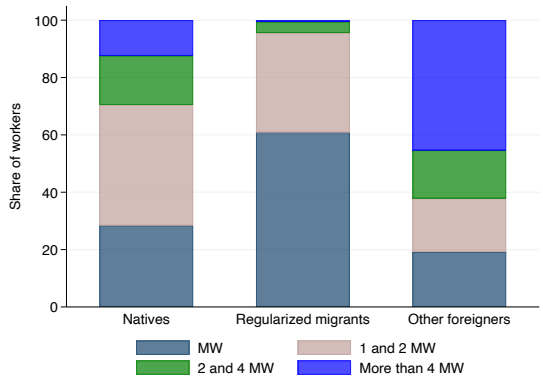
(b) Firm pay premiums



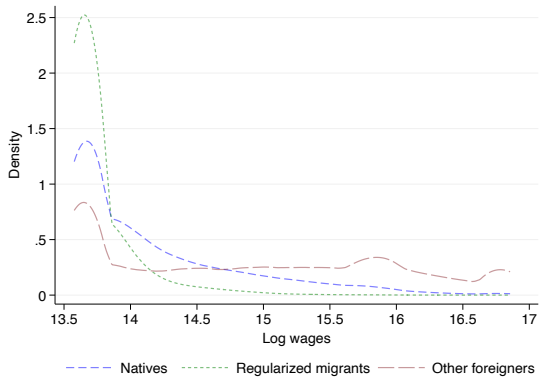
Note: I restrict the sample to full-time employees between 20 and 60 years old with 30 days of employment in the PILA. For (a), I restrict to workers in firms observed in August 2019. For (b), I restrict to workers in firms with non-missing firm fixed effects in the estimation period of 2015 to 2019.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

Figure A.6: **Wages in the PILA by origin**

(a) Wage categories

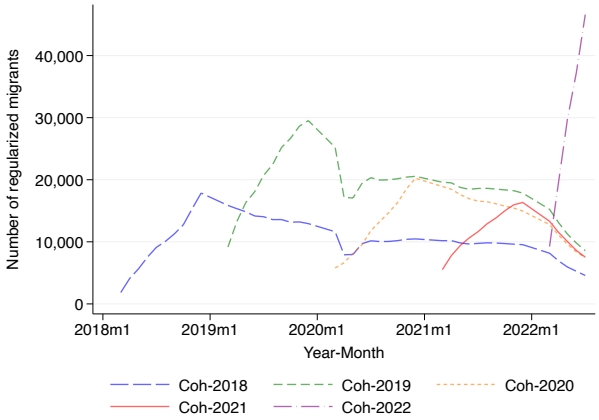


(b) Log wage distribution



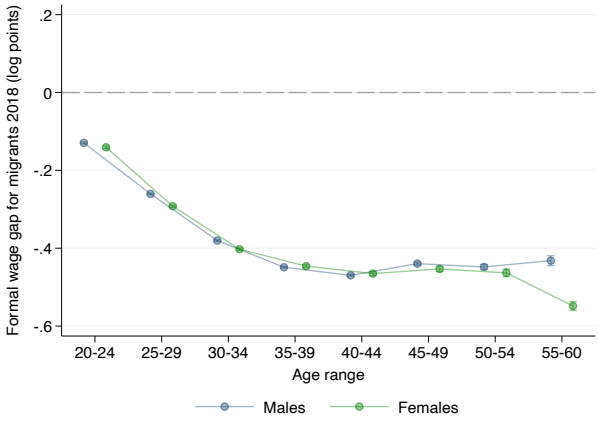
Note: I restrict the sample to workers between 20 and 60 years old with 30 days of employment in the month. Source: PILA, 2018–2022 for July.

Figure A.7: **Number of regularized migrants in the PILA by cohorts over time**



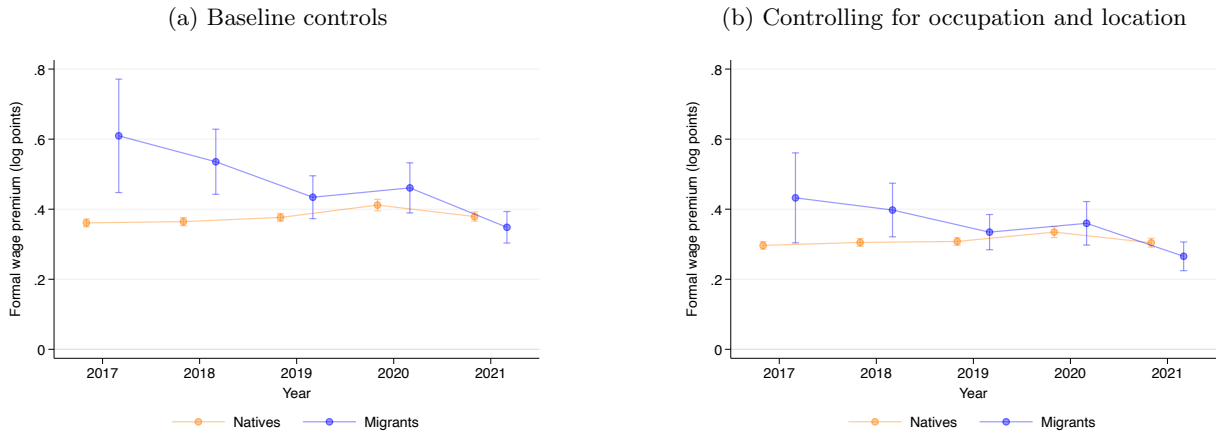
Note: I restrict the sample to full-time workers between 20 and 60 years old with 30 days of employment in the PILA.
Source: PILA, 2018–2021.

Figure A.8: **Formal wage gap over the life cycle for migrants**



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 (4) estimated separately by subgroups in all years. I use as controls time fixed effects. I use a 95% confidence interval.
Source: PILA, 2018–2022.

Figure A.9: **Formal wage premium by origin**



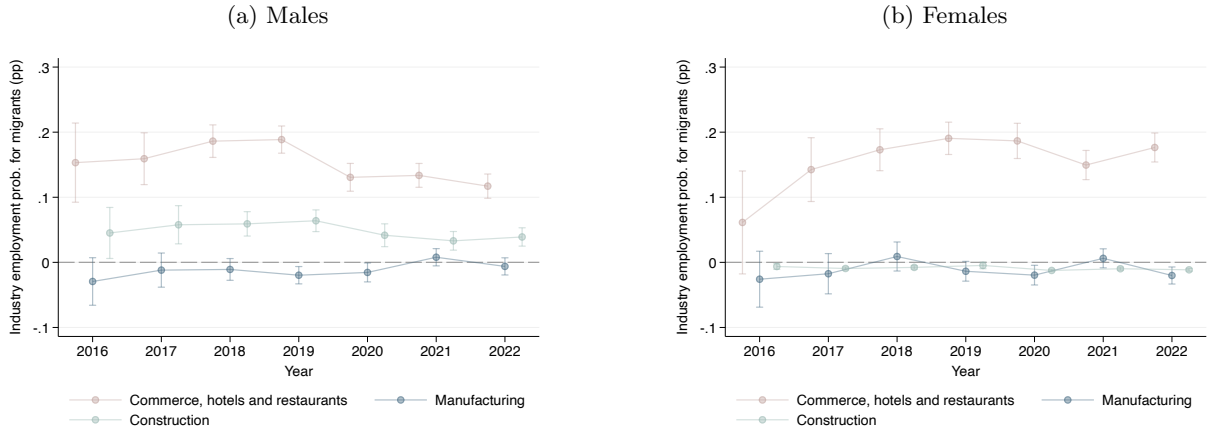
Note: I restrict the sample to full-time salaried workers between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). Both specifications control for education (3 groups), age (8 groups), their interaction, gender dummies, and time fixed effects. Panel (b) additionally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

B Employment Gaps by Industry and Occupation

In this Appendix section, I use the labor force survey to show integration measures by industry and occupation. First, I analyze the economic sectors where immigrants are overrepresented.[B.1] To start, I highlight the disproportionate concentration of migrants in commerce, hotels, and restaurants (CHR), an industry with a high proportion of informal hiring. Of those who were employed, migrant males were more likely to work in CHR and construction sectors than native males, while migrant females were more likely to work in CHR than native females. The gap between migrant males and natives reached a 17 pp difference in 2018, and it maintained its trajectory so that by 2022, it reached an 18 pp difference (see Appendix Figure B.1a). For migrant females, this gap remained between 19 pp in 2018 and 12 pp in 2022 (see Appendix Figure B.1b). Meanwhile, in manufacturing, there was no large differential likelihood in employment between migrants and natives.

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

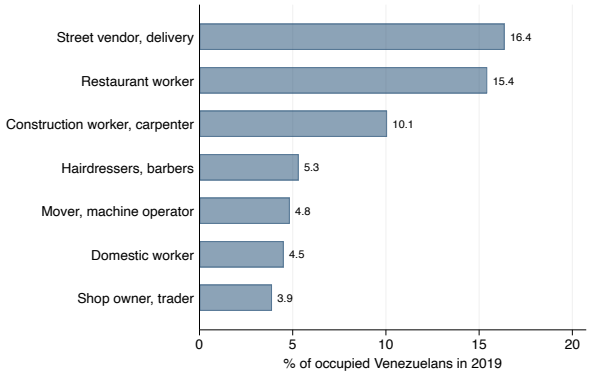
Figure B.1: **Employment gaps for migrants by industry**



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

Turning to specific occupations, Appendix Figure B.2 shows the most prevalent ones among migrants. Street vendors and delivery is the largest, followed by restaurant workers. Thus, I examine how likely migrants are to work as street vendors and deliver compared to natives. Firstly, focusing on street vendors or delivery workers, a prevalent occupation in Colombia that increased significantly with delivery applications such as Rappi. Figure B.3a shows a positive gap for migrants since 2017 for males and 2018 for females, which has remained steady. The most notable increase occurred in 2020 during the COVID-19 pandemic when migrant females turned to this sector as a cushion against job loss or reduced wages.

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



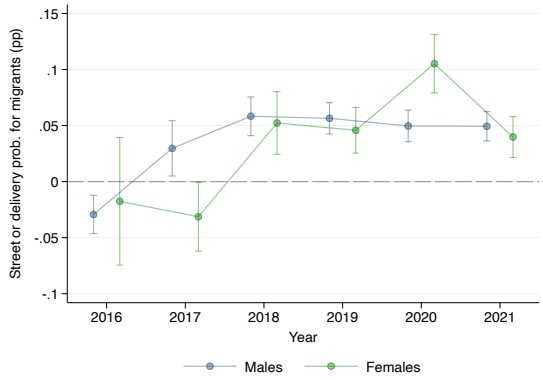
Note: I use survey weights to aggregate all employed Venezuelans into different occupations. Source: GEIH, 2019.

Domestic workers are a prevalent occupation, especially for migrant females. Appendix Figure B.3b studies the likelihood of employment for migrants relative to natives. In this occupation, many migrant females were initially overrepresented relative to natives in this type of employment,

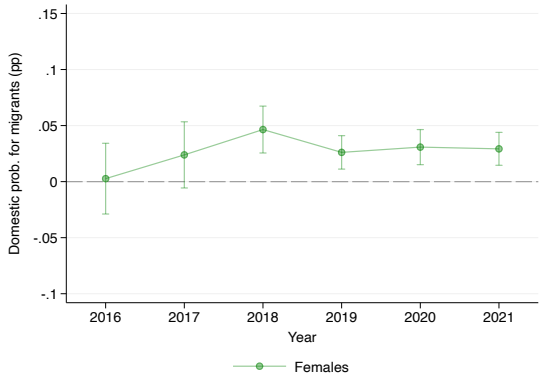
but the gap has been diminishing over time.[B.2]

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

(a) Street vendor or delivery



(b) Domestic worker



Note: I restrict the sample to individuals between 20 and 60 years old in urban areas. The plotted coefficients come from equation (2). I use as controls three education groups, eight age groups, the interaction between both, and time fixed effects. I use a 95% confidence interval. The regression uses survey weights. Source: GEIH, 2016–2022.

[B.2] I exclude males from this analysis, given the relatively low numbers of migrants and natives engaged in this occupation.