Criminals or Victims? Evidence on Forced Migration and Crime from the Colombia–Venezuela Border[*]

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Abstract

How does a sudden migrant crisis affect criminal activity, and through which mechanisms does this effect take place? We approach this topic by studying the effect of Venezuelan migration on crime rates in Colombia, in the context of the recent migrant crisis that made more than 1.2 million Venezuelans cross the border. Our study focuses on border provinces, where the presence of non-economic migrants is higher and potential assimilation problems could be exacerbated. Building on the fact that Venezuelan migration to Colombia happened due to apparently exogenous reasons and is unrelated to economic outcomes in the latter, we are able to study the causal effect of this large migration wave on crime rates. Our results show that Venezuelan forced migration had no significant effect on overall crime, but a positive and significant effect on personal theft in Colombian border provinces. Furthermore, migration had a positive and significant effect on personal theft victimization rates of both Venezuelans and Colombians, while only having significant effects on the criminalization rates of Venezuelans. These results are robust to different specifications and controls, and two placebo tests provide strong evidence in favor of our empirical strategy and results. Finally, we link our findings with the overarching criminal context in Colombian border provinces, and develop relevant policy recommendations based on our findings.

1. Introduction

In this paper we exploit a quasi-natural experiment, given by the exogenous migrant crisis that forced over 1.2 million Venezuelans to migrate to Colombia by 2018, to study the effects of forced migration on crime. Starting in 2013, Venezuela entered a severe economic crisis, which created civil unrest and started the largest recorded refugee crisis in the Americas. More than 4 million Venezuelans have fled the country since 2013, and more than 1.8 million of these were in Colombia as of June 2020, according to R4V. While these migrants were initially well received in the neighbouring provinces, crime rates increased rapidly as the number of migrants accumulated, and their rapid inflow made the situation unsustainable and caused a change in attitudes toward migration by their Colombian counterparts.

By running both fixed effects and instrumental variable regressions, we find that the inflow of Venezuelan migrants into Colombian border provinces had no significant effect on overall crime, but a positive and significant effect on personal theft. Furthermore, we find that migration had a positive and significant effect on both personal theft victimization and criminalization rates of Venezuelans, while only having significant effects on the victimization rates of Colombians. We also find that these results are robust to different specifications and controls, and we perform two placebo tests (on the same region and different time period, and on the same time period in different municipalities) that provide strong evidence in favor of our empirical strategy and results.

The remainder of the paper is structured as follows. In section 2, we review the key strands of existing relevant literature and our main contributions. In section 3, we provide an overview of the background and set-up of our quasi-natural experimental setting. Sections 4 and 5 introduce our data and empirical strategy. In section 6 we present our results, complemented by the robustness checks in section 7, and conclude with a brief discussion and policy recommendations in section 8.

2. Literature review

Our paper is nested mainly within two strands of literature: the first is related to the effects of migration on crime, whereas the second focuses on the effects of Venezuelan forced migration to Colombia.

Effects of migration on crime: The first contribution of our work is to the ongoing research on the effects of immigration on crime, a topic that is rapidly growing, although primarily focused in developed countries. Cross-sectional studies initially made up the majority of the literature, but longitudinal studies continue to increase in popularity. Mixed results are found within the literature due to the lack of uniformity in host country contexts, study designs, measurements of immigration, study units, and identification strategies, but a common pattern emerges: at first there is a positive correlation between immigration and crime, but once endogeneity due to location choice is accounted for by using instrumental variables, studies find mostly negative or null effects (e.g. Butcher and Piehl (1998), Wadsworth (2010)).

However, when overall crime is decomposed, several studies find a causal relationship between migration and property crime. Our work most closely follows that of Bianchi et al. (2012), who use panel data to analyze the effect of immigration on crime rates in Italy in the 1990s. Their results show no effect of immigration on crime rates, but once crime is decomposed into various categories, a positive and significant effect emerges for robberies, a specific type of property crime. Similar results are found in Bell et al. (2013) and Spenkuch (2014), who

study the UK and United States respectively. Bell et al. analyze two migration waves entering the UK: asylum seekers and economic immigrants coming from recently admitted European Union countries. The authors find that the increase in asylum seekers caused an increase in property crime rates in the UK. Similarly, Spenkuch, who studies immigrant inflow in the United States between 1980 and 2000, finds that immigration, primarily that of Mexican immigrants, caused an increase in property crimes in the United States. Although these studies have found positive effects of immigration on property crime rates, to our knowledge there is no study that has found a positive and significant effect of immigration on total crime rates.

Different strands of relevant literature have also focused on ways through which migration can affect crime. On the one hand, immigrants can directly affect crime if they inherently have a higher propensity to be either perpetrators or victims of criminal activity than natives. Most of the literature studying this direct effect has focused on comparing victimization rates of immigrants versus natives, and most have found that immigrants have a higher victimization rate (good examples include Krueger and Pischke (1996) and Zhong et al. (2014)), although there is very little evidence on causal effects.

On the other hand, immigrants can indirectly affect crime through different mechanisms that lead to an increase in crime. The literature has focused mainly on studying three key potential driving mechanisms. One such channel is the composition effect. According to the literature, immigrants more often than not tend to be younger and male, which is a demographic that also happens to be correlated to higher crime rates (Freeman (1999)). A large increase in immigrants can lead to a larger share of young males, which indirectly leads to an increase in crime. The labor market effect of immigration is another indirect channel within the migration literature. Borjas (2010) claims that immigration can increase the labor supply of specific skill groups, crowding out natives from the job market while reducing wages. A fall in wages or change in employment can lead an individual to resort to criminal activity (Becker (1968)). Lastly, immigrants can also affect crime through differing economic incentives. The difference in expected utility of crime between natives and immigrants can be attributed to varying labor market opportunities, education levels, or risks of deportation (Spenkuch (2014)).

Our study contributes directly to this strand of literature by providing compelling and robust evidence on positive effects of migration on personal theft in a developing country. Our paper also analyzes both the direct and indirect mechanisms through which this migration inflow can have an effect on different crime rates, and establishes a causal effect of migration on both personal theft victimization and criminalization rates of migrants in a large-scale forced migration setting.

Effects of Venezuelan forced migration to Colombia: Our work also contributes to the literature studying the current Venezuelan migration crisis that we are in the midst of. The mass immigration of Venezuelans into Colombia is a relatively new phenomenon and the literature is fairly sparse. Most of the literature examines economic outcomes other than crime rates, such as voting behavior and wages.

Caruso et al. (2019) use panel data and fixed effects to analyze the effect of the inflow of Venezuelan migrants into Colombian wages in urban areas of Colombia between 2013 and 2017. The results show that a 1% increase in Venezuelan immigration decreased informal sector wages by 10% in urban areas of Colombia. Similar to Caruso et al., Pacheco (2019) analyzes the effect of the increase of Venezuelans on Colombian wages, however, Pacheco focuses on border provinces. He uses a difference in difference strategy to find that the immigration inflow in the second semester of 2016 led to an average decline in hourly wages of 6-9% in two of the border provinces.

Rozo and Vargas (2019) analyze the effect of both internal migration and international migration in Colombia on political outcomes between 1995 and 2015. The results show that the Venezuelan migration has a strong negative effect on votes for the incumbent party and political participation. Interestingly, the authors conclude that the natives' negative perceptions of international immigrants are not due to changes in the economic environment of host municipalities, but rather due to differences in cultural norms.

Our study contributes to this very policy-relevant strand of existing literature by studying the effects of Venezuelan forced migration to Colombia on crime rates. We examine specific types of crimes and victimization and criminalization rates to gain an in-depth understanding of the drivers behind it, and link these effects with the overarching criminal context in Colombian border provinces.

Based on the literature our study is nested in, we define our research objectives as follows:

1. Study the effects of forced migration from Venezuela on total and specific crime rates in Colombian border provinces

2. Investigate the effects of both direct and indirect mechanisms through which migration might affect crime rates

3. Decompose the effects of migration on victimization and criminalization rates of Colombians and Venezuelans

4. Link our empirical results with the overarching criminal context in Colombian border provinces and develop policy recommendations to help tackle these effects

3. Background

3.1. Economic and crime context in Colombia

After several decades of civil unrest and violence, largely driven by armed guerrillas and drug trafficking, Colombia started a period of relative peace and rapid economic growth starting in 2002. Since then, income per capita has almost doubled and the unemployment rate has steadily declined to an all time low of 9.2% in 2018. Crime rates have also declined steadily across the country, allowing foreign direct investment and tourism to boost growth in recent years.

Still, some problems persist in the fabric of the society. Although Colombia's inequality has decreased over the past decade, it continues to be extremely high[1], and is particularly visible in the gap between urban and rural areas. Moreover, more than 7 million people still live in poverty and 2 million in extreme poverty, without access to basic services like clean water and waste disposal. Notwithstanding, Colombia's economy has remained relatively stable compared to other Latin American countries.

These problems have been particularly evident in Colombia's border provinces with Venezuela. Despite the nation's overall positive trend, these provinces have experienced sharp increases in crime rates. Historically, the border provinces were characterized by perpetual poverty and various guerilla groups and criminal networks exploiting the informal economy to set up their illegal activities. Particularly, these organizations took advantage

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[1]Colombia's GINI index was 49.7 in 2017 according to the World Bank, making it the fourth country with highest levels inequality in Latin America.

of the deficiencies of local judicial systems to expand their activities, particularly drug and illegal arms trafficking, and more recently money laundering and investments in legal businesses (Suarez (2000)). Although the FARC, one of the main guerilla movements in the country with extensive presence in these provinces, came to a peace agreement with the government of Colombia in 2016, criminal groups still persist on the border, mostly composed of ex-guerilla dissidents and small fragmented groups from former drug cartels (InSight Crime (2019)). These groups have taken advantage of the increasing migrant inflow to recruit at a low cost, leaving Venezuelan migrants particularly vulnerable to exploitation and criminal acts.

3.2. Venezuelan migration crisis

Starting in 2013, Colombia experienced an unprecedented and sudden inflow of Venezuelan migrants, as Venezuela entered a sharp economic crisis particularly triggered by the drop in oil prices, lack of economic diversification and a complicated internal and external political environment. This created civil unrest and severe food and medicine shortages in the country, forcing people to massively escape the country starting in 2015 (see Figure A1 in the Appendix).

Although the Colombian government had initially closed all borders with Venezuela due to safety and migratory concerns, by 2016 the border was reopened causing a sharp acceleration in arrivals. Initially, more than 100,000 Venezuelans migrated to Colombia in the first half of 2017, and by the end of the year they were estimated at 660,000. By 2018, more than 1.2 million Venezuelans had arrived in Colombia, and this number continues to grow rapidly to this day.

While at first the solidarity of Colombians towards Venezuelan migrants was remarkable, the massive inflow of migrants eventually put a strain on Colombia's health and education systems, generating some social tensions. Overall perceptions of the citizens were negative regarding the mass arrival of these new migrants, as citizens started to be concerned with the potential effects on their livelihoods: according to INVAMER (2018), 47.3% of Colombians believed that the government should close the border with Venezuela; and according to Latino-barómetro (2018), 81.3% of Colombians thought that the arrival of immigrants to the country would have a negative effect on their lives.

3.3. Set-up of the natural experiment

As explained in the previous subsection, this Venezuelan forced migration can be characterized as an exogenous shock, and we exploit this quasi-natural experimental setting to identify the causal effects of a sudden increase in migrants on crime rates between 2014 and 2018. We focus our analysis on the border provinces, with lower levels of income than the rest of the country, a chronic lack of employment opportunities and where 99% of all foreign-born residents are Venezuelans, as the Venezuelan settlement choice in these areas was not driven by socioeconomic factors. Specifically, we study Colombia's 7 border provinces (departamentos) with Venezuela: Arauca, Boyaca, Cesar, Guainia, La Guajira, Norte de Santander and Vichada.

An initial concern would be that, while the "supply side" shock was clearly exogenous, migrants' settlement decisions once in Colombia might not have been so, and this would cause endogeneity in our analysis. In order to mitigate these concerns, we run a simple OLS regression, with the change in Venezuelan migrant population

between 2014 and 2018 as the dependent variable and all socioeconomic, mechanism and time-invariant controls as explanatory variables.

After this regression, we perform several hypotheses tests (see Table A1 in the Appendix), and find that Venezuelan migrant settlement decisions in these border provinces over the 2014-18 period were only determined significantly by two key baseline and time-invariant municipality-specific indicators: being on the Colombia-Venezuela border or not, and the distance to border, which measures the road distance in kilometers to the nearest border crossing.

Moreover, we find no significant effect of baseline values of our time-variant socioeconomic variables (including socioeconomic and mechanism indicators) on this settlement decision. These results strongly support our claim that migrants did not target areas with specific characteristics but just settled in the closest center to get food, medicine and essential services, and provides evidence in favor of interpreting this variable as exogenous. This settlement decision strictly based on closeness to border is also illustrated by Figure 1 below: not only is the highest share of foreign-born population in the Colombian regions concentrated in our area of study (the 7 border provinces), but within these border provinces there is also a clear concentration in municipalities on the physical border with Venezuela.

Figure 1. Venezuelan-born population as % of total population by province and municipality, 2018
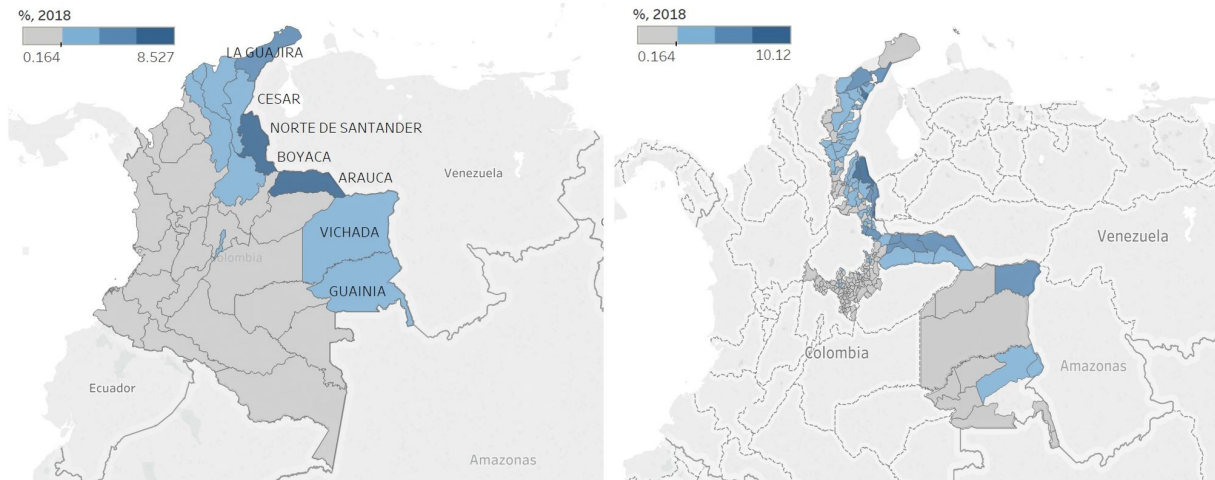
Source: Own calculations, based on data from DANE.

4. Data

We extracted information from a number of sources to collect data on migration, socioeconomic characteristics, mechanism-specific indicators, crime rates (overall and victimization/criminalization rates) and geographical data per municipality for the 7 Colombian "departamentos" (provinces) on the Colombia-Venezuela border.

- **Migration and socioeconomic characteristics:** We obtained information on total population, urban population density, total/migrant population density and Venezuelan migration incidence per Colombian municipality in 2005, 2014 and 2018 as well as average income per capita and educational attainment from the 2005 and 2018 National Population and Housing Census. These data comprise over 4.2 million people in

223 municipalities, which we analyze either at an individual-level or aggregate by municipality to compute average values and match with our other variables of interest.

- **Mechanism-specific indicators:** In order to study the three main indirect mechanisms through which migration can have an effect on crime - composition effects, labor market effects and economic incentives - we obtained data on the percentage of male population with ages between 15 and 29 from the 2018 National Population and Housing Census; data on average monthly wages in 2014 real Colombian pesos from the Colombian Ministry of Labor; and data on clear rates, defined as number of convictions divided by the number of crimes committed per type of crime, from the Colombian National Registry. All data on these three mechanisms was obtained for our 223 municipalities of interest and for the 2014-2018 period.

- **Crime indicators:** We obtain detailed data for 2014-2018 per municipality and per type of crime, nationality of the victim and nationality of the indicted/convicted from the National Police and "Fiscalia General" of Colombia.

- **Geographical data:** Data on distance to the nearest border crossing was compiled scraping data for roads and total distance from Google Maps, and geo-coded data on border crossing points from the Colombian Migration Agency. We also constructed a Border dummy (1 if municipality is on the border with Venezuela) using data from DANE, the National Statistics Office of Colombia.

5. Empirical strategy

Before detailing our different specifications, we briefly discuss an issue with our overall empirical strategy and how we tackle it based on our extensive literature review.

First, our measures of crime rates are the number of crimes reported by the police divided by the total population of each municipality. Reported crimes are broken down by type of criminal offense; in our case, we analyze the overall crime rates, as well as the 5 most common types of crimes in Colombia: personal theft, personal injury, homicides, sex crimes and house burglary.

A well-known problem in the crime literature is the fact that reported crimes often underestimate the true (unobserved) number of committed crimes, which may bias econometric estimates of the effect of those determinants of criminal activity that are correlated with the extent of under-reporting. Following standard practice in the main literature, we deal with this issue by taking natural logarithms of crime rates, and exploit our panel data structure to include fixed effects for geographical areas and time periods (other papers using this approach include Bianchi et al. (2012) and Ozden et al. (2018)). This approach attempts to eliminate constant measurement errors within municipalities (over time) or within certain years (across municipalities).

Similarly to the underestimation of true crime rates, our data on migrants only cover legal migrants who were reported by the 2005/2018 National Census, and is likely underestimating the true migrant population, particularly after such a large wave of forced migration. Indeed, official government data estimated that there were approximately 800,000 Venezuelans living in Colombia in 2018, whereas international estimates vary between 1.2 and 3.5 millions in the same period.

To correct for the measurement error in our dataset, and taking into account that correlation of illegal immigration with the level of criminal activity would lead to a bias in the estimates of the effect of migration on crime

rates, we follow the standard approach in the migration and crime literature and also take natural logarithms of our independent variables, as the combination of logarithms and fixed effects may help attenuate the influence of this source of measurement error as well.

Hannon et al. (2005) is an important reference on the impact of using a level, "semi-log" or "double-log" specification on crime empirical studies, and they argue that the (double) logarithmic transformation "is by far the more popular (method) and is also more powerful (i.e. more effective for cases of severe positive skew)". They do, however, find some differences in significance when estimating double-log and semi-log specifications, whereas double-log and level specifications tend to yield similar results.

Therefore, and following the approach of the majority of the relevant literature, we use double-log specifications as our base specifications, and we also replicate some of our key analyses in semi-log form in the robustness checks chapter to ensure that our results are robust to different types of specifications.

5.1. Fixed effects model

To estimate the impact of the migrant inflow from Venezuela into Colombian border provinces on crime outcomes, we first use a fixed effects model and identify the municipality-level response from variations along the treatment between the pre-treatment period (2014) and the post-treatment one (2018).

Despite our previous analyses showing that migration settlement patterns were only explained by time invariant characteristics, we allow for the fact that migration may still be correlated with some omitted variables, e.g. socioeconomic and geographic characteristics, and that municipalities that differ on those dimensions may follow different trends. Therefore, we control for several socioeconomic time-variant effects (income, education, total population, urban population, total / migrant population density and political ideology of the party in power), and use a fixed effects model to address the issue of time-invariant effects.

We estimate the following panel regression on all municipalities:

$$ln(Y_{mt}) = \beta_0 + \beta_1 ln(T_{mt}) + \gamma ln(\mathbf{X}_{mt}) + \delta_m + \phi_t + \epsilon_{mt}$$

In this expression, β_1 is our parameter of interest, m indexes the municipality and t indexes time ($t = 2014$ or 2018). Y_{mt}, our dependent variable, will be total crime rate or different types of specific crime rates (personal theft, personal injury, homicide, sex crime and house burglary per 100,000 inhabitants), depending on the specification. T_{mt} is the proportion of Venezuelan migrants in the total population per municipality. The vector $\mathbf{X_{mt}}$ includes time-varying socioeconomic characteristics of the municipality (income, education, total population, urban population, total / migrant population density indicators and political ideology of the party in power) and α_m and ϕ_t are respectively a set of municipality- and time-specific fixed effects. Finally, ϵ_{mt} is the error term with standard errors clustered at the municipality level.

The key identifying assumption in this approach is the exogeneity assumption, and while we provide evidence in favor of this assumption in section 3 of this paper, we mitigate this concern by also using an instrumental variable approach.

5.2. Instrumental variable approach

In order to provide further empirical evidence on this effect, and taking into consideration the potential omitted variable bias and endogeneity concerns with the previous approach, we will also use IV estimation. We will now instrument the change (Δ) in migrant population per municipality with the exogenous variable distance to border.

As we argued earlier in this paper, most of the forced migration in this period was driven by non-economic reasons, and therefore closeness to border was one of the key factors for migrant settlement. Taking advantage of this, we will use 2SLS to estimate the following base model:

$$1^{st}stage : \Delta ln(T_m) = \pi_0 + \pi_1 ln(DistanceBorder_m) + \pi_2 \Delta ln(\mathbf{W}_m) + \Delta u_m$$

$$2^{nd}stage : \Delta ln(Y_m) = \alpha_0 + \alpha_1 \widehat{\Delta ln(T_m)} + \alpha_2 \Delta ln(\mathbf{W}_m) + \Delta \epsilon_m$$

Once again m indexes the municipality and t indexes time ($t = 2014$ or 2018). ΔT_m stands for the change in proportion of Venezuelan migrants in the total municipality population between 2014 and 2018. $DistanceBorder_m$ represents our instrument, which is the average distance to the nearest border crossing by road in kilometers. ΔY_m will represent the changes between 2014 and 2018 in our different variables of interest. Finally, the vector $\mathbf{\Delta W}_m$ now includes the changes in our time-varying socioeconomic characteristics of each municipality (income, education, total population, urban population, total / migrant population density and political ideology of the party in power), and for our preferred specification, indicators measuring the change in our three main mechanisms of interest: the percentage of male population with ages between 15 and 29 (composition effects), average monthly wages in 2014 real Colombian pesos (labor market effects) and clear rates, defined as number of convictions divided by the number of crimes committed per type of crime (economic incentives).

In order for our proposed instrument to be valid, two conditions have to be met: relevance and the exclusion restriction.

The condition of relevance is satisfied in the first stage, as there is a significant correlation between our instrument (distance to border) and the change in proportion of Venezuelan migrants between 2014 and 2018. We calculate the Kleibergen-Paap rk Wald and Cragg-Donald Wald F statistics to test for weak identification. For all our specifications, both statistics have values above 20, indicating that the instrument has sufficient strength.

On the exclusion restriction condition, and since our instrument is time-invariant, the identifying assumption requires that the correlation between our instrument and any relevant omitted municipality characteristics did not change between 2014 and 2018, other than the arrival of Venezuelan migrants. While, given the apparently exogenous supply-side push behind this migrant crisis, the exclusion restriction is expected to hold, we present substantive evidence in favor of this assumption in the robustness checks section of this paper, where we perform different types of placebo tests.

6. Results

This section is organized as follows. First, we present the results of our baseline fixed effects specification. In the following subsection, we present the results of our baseline instrumental variable specification. Then, we dedicate the third subsection to our preferred specification in both fixed effects and IV models, analyzing the effects of the key indirect mechanisms. Finally, the fourth subsection deep-dives into the victimization and criminalization rates of Venezuelans and Colombians, where we attempt to answer our key question.

6.1. Baseline fixed effects specification

Running our baseline fixed effects model, it's important to remember that we are using a double-log specification, meaning that our estimated coefficients can be interpreted as elasticities.

As Table 1 below shows, we find that migration seems to have no significant effect on overall crime rates and on most specific crimes, but we do estimate that an increase of 1% in the proportion of Venezuelan migrants in total population leads to an increase of around 0.17% in personal theft rates.

Table 1. Effect of migrant inflows on crime rates - baseline FE specification

	(1) Ln (Total Crime Rate)	(2) Ln (Personal Theft Rate)	(3) Ln (Personal Injury Rate)	(4) Ln (Homicide Rate)	(5) Ln (Sex Crime Rate)	(6) Ln (House Burglary Rate)
Ln (Venezuelan Migrants as % of Population)	0.0135 (0.0294)	0.171** (0.0625)	-0.0303 (0.0392)	0.0378 (0.0494)	-0.0204 (0.0590)	-0.0206 (0.0572)
Constant	5.924 (8.919)	7.592 (18.96)	7.985 (11.89)	26.51 (14.98)	-8.142 (17.88)	-0.345 (17.35)
R^2	0.883	0.759	0.811	0.763	0.669	0.756
Municipality + Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
N	446	446	446	446	446	446

Robust standard errors, clustered at a municipality level, in parentheses
$^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

6.2. Baseline instrumental variable specification

In order to tackle potential concerns of omitted variable bias and endogeneity in our baseline fixed effects approach, we also use IV estimation, and instrument the change in migrant population per municipality with the exogenous distance to border. As mentioned in the empirical strategy section, the instrument is highly relevant and the exclusion restriction condition seems to hold.

Table 2 below shows the key results of our IV estimation: as in our fixed effects regression, we find that migration seems to have no significant effect on most specific crimes; and we do estimate a positive and significant effect on personal theft rates, this time with a significantly larger coefficient - we estimate that an increase of 1% in the proportion of Venezuelan migrants in total population leads to an increase of around 0.81% in personal theft rates. Moreover, this specification yields a positive and somewhat significant effect of migration on overall crime rates, but as we will see in the following subsection, this is not robust to adding additional mechanism-related covariates.

Table 2. Effect of migrant inflows on crime rates - baseline IV specification

	(1) Δ Ln (Total Crime Rate)	(2) Δ Ln (Personal Theft Rate)	(3) Δ Ln (Personal Injury Rate)	(4) Δ Ln (Homicide Rate)	(5) Δ Ln (Sex Crime Rate)	(6) Δ Ln (House Burglary Rate)
Δ Ln (Venezuelan Migrants as % of Population)	0.188* (0.0752)	0.814*** (0.154)	-0.0107 (0.0836)	0.157 (0.109)	-0.0795 (0.104)	-0.0345 (0.119)
Constant	-14.80 (30.41)	-59.23 (71.30)	30.30 (43.79)	-16.83 (32.91)	-15.20 (70.60)	109.3* (53.84)
F-stat.	1.70	4.77	2.14	0.79	0.90	0.90
1st stage F-stat.	32.91	32.91	32.91	32.91	32.91	32.91
Controls	YES	YES	YES	YES	YES	YES
N	223	223	223	223	223	223

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The magnitude of these IV coefficients shows that previous estimates using our baseline fixed effects model were downward-biased. The discrepancy between our fixed effects and instrumental variable coefficients was expected and is first and foremost an indication of attenuation bias coming from our key explanatory variable: as mentioned earlier in this paper, our data on migrants only covers legal migrants who were covered by the 2018 National Census, and is likely underestimating the true migrant population, particularly after such a large wave of forced migration. Indeed, official government data estimated that there were approximately 800,000 Venezuelans living in Colombia in 2018, whereas international estimates vary between 1.2 and 3.5 millions in the same period.

Moreover, there could also potentially be some omitted variables which were correlated with both our dependent and independent variables in different ways (negatively with one and positively with the other). Some of the potential unobservables that could be causing this bias are, for example, the magnitude of presence of police force (which could be positively correlated with migration and negatively correlated with crime) or local attitudes towards migrants (which could be negatively correlated with migration and positively correlated with crime), among others. These factors might have important repercussions on the overall effect of migrant inflows on crime rates besides being of interest by their very nature, and would make for interesting further research.

6.3. Preferred fixed effects and instrumental variable specifications

We now turn to our preferred specification, where we add to the baseline fixed effects and instrumental variable specifications indicators measuring our three main mechanisms of interest: the percentage of males with ages between 15 and 29 in the overall population (composition effects); the average monthly wages in 2014 real Colombian pesos (labor market effects); and the crime clear rates, defined as number of convictions divided by the number of crimes committed per type of crime (economic incentives).

The results of these preferred specifications, shown in Table 3 below - Panel A shows the results of our preferred fixed effects specification, whereas Panel B shows the results of our preferred IV specification -, confirm our baseline results: migrant inflows to Colombian border provinces only had a positive and significant effect on personal theft rates, with no significant effects either on overall crime rates or on other specific crime rates.

Given that the average increase in migrant population between 2014 and 2018 in our border provinces was a staggering 257%, this would mean that migration led to a 169% increase in personal theft rates in provinces on the Colombia-Venezuela border, which account for 68% of the total increase in the studied period.

Interestingly, none of the studied mechanisms had a significant effect on personal theft rates, hinting at a

more direct effect of migration in this specific case, as we will study in the following subsection. However, and as expected from the literature on economic incentives of crime, clear rates do seem to have a negative and significant effect on overall crime rates and some specific types of crimes - more specifically, in our context, a steep drop in clear rates led to increases in crime rates.

Table 3. Effect of migrant inflows on crime rates - preferred FE and IV specifications

	(1) Ln (Total Crime Rate)	(2) Ln (Personal Theft Rate)	(3) Ln (Personal Injury Rate)	(4) Ln (Homicide Rate)	(5) Ln (Sex Crime Rate)	(6) Ln (House Burglary Rate)
PANEL A: Preferred fixed effects specification						
Ln (Venezuelan Migrants as % of Population)	-0.00936 (0.0289)	0.124* (0.0624)	-0.0455 (0.0400)	0.0221 (0.0503)	-0.0386 (0.0601)	-0.0286 (0.0589)
Ln (Males 15-29 as % of Population)	1.528 (0.959)	4.006 (2.068)	1.743 (1.325)	0.703 (1.670)	-1.137 (1.995)	-0.710 (1.954)
Ln (Wages)	-0.219 (0.198)	-0.613 (0.426)	-0.112 (0.273)	-0.377 (0.344)	-0.360 (0.411)	0.00369 (0.403)
Ln (Clear Rate)	-0.137*** (0.0381)	-0.133 (0.0821)	-0.0838 (0.0526)	-0.120 (0.0663)	-0.156* (0.0792)	-0.0513 (0.0776)
R^2	0.894	0.775	0.816	0.769	0.677	0.758
Municipality + Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
N	446	446	446	446	446	446
PANEL B: Preferred instrumental variable specification						
	(1) Δ Ln (Total Crime Rate)	(2) Δ Ln (Personal Theft Rate)	(3) Δ Ln (Personal Injury Rate)	(4) Δ Ln (Homicide Rate)	(5) Δ Ln (Sex Crime Rate)	(6) Δ Ln (House Burglary Rate)
Δ Ln (Venezuelan Migrants as % of Population)	0.105 (0.0783)	0.657*** (0.175)	-0.114 (0.0876)	0.0778 (0.125)	-0.161 (0.124)	-0.0228 (0.135)
Δ Ln (Males 15-29 as % of Population)	1.355 (1.192)	3.261 (2.414)	1.877 (1.542)	0.613 (1.878)	-0.981 (2.246)	-0.625 (1.872)
Δ Ln (Wages)	-0.122 (0.216)	-0.168 (0.496)	-0.172 (0.300)	-0.328 (0.336)	-0.467 (0.451)	0.0109 (0.456)
Δ Ln (Clear Rate)	-0.129*** (0.0332)	-0.0940 (0.0856)	-0.0876* (0.0365)	-0.116 (0.0693)	-0.166* (0.0672)	-0.0471 (0.0636)
F-stat.	5.35	3.98	3.27	0.92	1.34	0.80
1st stage F-stat.	26.31	26.31	26.31	26.31	26.31	26.31
Controls	YES	YES	YES	YES	YES	YES
N	223	223	223	223	223	223

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.4. Victimization and criminalization rates

So how did migration cause this increase in personal theft? With indirect mechanisms having no significant effect, migrants most likely had a more direct effect on personal theft rates, which illustrates our title question: did migration affect criminalization and/or victimization rates?

In order to study this effect, we ran our IV specification on the victimization and criminalization rates of both Colombians and Venezuelans, using the same first stage as in the previous IV specification to estimate the following second stage equations:

$$\Delta ln(VictimizationRate_{mn}) = \alpha_0 + \alpha_1 \widehat{\Delta ln(T_m)} + \gamma \Delta ln(\mathbf{X}_m) + \Delta\epsilon_{mn}$$

$$\Delta ln(CriminalizationRate_{mn}) = \beta_0 + \beta_1 \widehat{\Delta ln(T_m)} + \delta \Delta ln(\mathbf{X}_m) + \Delta e_{mn}$$

$\Delta VictimizationRate_{mn}$ and $\Delta CriminalizationRate_{mn}$ are now our key dependent variables, where m indexes the municipality as previously and now n indexes the nationality of the victim or perpetrator ($n = Venezuelan$ or $Colombian$).

The results can be seen in Table 4 below: regarding victimization rates, we see a positive and significant effect of migration on both nationalities' victimization rates in personal theft; however, replicating this exercise on the criminalization rates tells a different story – migration only had a positive and significant effect on Venezuelan criminalization rates, with no significant effect on Colombians. Interestingly, migrant population density had a positive and significant effect on both victimization and criminalization rates for Venezuelans only.

In order to understand the magnitude of these estimates, and given the previously mentioned increase of 257% in Venezuelan migrant population proportion, we estimate that this wave of forced migration led to a: 95% increase in personal theft victimization rates of Venezuelans (which accounts for only 9% of the total increase in the studied period); 170% increase in personal theft victimization rates of Colombians (accounting for 38% of the total increase in the studied period); 148% increase in personal theft criminalization rates of Venezuelans (18% of the total increase in the studied period); and no significant effect on criminalization rates of Colombians.

So what is the answer to our key question – criminals or victims? The evidence we have provided seems to be aligned with both. Further evidence in favor of this story comes from analyzing different crimes: while overall effects were non-significant, migration does seem to have a positive effect on the victimization rate of Venezuelans in other types of crimes, including homicides and personal injury (see Table A2 in the Appendix). Further interpretation of these results will be discussed at length in the final section.

Table 4. Effect of migrant inflows on personal theft victimization and criminalization rates -
- preferred IV specification

	PANEL A: Preferred IV specification on victimization rates			
	(1) Δ Ln (Venezuelan Personal Theft Victimization Rate)	(2) Δ Ln (Venezuelan Personal Theft Victimization Rate)	(3) Δ Ln (Colombian Personal Theft Victimization Rate)	(4) Δ Ln (Colombian Personal Theft Victimization Rate)
Δ Ln (Venezuelan Migrants as % of Population)	0.407*** (0.110)	0.370** (0.127)	0.821*** (0.157)	0.665*** (0.178)
Δ Ln (Males 15-29 as % of Population)		0.550 (0.991)		3.261 (2.422)
Δ Ln (Wages)		-0.113 (0.216)		-0.164 (0.498)
Δ Ln (Clear Rate)		-0.0154 (0.0470)		-0.0931 (0.0860)
Δ Ln (Migrant Population Density)	0.146*** (0.0335)	0.128** (0.0420)	0.121 (0.103)	0.0413 (0.114)
F-stat.	3.48	2.56	4.70	3.95
1st stage F-stat.	32.91	26.31	32.91	26.31
	PANEL B: Preferred IV specification on criminalization rates			
	(1) Δ Ln (Venezuelan Personal Theft Criminalization Rate)	(2) Δ Ln (Venezuelan Personal Theft Criminalization Rate)	(3) Δ Ln (Colombian Personal Theft Criminalization Rate)	(4) Δ Ln (Colombian Personal Theft Criminalization Rate)
Δ Ln (Venezuelan Migrants as % of Population)	0.638*** (0.168)	0.576*** (0.173)	0.0583 (0.146)	0.209 (0.170)
Δ Ln (Males 15-29 as % of Population)		2.963 (1.662)		-3.337 (1.852)
Δ Ln (Wages)		0.0733 (0.299)		0.225 (0.436)
Δ Ln (Clear Rate)		0.0359 (0.0605)		-0.0458 (0.0772)
Δ Ln (Migrant Population Density)	0.205*** (0.0522)	0.183** (0.0605)	0.106 (0.104)	0.167 (0.114)
F-stat.	3.08	2.35	1.23	1.27
1st stage F-stat.	32.91	26.31	32.91	26.31
Socioeconomic controls	YES	YES	YES	YES
Mechanism controls	NO	YES	NO	YES
N	223	223	223	223

Robust standard errors, clustered at a municipality level, in parentheses
$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

7. Robustness checks

7.1. Placebo tests

First placebo test: In our first placebo test, we replicate the baseline IV specification in the same municipalities in border provinces but studying the period between 2005 and 2014. Migrant inflows from Venezuela were almost non-existent in this time period, and therefore we would expect migration not to have a significant effect on crime rates - if it does, there may be some confounding factors in our instrument or in our setting.

The results of this first placebo test can be found in Table 5 below: when we compare the equivalent coefficient (column 2) in 2014-18 with the 2005-14 one (column 3), we see that there was no effect in the previous period, as expected. This provides evidence in favor of our empirical strategy and results.

Table 5. First placebo test: Effect of migrant inflows on personal theft rates - 2014-18 vs 2005-14

	(1) Δ Ln (Personal Theft Rate) 2014-18	(2) Δ Ln (Personal Theft Rate) 2014-18	(3) Δ Ln (Personal Theft Rate) 2005-14
Δ Ln (Venezuelan	0.657***	0.816***	-12.55
Migrants as % of Population)	(0.175)	(0.154)	(45.14)
F-stat.	3.98	7.03	0.13
1st stage F-stat.	26.31	32.98	0.08
Socioeconomic controls	YES	YES	YES
Mechanism controls	YES	NO	NO
N	223	223	215

Robust standard errors, clustered at a municipality level, in parentheses
$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Second placebo test: In order to provide further evidence in favor of our empirical strategy and results, we run a second placebo test, this time replicating the baseline IV specification in our same time period (2014-18) but in other Colombian municipalities not on the Colombia-Venezuela border.

First, we need to find comparable municipalities for our placebo test - in order to do this, we use propensity score matching with our base socioeconomic control variables (total population, urban population, population density, GDP per capita and educational level) to find comparable municipalities across Colombia. This resulted in a list of 179 municipalities, scattered all across the country and located in 24 of the 25 Colombian "departamentos" not on the border with Venezuela. Table A3 in the Appendix presents the balance check between our border province municipalities and comparable municipalities selected through propensity score matching, and illustrates that there were no significant differences between both groups of municipalities in terms of socioeconomic indicators. Having found comparable municipalities, we compile the same data points for all new municipalities and run our baseline IV specification on them.

The results can be seen in Table 6: whereas in Panel A we show the results for our baseline IV specification in border municipalities for comparison, we can see in Panel B that there is no significant effect of our instrumented change in Venezuelan migration variable on any crime rate in comparable municipalities, which provides further evidence in favor of the exclusion restriction of our distance to border instrument.

Table 6. Second placebo test: Effect of migrant inflows on personal theft rates - border province municipalities vs comparable municipalities (propensity score matching)

	(1) Δ Ln (Total Crime Rate)	(2) Δ Ln (Personal Theft Rate)	(3) Δ Ln (Personal Injury Rate)	(4) Δ Ln (Homicide Rate)	(5) Δ Ln (Sex Crime Rate)	(6) Δ Ln (House Burglary Rate)
PANEL A: Basic IV specification on border province municipalities						
Δ Ln (Venezuelan Migrants as % of Population)	0.188* (0.0752)	0.814*** (0.154)	-0.0107 (0.0836)	0.157 (0.109)	-0.0795 (0.104)	-0.0345 (0.119)
F-stat.	1.70	4.77	2.14	0.79	0.90	0.90
1st stage F-stat.	32.91	32.91	32.91	32.91	32.91	32.91
Socioeconomic controls	YES	YES	YES	YES	YES	YES
Mechanism controls	NO	NO	NO	NO	NO	NO
N	223	223	223	223	223	223
PANEL B: Basic IV specification on comparable municipalities (propensity score matching)						
Δ Ln (Venezuelan Migrants as % of Population)	-0.417 (0.423)	-0.485 (0.458)	-0.272 (0.482)	0.232 (0.398)	-1.072 (1.509)	-1.127 (1.273)
F-stat.	3.69	1.50	1.60	3.81	0.99	0.27
1st stage F-stat.	2.79	2.79	2.79	2.79	2.79	2.79
Socioeconomic controls	YES	YES	YES	YES	YES	YES
Mechanism controls	NO	NO	NO	NO	NO	NO
N	171	121	157	95	126	95

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7.2. Other robustness checks

IV regression with semi-log specification: As discussed in the initial part of the empirical strategy chapter, there are two main empirical approaches in the literature regarding the use of natural logarithms: taking natural logarithms of both dependent and independent variables - a "double-log" specification -, and the use of natural logarithm only for dependent variables - a "semi-log" specification. Even though we decided to use double-logs for our main specifications, in this subsection we replicate our preferred IV specification using a semi-log structure to check the robustness of our results.

As can be seen in Table A4 in the Appendix, our key finding still holds under the semi-log IV specification: Venezuelan migration had no significant effect on both overall crime rates and most specific crime rates, but a positive and significant effect on personal theft rates.

Furthermore, we can see that the economic interpretation yields similar results to our original specification, although larger in magnitude: with a semi-log structure, the coefficients can be interpreted as the % change in Y by increasing X by one unit. In this specific case, increasing Venezuelan migrant population proportion by 1 percentage point increases the personal theft rate by approximately 62%. Given an average increase in migrant population of 3.6 percentage points, we estimate that this wave of forced migration caused a 222% increase in personal theft rates in the studied provinces, compared to our initial estimation of 169% in the double-log specification.

This slightly larger magnitude was expected: as mentioned previously, we are likely underestimating the true migrant population, and not correcting for this using the natural logarithm causes an overestimation of the impact of the change in Venezuelan migrant population.

Baseline check: Although our empirical approach doesn't strictly require a balanced sample at baseline or "parallel trends" assumptions to hold - these are requirements for Difference-in-Differences strategies, which are quite different from our empirical approaches -, there could be confounding effects of migrants' settlement decisions potentially being correlated with baseline crime rates, and that as migrants decided to settle in municipalities with high personal theft rates, they exacerbated a previously worsening trend without having a true direct effect on these crimes.

In order to study this, we perform a baseline check, comparing 2014 crime rates between high migrant population change (above average) and low migrant population change (below average) in our 2014-18 studied period. The results can be seen in Table A5 in the Appendix, and they show that, whereas there are some noticeable differences - particularly the fact that baseline homicide rates were higher and that baseline personal injury and sex crime rates were lower in high migration municipalities -, there were no significant differences at baseline in both overall crime rates and personal theft rates, our key dependent variables. Therefore, we believe that previous trends or baseline differences play no significant role in the results of this paper.

8. Discussion

8.1. Conclusion

In this paper we analyzed the impact of the Venezuelan migrant crisis, which saw more than 1.2 million Venezuelans cross the border, on crime rates in Colombian border provinces between 2014 and 2018.

Our results show that Venezuelan forced migration had no significant effect on overall crime, but a positive and significant effect on personal theft in Colombian border provinces. Furthermore, migration had a positive and significant effect on both victimization and criminalization rates of Venezuelans, while only having significant effects on the victimization rates of Colombians. We also find that these results are robust to different specifications and controls, and we perform two placebo tests and other robustness checks that provide strong evidence in favor of our empirical strategy.

These results could be interpreted as follows: this large wave of migrants arrived in low-income border provinces with little (formal) employment opportunities, and some had to resort to small-scale theft to make a living, which explains the positive effect of migration on Venezuelan personal theft criminalization rates. Driven by both opportunity and attractiveness of targets, this caused an increase in personal theft victimization rates for both Colombians and Venezuelans, although it was much higher for the former (170% increase) than for the latter (95% increase). Descriptive statistics confirm this hypothesis: in 2018, personal theft victimization rates of Colombians (277.9 per 100,000 Colombians) were approximately 3 times higher than those of Venezuelans (85.5 per 100,000 Venezuelans).

Can we rule out any type of discrimination? We ran a Logit model on the probability of being a personal theft victim taking into account the nationality and socioeconomic characteristics (gender, age, civil status, educational attainment and employment status) on the full dataset of 4.3 million people in our border regions - the specification can be found below:

$$Pr(Victim_{im} = 1) = \Phi[\beta_0 + \beta_1 Venezuelan_{im} + \beta_2 X_{im} + e_{im}]$$

As can be seen in Table A6 in the Appendix, the results don't support a discrimination hypothesis: after controlling for all other covariates, being Venezuelan actually seems to have a negative and significant effect on being victim of personal theft.

Although our story on personal theft was compelling and robust, other results hint at a more holistic narrative: as can be seen in Table A2 in the Appendix and mentioned in our results section, migration also had a positive and significant effect on both homicide and personal injury victimization rates of Venezuelans.

What could be driving these effects? As seen previously, Venezuelan migrants settled in municipalities right across the border from Venezuela – which, coincidentally, are municipalities where criminal organizations have a large presence: criminal organizations are present in 23 of the 42 (55%) municipalities on the border with Venezuela, and in 39 of the 81 (48%) municipalities where the change in proportion of Venezuelan migrants between 2014-18 was above the average (>1.5%).

In these high migration municipalities, as a consequence of criminal activity, homicide rates tended to be much higher at baseline than in other municipalities, as can be seen in Table A5 in the Appendix and was mentioned in the robustness checks section. Moreover, we see some evidence of discrimination in homicides - we replicate our previously specified Logit model on the probability of being a homicide victim, and the results in Table A7 in the Appendix show that, after controlling for all relevant socioeconomic covariates, being Venezuelan seems to have a significant and positive effect on being a victim of homicide. Descriptive statistics also tell a similar story: in 2018 in our border provinces, homicide victimization rates for Venezuelans (69.5 per 100,000 Venezuelans) were nearly 3 times higher than those of Colombians (25.5 per 100,000 Colombians).

This could be interpreted as follows: The municipalities where mostly vulnerable Venezuelan migrants arrived, with little formal job opportunities, were controlled largely by criminal organizations, which started threatening Venezuelans and forcefully recruiting them in large numbers (Reuters (2019), InSight Crime (2019)). Indeed, according to Reuters, "five military commanders said that as many as 30% of insurgents in Colombia's eastern border region are Venezuelans, willing to take up arms in return for food and pay". Importantly, the same sources mention that recruitment is happening in Colombian soil after Venezuelan migrants cross the border, and is not influencing migration per se.

This narrative could help explain the positive and significant effect of migration on homicide and personal injury victimization rates of Venezuelans, and a simple t-test illustrates this hypothesis: as can be seen in Table A8 in the Appendix, homicide and personal injury victimization rates were significantly higher in municipalities where criminal organizations are present than in those with no presence. This significant difference is also robust to restricting the t-test to high migration municipalities only.

8.2. Policy implications

As seen in the previous section, the key factor driving both the increase in victimization and criminalization rates of Venezuelans is their vulnerability: some descriptive statistics help us characterize Venezuelan victims as being predominantly male (86%), young (average age 28), single (82%), unemployed (55%) and with low levels of education (73% have primary or no education).

These findings imply that government policies should focus on reducing the vulnerability of Venezuelans by providing swift access to the formal labor market, either in border provinces or nationwide, so that Venezuelans can avoid resorting to small-scale theft and escape forced recruitment and exploitation from criminal organizations. There are minimum expected standards that integration policies should be guided by when dealing with humanitarian crises, according to the UNHCR:

- **Documentation and status determination:** Providing reception facilities and information on rights and public services, registration and data collection, ensuring that refugees are documented and determining status, among others.

- **Safe and sustainable existence:** The host should allow refugees to work and access the country's basic social services along with education and healthcare, to continue integrating within host communities to the point where they can also access financial capital.

However, large numbers of Venezuelan migrants settled in municipalities widely controlled by criminal organizations. The presence of these armed groups complicates government efforts to efficiently coordinate assistance, and prosecution and law enforcement presence is sparse in areas controlled by these organizations due to security concerns.

Notwithstanding the complexity of border municipalities, the government of Colombia should tailor specific policies targeting unemployed Venezuelans in this region. Ideally, this could be in the form of a temporary fast-track work permit that includes practical job training for suitable and willing Venezuelans entering the country illegally. Furthermore, it is important to provide transportation for them to places with work opportunities.

Labor intensive industries like construction and agriculture have sizeable nationwide projects that we identified as potential venues to absorb unemployed Venezuelans through a temporary work permit:

- **"Carreteras 4G":** massive infrastructure plan underway aimed at the construction of 30 roads. This project is based on a long term concession scheme and is estimated to generate around 120,000 jobs.

- **"Plan de Ordenamiento de la Producción Agropecuaria":** country-wide strategic project to improve the efficient use of land for agriculture. An employment policy for the agricultural sector was created under this plan, which is estimated to generate 90,000 formal jobs annually starting in 2020.

Such a plan would necessarily involve prioritization, as the scope and numbers of Venezuelan migrants increase on a daily basis. We identified six high-risk municipalities with presence of criminal organizations that concentrate more than 85,000 Venezuelan migrants, or more than 40% of all migrants in border provinces: Cucuta, Tibu and Villa del Rosario in the Norte de Santander province; and Arauca, Arauquita and Saravena in the Arauca province.

Countries like Turkey and Jordan, who are also dealing with large-scale refugee crises, provide important examples that countries like Colombia should take advantage of and learn from. Specifically, both countries have implemented work permits in similar industries (i.e. construction, agriculture and services) and established workplace quotas on sectors where a high number of natives have jobs. Also, Turkey allowed work permit exemptions in 2016 for seasonal agricultural or livestock breeding activities.

However, translating high-level policy objectives into practice poses challenges. It is highly important that the process of acquiring a work-permit for these Venezuelans be as seamless as possible. In countries like Turkey and Jordan, work-focused policies have not been practical in execution, and continuous policy modifications have been called for. From these countries' ongoing process we identified 4 common pitfalls to be avoided:

- **Excessive requirements:** Cumbersome lists of provisions that either migrants or employers must comply with (i.e. complete a minimum waiting time period, have proof of status, obtain health certificates and the requirement for employers to have sector hiring quotas and proof of social security enrollment before permit is expedited) can hinder ease of implementation.

- **Costs to employers:** The financial and time costs associated with obtaining a work permit can outweigh the benefits. Workers cannot generally afford to cover all of the fees, while employers do not have an incentive to pay for them due to the high turnover of Syrian refugees.

- **Potential worker exploitation:** Matching migrants to a single employer in a specific sector can create lack of mobility, driving down working conditions and local wages if not regulated properly.

- **Lack of coordination:** Matching gaps between migrant labor supply and employment opportunities are common, and can be exacerbated in these situations (e.g. in Turkey, the number of community centers providing relevant work permit information was very limited).

Generally, work permit applications are made by the employer, and a strategic collaboration with the government should be pursued. Turkey and Jordan have also been focusing on lowering costs and requirements to the extent possible. Changes around the removal of requirements for refugees and incentive schemes for employers had some success in increasing the amount of work permits applied for. International organizations advise that further sector-specific mechanisms should be developed to meet the specific labor needs of these large-scale refugee crises, always founded in an overall framework to ensure workers can access decent job opportunities.

The task that Colombia faces, trying to address the largest recorded refugee crisis in the Americas while also continuing to foster inclusive growth in the country, is daunting and requires a comprehensive strategy, as many other countries around the world facing similar situations have learned. Nevertheless, empirical studies that analyze the complex effects of such a large-scale event and help design concrete policies to tackle them can go a long way in supporting fact-based decision making. While we focused on studying the specific effects of migration on crime rates in this paper, further work studying other areas of economic and social impact of this refugee crisis should be pursued.

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Appendix

Table A1: Hypotheses test results for determinants of migrant settlement decisions

	Joint F test statistic	Prob $> F$
Baseline socioeconomic controls (income, education, (migrant) population density, total population, political ideology)	1.32	0.2564
Baseline mechanism controls (% of males aged 15-29, average wages, clear rate)	2.13	0.0972
Baseline socioeconomic + mechanism controls (all indicators in previous two tests)	1.69	0.1124
Time-invariant characteristics (Border with Venezuela, distance to border)	60.23	0.000^{***}

$^{*}\,p < 0.05,\,^{**}\,p < 0.01,\,^{***}\,p < 0.001$

Table A2: Effect of migration on homicide and personal injury victimization rates - preferred IV specification

	(1) Δ Ln (Venezuelan Homicide Victimization Rate)	(2) Δ Ln (Colombian Homicide Victimization Rate)	(3) Δ Ln (Venezuelan Personal Injury Victimization Rate)	(4) Δ Ln (Colombian Personal Injury Victimization Rate)
Δ Ln (Venezuelan Migrants as % of Population)	0.192^{**}	0.0379	0.222^{***}	-0.0454
	(0.0669)	(0.0506)	(0.0576)	(0.0362)
Δ Ln (Males 15-29 as % of Population)	0.843	-0.401	0.423	0.187
	(0.461)	(0.798)	(0.553)	(0.635)
Δ Ln (Wages)	-0.0805	0.000237	-0.243^{*}	-0.0990
	(0.101)	(0.133)	(0.118)	(0.116)
Δ Ln (Clear Rate)	0.0292	-0.0280	-0.00217	-0.0263^{*}
	(0.0232)	(0.0310)	(0.0222)	(0.0132)
Δ Ln (Migrant Population Density)	0.0558^{*}	-0.0000993	0.0845^{***}	-0.00258
	(0.0221)	(0.0271)	(0.0203)	(0.0325)
F-stat.	2.73	0.48	5.98	2.79
1st stage F-stat.	26.31	26.31	26.31	26.31
Socioeconomic controls	YES	YES	YES	YES
Mechanism controls	YES	YES	YES	YES
N	223	223	223	223

Robust standard errors, clustered at a municipality level, in parentheses
$^{*}\,p < 0.05,\,^{**}\,p < 0.01,\,^{***}\,p < 0.001$

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Table A3: Propensity score matching - Balance check

	(1) Border province municipalities	(2) Comparable municipalities	(3) p-value
Total population	23,356 (4,268)	26,061 (4,786)	0.6734
Urban population	15,312 (3,891)	16,929 (4,164)	0.7768
Population density	64.76 (9.04)	64.13 (8.52)	0.9591
GDP per capita	17,978 (2,105)	16,612 (1884)	0.6291
Education	84.76 (1.91)	85.13 (1.86)	0.8882
N	223	179	

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

Table A4: Preferred IV specification - double-log vs semi-log specifications

	(1) Δ Ln (Total Crime Rate)	(2) Δ Ln (Personal Theft Rate)	(3) Δ Ln (Personal Injury Rate)	(4) Δ Ln (Homicide Rate)	(5) Δ Ln (Sex Crime Rate)	(6) Δ Ln (House Burglary Rate)
	PANEL A: Double-log preferred IV specification					
Δ Ln (Venezuelan Migrants as % of Population)	0.105 (0.0783)	0.657*** (0.175)	-0.114 (0.0876)	0.0778 (0.125)	-0.161 (0.124)	-0.0228 (0.135)
Δ Ln (Males 15-29 as % of Population)	1.355 (1.192)	3.261 (2.414)	1.877 (1.542)	0.613 (1.878)	-0.981 (2.246)	-0.625 (1.872)
Δ Ln (Wages)	-0.122 (0.216)	-0.168 (0.496)	-0.172 (0.300)	-0.328 (0.336)	-0.467 (0.451)	0.0109 (0.456)
Δ Ln (Clear Rate)	-0.129*** (0.0332)	-0.0940 (0.0856)	-0.0876* (0.0365)	-0.116 (0.0693)	-0.166* (0.0672)	-0.0471 (0.0636)
F-stat.	5.35	3.98	3.27	0.92	1.34	0.80
1st stage F-stat.	26.31	26.31	26.31	26.31	26.31	26.31
Controls	YES	YES	YES	YES	YES	YES
N	223	223	223	223	223	223
	PANEL B: Semi-log preferred IV specification					
Δ Venezuelan Migrants as % of Population	9.810 (11.66)	61.71** (21.46)	-3.043 (15.91)	7.301 (18.08)	0.920 (21.04)	8.970 (20.42)
Δ Males 15-29 as % of Population	8.181 (15.10)	-15.03 (29.84)	20.83 (24.77)	6.087 (28.43)	-5.402 (32.72)	-11.12 (28.32)
Δ Wages	0.0177 (0.123)	0.234 (0.249)	-0.0571 (0.164)	-0.0955 (0.177)	-0.169 (0.273)	0.0459 (0.253)
Δ Clear Rate	-0.628* (0.313)	-1.035* (0.508)	-0.555 (0.498)	-0.795 (0.499)	-0.411 (0.561)	-0.0599 (0.808)
F-stat.	7.26	8.05	3.21	0.81	2.02	2.45
1st stage F-stat.	84.05	84.05	84.05	84.05	84.05	84.05
Controls	YES	YES	YES	YES	YES	YES
N	223	223	223	223	223	223

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A5: Baseline check

	(1) Municipalities with Δ Migrant Pop. > 1.5%	(2) Municipalities with Δ Migrant Pop. < 1.5%	(3) p-value
Total Crime Rate 2014	232.65 (21.34)	264.51 (17.95)	0.2548
Personal Theft Rate 2014	32.83 (4.90)	39.99 (5.58)	0.3363
Personal Injury Rate 2014	124.11 (13.59)	162.32 (11.75)	0.0348*
Homicide Rate 2014	21.71 (2.66)	9.98 (1.34)	0.0001***
Sex Crime Rate 2014	22.37 (2.43)	30.72 (2.95)	0.0300*
House Burglary Rate 2014	25.14 (3.80)	20.77 (2.98)	0.3671
N	81	142	

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

Table A6: Logit specification on probability of being a victim of personal theft

Marginal effects	(1) Probability of being victim of personal theft
Victim nationality (1 = Venezuelan)	-0.0020*** (0.0001)
Gender (1 = Female)	-0.0008*** (0.0002)
Age	0.0005*** (0.0001)
Civil status (1 = Married or in union)	-0.0029*** (0.0005)
Employment status (1 = Employed)	0.0012** (0.0003)
Educational attainment (1 = secondary or higher)	0.0031*** (0.0002)
Pseudo-R^2	0.0815
N	3,904,030

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A7: Logit specification on probability of being a victim of homicide

| Marginal effects	(1) Probability of being victim of homicide
Victim nationality	0.0003***
(1 = Venezuelan)	(0.0001)
Gender	-0.0004***
(1 = Female)	(0.0000)
Age	0.0001***
	(0.0000)
Civil status	-0.0004***
(1 = Married or in union)	(0.0001)
Employment status	-0.0003
(1 = Employed)	(0.0003)
Educational attainment	-0.0002
(1 = secondary or higher)	(0.0002)
Pseudo-R^2	0.1125
N	3,894,557

Robust standard errors, clustered at a municipality level, in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A8: Results of two-sample t-test with unequal variances by presence of criminal organizations

	(1) Municipalities with presence of criminal organizations	(2) Municipalities with no presence of criminal organizations	(3) p-value
Δ Log (Venezuelan Homicide Victimization Rate)	0.255 (0.061)	0.049 (0.018)	0.0019**
Δ Log (Venezuelan Personal Injury Victimization Rate)	0.313 (0.060)	0.142 (0.028)	0.0120*
Δ Log (Venezuelan Personal Injury Criminalization Rate)	0.171 (0.076)	0.033 (0.024)	0.0863
N	59	164	

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

Figure A1: International stock of Venezuelan migrants, 2005-18

International stock of Venezuelan migrants
Millions
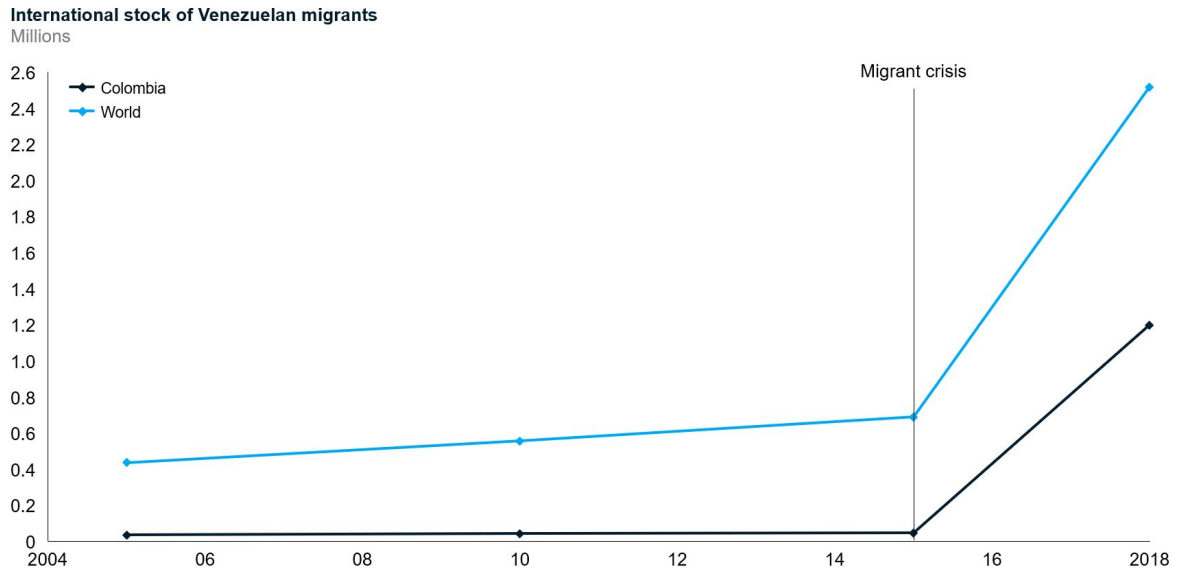
Source: Own calculations, based on data from the International Organization for Migration.