Escuela de Gobierno y Transformación Pública
Tecnológico de Monterrey

Identifying Economic and Migration Effects of US Sanctions: Subnational Evidence from Venezuela's Oil Producing Regions

José Morales-Arilla
josemoralesarilla@tec.mx
Escuela de Gobierno y Transformación Pública, Tecnológico de Monterrey

Miguel Angel Santos
miguelsantos@tec.mx
Escuela de Gobierno y Transformación Pública, Tecnológico de Monterrey

Zinedine Partipilo Cornielles
zpartipilocornielles@g.harvard.edu
Department of Economics, Harvard University

School of Government and Public Transformation

Working Paper No. 36

Publication update: August 2026

Identifying Economic and Migration Effects of US Sanctions:

Subnational Evidence from Venezuela's Oil Producing Regions.[1]

Jose Morales-Arilla
Tecnologico de Monterrey

Miguel Angel Santos
Tecnologico de Monterrey

Zinedine Partipilo Cornielles
Harvard University

[Word count: 5956]

July 9, 2026

Abstract

Starting in 2013, Venezuela experienced one of the largest economic collapses and refugee crises in modern history, with more than eight million people (over 25% of the population) emigrating. A prominent literature argues that U.S. sanctions, first imposed in 2017, caused these outcomes by eroding oil production and export revenues. If sanctions induced the economic collapse by disrupting the oil sector, oil-producing municipalities should have experienced disproportionate economic deterioration and outmigration. We test this hypothesis using a difference-in-differences design that exploits the geographic concentration of oil production across Venezuelan municipalities. Combining municipality-level panel data on nighttime lights, staple food sales, migration to Colombia and electoral turnout, we find no evidence that oil-producing municipalities experienced sharper economic declines or higher migration rates upon sanctions. These findings challenge the view that sanctions were a primary driver of Venezuela's economic and refugee crisis.

Keywords: Sanctions, refugee crisis, oil production, migration, collapse, Venezuela.
JEL: F51, F22, O54, Q43, D72.

[1]The authors declare no conflict of interest. The authors used a large language model (Claude, Anthropic) for copy-editing assistance. All content was reviewed and verified by the authors, who bear full responsibility for the manuscript.

1 Introduction

Between 2013 and 2020, Venezuela experienced one of the largest economic collapses in modern history. Coinciding with a decisively authoritarian turn, the country lost nearly three-quarters of its GDP. As a result, more than eight million Venezuelans – over a quarter of the country's population – emigrated, producing an exodus comparable in scale to those of Syria and Ukraine (Morales-Arilla et al., 2025). An influential and prominent literature holds that U.S. economic sanctions, first imposed in 2017, played a central role in driving the Venezuela's collapse, explaining over half of the country's economic and refugee crises.[2] The proposed mechanism is straightforward: by constraining PDVSA's (Venezuela's NOC) financing and operations, sanctions reduced oil production and export revenues, limiting the country's ability to finance essential imports – especially food and medicines – and sustain domestic economic activity (Sachs and Weisbrot, 2019; Rodríguez, 2025).

This paper evaluates whether US sanctions played such a prominent role in Venezuela's economic collapse and refugee crises. While the lion's share of this literature relies on national-level counterfactuals, we instead exploit the geographic concentration of oil production across the Venezuelan territory. If sanctions generated Venezuela's economic collapse by disrupting oil sector activities, oil-producing areas should have experienced disproportionate economic deterioration and outmigration after sanctions were first imposed - that is, the proposed first-order effects of sanctions should be felt most strongly in municipalities hosting oil sector activities. We implement a difference-in-differences design comparing oil-producing to non-oil municipalities before and after the start of US economic sanctions in August of 2017. We combine multiple municipality-level datasets spanning 2012 to 2024, including nighttime lights from NASA's VIIRS satellites, proprietary data on cornflour sales,[3] migration records from Colombia's Registro Administrativo de Migrantes Venezolanos (RAMV),

[2] In August 2017, the United States restricted the Venezuelan government and the state oil company, Petroleos de Venezuela (PDVSA), from accessing U.S. financial markets. In January 2019, sanctions directly targeted the oil sector by restricting exports and access to key production inputs.

[3] The main ingredient in *arepas*, a key staple of Venezuelans' diets.

electoral turnout data, and administrative records from the Carnet de la Patria social program. Together, these data allow us to track local economic activity, food access, migration, and redistribution patterns across municipalities differentially exposed to sanctions through the presence of oil sector activities.

Across all outcomes and specifications, we find no evidence that oil-producing municipalities experienced disproportionate deterioration – economic decline or greater outmigration – following the imposition of sanctions. Economic activity, staple food sales, migration flows, and electoral turnout evolve similarly in oil and non-oil municipalities after both rounds of sanctions. Event study estimates reveal parallel pre-treatment and post-treatment trajectories across oil and non-oil municipalities, while a broad set of robustness checks yields similar conclusions. We compare cumulative outmigration patterns using two independent data sources: geolocalized Twitter data from Morales-Arilla et al. (2025) identifying Venezuelan users who moved abroad and Colombia's Encuesta Pulso de la Migracion survey of Venezuelan migrants. Neither source reveals disproportionate emigration from oil-producing municipalities. Finally, we evaluate whether compensatory redistribution could have offset localized sanction effects by analyzing registration drives for the Carnet de la Patria, the Venezuelan government primary targeted social assistance program (Morales-Arilla, 2021). We find no evidence that the post-sanction redistribution disproportionately favored oil-producing municipalities in ways that could mask the effects of sanctions.

These findings challenge the view that U.S. sanctions were a primary driver of Venezuela's refugee crisis. Using aggregate time-series counterfactual approaches, several studies conclude that, by eroding oil production in the country, U.S. sanctions were a key determinant behind the deterioration of economic and humanitarian conditions in the country, constituting a form of "collective punishment" on Venezuelans. Sachs and Weisbrot (2019) argued that the 2017 financial sanctions contributed to 40,000 excess deaths by restricting access to essential imports. Rodríguez (2019) used synthetic control methods to estimate large sanction-induced declines in oil production following the 2017 financial sanctions. Rodríguez

(2022) subsequently exploits differential access to international credit among firms operating in Venezuela's Orinoco Basin to estimate substantial production losses associated with both the 2017 financial sanctions and the 2019 oil sanctions. More recently, Rodríguez (2025) concludes that sanctions explain over half of Venezuela's economic collapse and corresponding refugee crisis. Santos et al. (2026), however, argue that this literature faces important identification challenges, including the difficulty of disentangling the effects of sanctions from the continuation of severe pre-existing trends, concurrent shocks, and broader institutional deterioration. Observing no disproportionate deterioration in, or outmigration from, areas differentially exposed to the effects of sanctions through the proposed mechanism suggests that the continuation of pre-sanction economic trends, along with concurrent nation-wide political events, are more plausible explanations for the onset of the country's refugee crisis.

More broadly, the paper contributes to the literature on the identification of the economic effects of sanctions. Estimating the causal impact of sanctions is inherently difficult (Morgan et al., 2023). Sanctions are typically imposed amid political crises, macroeconomic instability, and institutional breakdown, all of which may independently affect the outcomes under study. In Venezuela, sanctions coincided with accelerating economic contraction, the militarization of the oil industry, severe infrastructure disruptions, and deepening authoritarian consolidation, complicating causal inference based on aggregate national trends alone. More broadly, recent work in the sanctions literature emphasizes that estimates derived from cross-country or national time-series variation are especially vulnerable to endogeneity and omitted-variable concerns, with estimated effects often becoming substantially attenuated once identification challenges are carefully addressed (Kwon et al., 2020; Felbermayr et al., 2019). This paper first illustrates how the challenges identified in the cross-country literature on the average effects of sanctions are also relevant for estimating the effects of specific sanction events on a country's economy. Most importantly, the paper shows how subnational variation in sanction-exposure can help identify the effects of sanctions through mechanisms that are hard to isolate through aggregate data. The results are consistent with the atten-

uation pattern documented in the cross-country literature once identification challenges are addressed.

The remainder of the paper proceeds as follows. Section 2 describes Venezuela's economic collapse, the structure of the sanctions, and the institutional setting surrounding their implementation. Section 3 presents the data, construction of key variables, and the empirical strategy. Section 4 reports the main difference-in-differences and event-study results together with robustness checks for all outcomes. Section 5 concludes with a discussion of the implications of our findings for the literature on sanctions, migration and economic collapse; the limitations of our analysis, and some avenues for future research.

2 Empirical Setting

Venezuela's collapse began well before U.S. sanctions. By 2013, shortages of basic goods were widespread (Lopez, 2013). The country entered recession in early 2014—about nine months before global oil prices fell—and these difficulties had halved export revenues by 2015 (International Monetary Fund, 2015; Santos, 2017). Maduro-era policies, including rigid price and exchange controls in place since 2003, deepened the crisis, fueling worsening inflation and contraction (Reinhart and Santos, 2016). By 2017, real GDP had fallen 37% relative to 2013, more than half of the total 2013–2020 loss (Santos et al., 2026).

The oil industry mirrored this pre-sanction trajectory. As documented by Hernández and Monaldi (2016), the sector was already in profound financial and operational fragility by 2016: net cash-generating exports had eroded to nearly half of reported production, resources were systematically diverted from PDVSA to social programs and extra-budgetary funds, and mounting arrears to contractors had led major firms to curtail operations. By 2016, external debt had surpassed US$120 billion, giving Venezuela the highest debt-to-exports ratio in the World Bank's World Development Indicators database. Sovereign risk averaged 2,364 basis points from January to August 2017—9.5 times the emerging-market

average—and did not significantly change once financial sanctions were imposed that month (Bahar et al., 2019). For all practical purposes, international financial markets were already closed to the Venezuelan government and PDVSA before sanctions.

2.1 The 2017 Financial Sanctions

U.S. financial sanctions were preceded by a decisive autocratic turn. After the opposition's supermajority victory in the December 2015 parliamentary elections, the government-controlled Supreme Court (TSJ) progressively stripped the National Assembly of its legislative powers through early 2017 (Llorens, 2018). By March 2017, the TSJ had dissolved the Assembly entirely, triggering massive protests met with heavy repression—deaths, injuries, and wrongful imprisonment. In July 2017, Maduro convened elections for a parallel National Constituent Assembly (ANC) without meeting constitutional requirements, further consolidating authoritarian control amid widespread international condemnation.

In direct response to the ANC, the Trump administration issued Executive Order 13808 on August 25, 2017, imposing financial sanctions on Venezuela. The order barred the Venezuelan government and PDVSA from issuing new debt in U.S. markets and limited transactions in existing sovereign and PDVSA bonds, constraining their ability to refinance external debt. The principal channel to the broader economy was therefore indirect: by limiting PDVSA's access to external financing, sanctions could have curtailed its capacity to sustain operations and oil production. Shortly afterward, in November 2017, Maduro appointed Manuel Quevedo, a National Guard Major General, as president of PDVSA, placing the oil industry under military control—a decision that may itself have independently affected the sector's performance (Reuters, 2018). These concurrent events, each plausibly affecting economic outcomes on its own, coincided temporally in ways that make them hard to disentangle through aggregate data.

2.2 The 2019 Oil Sanctions

After a widely contested presidential election in May 2018 and the resulting constitutional crisis, Juan Guaidó—then President of the National Assembly—took office as interim president on January 23, 2019, a move recognized by over fifty countries and supported by legal scholars (Zambrano, 2019). Five days later, on January 28, the U.S. Treasury designated PDVSA under Executive Order 13850, freezing its U.S.-held assets and prohibiting transactions with U.S. persons. In practice, these sanctions restricted oil exports to the United States while limiting access to the refined products and diluents needed to process Venezuela's extra-heavy crude.

Unlike the 2017 financial sanctions, the 2019 oil sanctions created a more direct and immediate channel through which they could plausibly affect oil production. Venezuela's oil industry—particularly the Orinoco Belt, where most production is concentrated—depends heavily on imported diluents and specialized inputs to extract, transport, and refine extra-heavy crude. To the extent sanctions disrupted access to these inputs, their effects should have been especially severe in oil-producing municipalities.[4]

The 2019 sanctions also coincided with several other major shocks. In early March 2019, Venezuela suffered nationwide blackouts, leaving most of the country without electricity for nearly a week and causing severe disruptions that persisted for months. As in 2017, the close proximity of the 2019 constitutional crisis, the oil sanctions, and the blackouts illustrates the broader identification challenge emphasized in the sanctions literature: disentangling sanctions from concurrent political, institutional, and economic shocks (Morgan et al., 2023; Santos et al., 2026).

[4]The 2019 sanctions could also have affected exports through a "macro" channel, by reducing the prices at which sanctioned Venezuelan production reached international markets. If relevant, this channel's effects would appear in parallel across oil and non-oil regions.

2.3 Implications for Identification

Two features of the Venezuelan setting are central to our empirical strategy. First, oil production is geographically concentrated: only 38 of 335 municipalities host oil activities, often with multiple extraction sites clustered in the same municipality. Because oil deposits are located by geology rather than contemporary economic or political factors, this concentration provides plausibly exogenous cross-sectional variation in exposure to oil-sector shocks. Second, the causal mechanism underlying the "collective punishment" hypothesis implies that sanctions' effects should manifest first and foremost in oil-producing areas. To the extent sanctions constrained PDVSA's access to financing and critical inputs, they should have reduced oil production, weakening local economic activity and driving disproportionate outmigration there. The difference-in-differences design below directly tests this prediction.

3 Data and Methods

3.1 Data

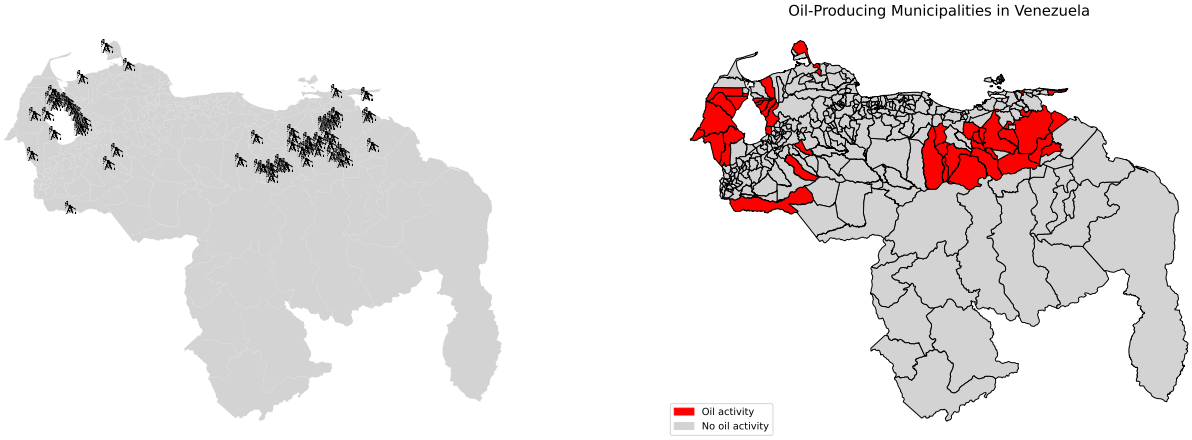
Our analysis combines multiple municipality-level datasets spanning economic activity, migration, electoral participation, and government redistribution. The unit of analysis throughout is the municipality, which we classify by whether it hosts oil extraction activities, allowing us to compare areas differentially exposed to oil-sector shocks.

3.1.1 Oil municipalities

To identify oil-producing municipalities, we match the geolocation of all oil production fields to Venezuela's administrative GIS shapefiles.[5] Any municipality containing at least one extraction site is classified as an oil municipality. Figure 1 displays the geographic distribution of oil activities: Panel A plots individual oil fields, while Panel B identifies the 38 municipalities (of 335) that host extraction activities.

[5]The geolocation of oil production fields was provided by an oil consulting firm requesting anonymity.

Figure 1: Location of Venezuelan Oil Activities



(a) Geolocation of Oil Fields

(b) Oil and Non-Oil Municipalities

Note: Panel A displays the geographic coordinates of individual oil extraction sites across Venezuela. Panel B classifies municipalities by oil status: red indicates the 38 municipalities containing at least one oil extraction site; grey indicates the remaining 297 non-oil municipalities. Oil field locations are obtained from proprietary field-level data provided by an oil consulting firm; municipal boundaries are from Venezuela's official administrative GIS shapefile. *Source:* Proprietary oil field location data; Venezuelan administrative shapefile.

3.1.2 Economic Activity

Our first measure of economic activity is nighttime light radiance from NASA's Visible Infrared Imaging Radiometer Suite (VIIRS). Nighttime lights are a well-established proxy for economic activity, especially valuable where official statistics are unavailable or unreliable. We construct a monthly municipality-level panel of average radiance per capita from January 2015 to December 2019.[6]

Our second measure of economic activity is proprietary municipality-level sales data for cornflour (*harina de ma'iz precocida*), the main ingredient of *arepas*—a Venezuelan di-

[6]Per capita values use municipality-level population from the 2011 Venezuelan census. Because this measure is time-invariant within each municipality, dividing an outcome by population before taking logarithms is equivalent to subtracting a municipality-specific constant, which is absorbed by the municipality fixed effects. Hence, for all log-transformed outcomes, our estimates are identical whether the dependent variable is in levels or per capita terms. We nonetheless report per capita figures in descriptive analyses for interpretability, and we assess robustness to specifications using non-log-transformed per capita outcomes.

etary staple—provided by a major domestic food producer.[7] The data are available at the municipality-month level over the same period, and we express sales in kilograms per capita. Unlike nighttime lights, which capture broad economic activity including industrial and commercial operations, cornflour sales directly measure household-level access to a basic food staple, making them particularly relevant for assessing whether sanctions affected welfare in oil-producing areas.

3.1.3 Migration and Electoral Turnout

Our primary panel measure of migration comes from the *Registro Administrativo de Migrantes Venezolanos* (RAMV), accessed through the Venezuelan Refugee Panel Study (VenRePS) (Rozo et al., 2023).[8] The RAMV recorded Venezuelan nationals entering Colombia through the *Permiso Especial de Permanencia* (PEP) program, which granted them access to labor rights, healthcare, education, and other social services (Ibañez et al., 2022). The data include migrants' municipality of origin and month of entry into Colombia, letting us construct a monthly municipality-level panel of migration rates per 100,000 inhabitants. This panel spans early 2016 to mid-2018, after which observations grow sparse as the registration program neared its enrollment cutoff. Although the data do not allow us to evaluate migration responses to the 2019 oil sanctions directly, they provide nearly one year of post-treatment variation following the 2017 financial sanctions.

We complement the migration panel with electoral turnout, an indirect but longer-horizon measure of population loss. We gathered voting-center-level results from the Venezuelan National Electoral Council (CNE) for the 2012 and 2013 presidential elections and the 2015 parliamentary elections. Venezuelan law requires results to be published at the voting-center level with geographic identifiers, letting us aggregate them to the municipality level and construct turnout rates as the ratio of votes cast to registered voters. For the 2018 presidential election, we use the CNE's published results despite the disputed, opposition-boycotted na-

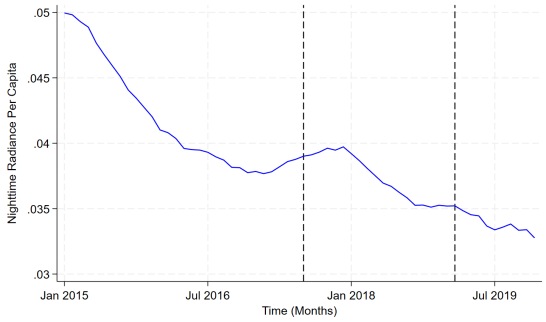
[7] The food producing firm requested anonymity.

[8] See www.venreps.com.

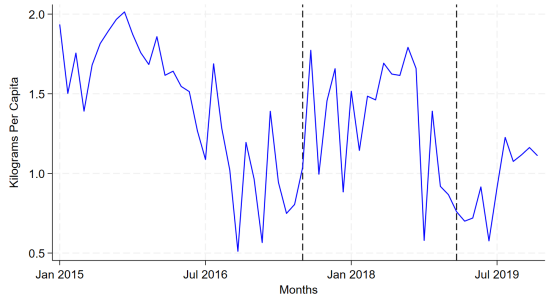
ture of that contest. For 2024, the CNE released no official disaggregated results; instead, we rely on voting-booth-level tallies collected and published by the opposition coalition led by María Corina Machado and subsequently validated through independent audits (Kronick, 2024; The Carter Center, 2024; ResultadosConVenezuela, 2024).

We aggregate these tallies into municipality-level turnout measures for 2024. The resulting panel spans five national elections (2012, 2013, 2015, 2018, 2024) and lets us assess whether oil-producing municipalities experienced disproportionate declines in electoral participation relative to non-oil ones, a pattern consistent with differential outmigration. Figure 2 displays the nationwide evolution of the four panel outcomes, with vertical lines marking the 2017 financial sanctions and the 2019 oil sanctions.

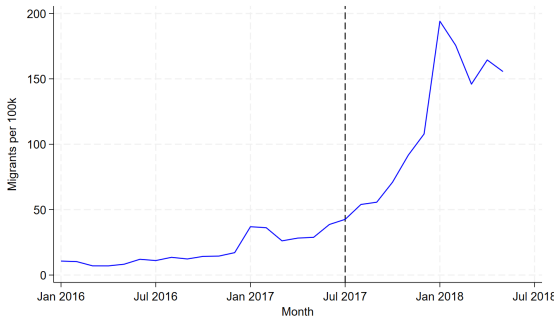
Figure 2: Aggregate Nationwide Trends for Panel Outcomes



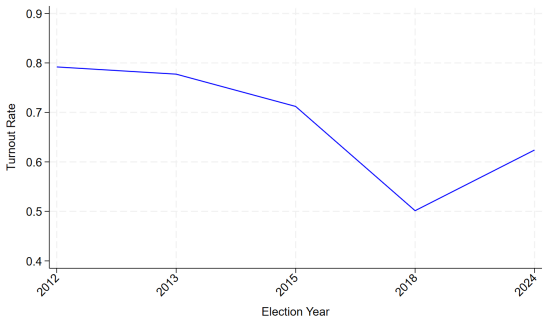
(a) Nighttime Light Radiance Per Capita



(b) Per Capita Cornflour Sales



(c) Monthly Entries to Colombia per 100k Inhabitants



(d) Voter Turnout Rates (%)

Note: Figure displays the aggregate nationwide evolution of the four panel outcome variables used in the analysis. Panel A shows average monthly nighttime light radiance per capita (in log scale) from NASA VIIRS data, January 2015–December 2019. Panel B shows average monthly cornflour sales in kilograms per capita from proprietary producer data over the same period. Panel C shows the monthly number of Venezuelan entries to Colombia per 100,000 inhabitants at the municipality-of-origin level, constructed from RAMV/VenRePS data; the series ends in mid-2018 when data collection was effectively discontinued. Panel D shows voter turnout rates (total votes cast as a share of registered voters) for five national elections: the 2012 and 2013 presidential elections, the 2015 parliamentary election, the 2018 presidential election, and the 2024 presidential election. Vertical dashed lines indicate the imposition of financial sanctions (August 2017) and oil sanctions (January 2019). The capital district (Caracas) is excluded from all panels. *Sources:* NASA VIIRS; proprietary cornflour sales data; RAMV via VenRePS (Rozo et al., 2023); CNE; ResultadosConVenezuela (2024); authors' calculations.

Several features of these trends are noteworthy. Nighttime lights (Panel A) decline sharply from early 2015, well before the 2017 financial sanctions, with no discrete break around either sanction episode. Cornflour sales (Panel B) show a similar pattern of sustained deterioration throughout the sample period. Migration to Colombia (Panel C) accelerates during 2017 and peaks in early 2018, largely predating the 2019 oil sanctions. Finally,

voter turnout (Panel D) falls markedly between the pre-2017 elections and the 2018 and 2024 contests, consistent with large-scale emigration and the opposition boycott of the 2018 contest.

3.1.4 Cross-Sectional Migration Measures

Because the RAMV panel ends in mid-2018, we complement it with two cross-sectional measures of cumulative outmigration capturing long-run displacement. The first derives from geolocalized Twitter data constructed by Morales-Arilla et al. (2025), who identify users with a sustained history of tweets originating in Venezuela who later posted from abroad. Users are assigned to Venezuelan municipalities by the coordinates of their pre-2017 tweets, and we aggregate these observations into a municipality-level index of cumulative emigrants per 100,000 people. The second measure comes from Colombia's*Encuesta Pulso de la Migración* (EPM), a nationally representative survey of Venezuelan migrants residing in Colombia conducted by Colombia's national statistical agency (DANE). The survey records respondents' municipality of origin in Venezuela, allowing us to construct a municipality-level migrants counts normalized by population (migrants per 100,000 people). These two cross-sectional measures provide independent evidence on cumulative outmigration and serve as robustness checks for the panel migration results.

3.1.5 Government Redistribution: Carnet de la Patria

To assess whether the Venezuelan government pursued compensatory redistribution toward oil-producing areas after sanctions, we analyze individual-level registration data from the *Carnet de la Patria* (CdlP), a government-issued identification system used to administer targeted social transfers, including subsidized food packages (CLAP boxes), cash bonuses, and other social programs (Morales-Arilla, 2021). The data cover three enrollment drives, in April 2016, January 2017, and October 2017; the first two preceded the August 2017 financial sanctions, the third followed sanctions. Using the electoral registry, we match registrants to

their voting center and aggregate to the municipality level, constructing registration rates per 100,000 inhabitants for each drive. This lets us test whether the post-sanction campaign disproportionately targeted oil-producing municipalities, as a compensatory redistribution hypothesis would predict.

Descriptive statistics for all panel and cross-sectional variables – disaggregated by oil status and, for panel variables, by pre- and post-sanction periods – are provided in the Appendix Table A.1.

3.2 Empirical Strategy

We estimate a difference-in-differences (DiD) specification comparing oil and non-oil municipalities before and after the imposition of sanctions. The identifying assumption is that, absent sanctions, outcomes in both groups of municipalities would have followed parallel trends. Under the hypothesis that sanctions disrupted oil-sector activity through financing and input constraints, municipalities linked to oil production should exhibit relatively larger declines in economic activity and larger increases in outmigration following the sanctions episodes. The DiD design allows us to test for the presence of such differential effects.

We estimate the following baseline specification:

$$y_{i,t} = \alpha + \beta \left(After_t \times Oil_i \right) + \psi_i + \mu_t + \varepsilon_{i,t} \tag{1}$$

where $y_{i,t}$ is the outcome of interest for municipality i at time t; Oil_i is an indicator equal to one for municipalities with oil activities; $After_t$ is an indicator equal to one for observations after July 2017 (the last month before financial sanctions were imposed); ψ_i are municipality fixed effects; and μ_t are time fixed effects (month-year for panel outcomes, election for turnout). The coefficient of interest is β, which captures the average differential change in the outcome for oil municipalities relative to non-oil municipalities after the imposition of sanctions. Under the collective punishment hypothesis, we would expect $\beta < 0$ for nighttime

lights and cornflour sales (indicating disproportionate economic deterioration in oil areas), $\beta > 0$ for migration (indicating disproportionate outflows), and $\beta < 0$ for voter turnout (indicating disproportionate population loss). Standard errors are clustered at the municipality level throughout. For the two cross-sectional migration outcomes (Twitter and EPM), we estimate a simple cross-sectional OLS regression of cumulative migration per capita on the oil municipality indicator, with and without controls. We include a vector of baseline municipality characteristics —population, population density, poverty rates, vote share for the ruling party (*chavismo*) in the 2013 presidential election, indicators for border and coastal municipalities, and distance to Caracas— each interacted with $After_t$. These interactions allow for differential post-treatment trends by baseline observable characteristics, addressing the concern that oil and non-oil municipalities may differ along dimensions correlated with both oil status and the trajectory of outcomes during the crisis. Our main specifications exclude the 5 municipalities that make up the Caracas metropolitan area. This decision is grounded on the special distributive priorities that autocratic regimes place on capital cities (Ades and Glaeser, 1995).[9]

To assess the plausibility of the parallel trends assumption and the timing of any potential effects, we complement the baseline DiD with event study specifications that replace the single $After_t \times Oil_i$ interaction with a full set of period-specific interactions. For monthly panel outcomes, these take the form $\sum_\tau \beta_\tau \left(\mathbf{1}[t = \tau] \times Oil_i\right)$, with the last period before the 2017 sanctions being normalized to zero. For election outcomes, each election date serves as a separate period. These event study estimates allow us to assess pre-treatment parallel trends and evaluate whether differential effects emerged following the enactment of sanctions. We then conduct a battery of robustness checks to assess the sensitivity of our results to alternative specifications and modeling choices.

[9]As shown in the appendix, conclusions are robust to including the municipalities of the Caracas metropolitan area to the analysis.

4 Results

4.1 Difference-in-Differences Estimates

Table 1 reports difference-in-differences estimates from Equation 1 for the four panel outcomes. Under the hypothesis that sanctions created localized economic distress through disruptions to the oil sector, oil-producing municipalities should exhibit relative declines in economic activity (negative coefficients for nighttime lights and cornflour sales) and voters turnout (negative), and higher outmigration (positive). Across all outcomes and specifications, we find no statistically significant evidence consistent with such differential effects. Point estimates for the economic outcomes are generally small, imprecise, and at times opposite in sign to those implied by the collective punishment hypothesis. Migration and turnout estimates are likewise null, with no evidence of relatively higher outmigration or larger declines in electoral participation in oil-producing municipalities following the imposition of sanctions. These results hold across specifications with no controls, with demographic controls interacted with the post-treatment indicator, and with both demographic and geographic controls.

Table 1: Difference-in-Differences Estimates for Panel Outcomes

Panel A: Economic Activity						
	Nighttime Lights			**Cornflour Sales**		
	(1)	(2)	(3)	(4)	(5)	(6)
DiD Estimate	0.048	0.058	0.090**	0.082	0.095	0.098
	(0.038)	(0.040)	(0.045)	(0.076)	(0.078)	(0.077)
Observations	16,041	16,041	16,041	17,897	17,897	17,897
Adjusted R-Squared	0.990	0.990	0.990	0.852	0.853	0.853
Panel B: Migration Trends						
	Migrants			**Turnout**		
	(1)	(2)	(3)	(4)	(5)	(6)
DiD Estimate	-0.168***	-0.056	-0.001	0.017	0.009	0.002
	(0.085)	(0.083)	(0.087)	(0.016)	(0.012)	(0.012)
Observations	6,875	6,875	6,875	1,115	1,115	1,115
Adjusted R-Squared	0.860	0.866	0.868	0.745	0.808	0.812
Demographic Controls Included		X	X		X	X
Geographic Controls Included			X			X

Note: Table reports difference-in-differences estimates from Equation 1, where the dependent variable is the outcome indicated in each panel and the coefficient of interest is $After_t \times Oil_i$. Panel A reports results for economic outcomes: nighttime light radiance (log) and cornflour sales in kilograms per capita (log). Panel B reports results for migration and demographic outcomes: monthly entries to Colombia per 100,000 inhabitants (log) from RAMV data and voter turnout rates (%) from national elections. For each outcome, Column 1 includes only municipality and time fixed effects; Column 2 adds demographic controls (population, poverty rate, and *chavismo* vote share in 2013) interacted with $After_t$; Column 3 adds geographic controls (border and coastal municipality indicators, population density, and distance to Caracas) interacted with $After_t$. Standard errors clustered at the municipality level are reported in parentheses. Monthly fixed effects are used for economic and migration outcomes; election fixed effects are used for turnout. The five municipalities of the Caracas metropolitan area are excluded from all specifications. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Sources:* NASA VIIRS; proprietary cornflour sales data; RAMV via VenRePS (Rozo et al., 2023); CNE; ResultadosConVenezuela (2024); authors' calculations.

These null findings are robust across a wide range of specification choices. Figures A.1 and A.2 in the Appendix report coefficient plots for the $After_t \times Oil_i$ interaction across alternative specifications that vary the inclusion of controls, Caracas metropolitan municipalities, outcome variable transformations, and population weights. Across all permutations, point estimates remain close to zero and confidence intervals consistently include it, indicating

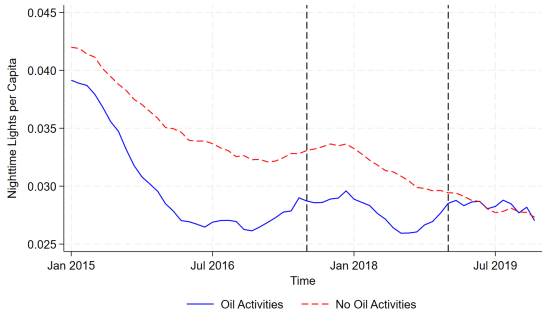
that the null results are not driven by particular modeling choices.

4.2 Descriptive Trends and Event Studies

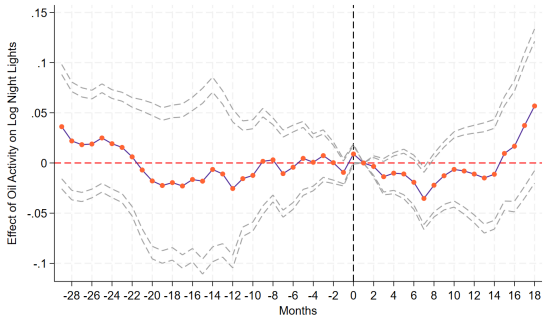
To complement the baseline regressions, Figure 3 examines the evolution of outcomes separately for oil and non-oil municipalities. Panel A displays average per capita nighttime light radiance for both groups. The series follow remarkably similar downward trajectories between 2015 and 2019, with most of the deterioration occurring before the 2017 sanctions. Although oil municipalities initially display somewhat higher levels of radiance, the gap gradually narrows over time, with no visible break around either sanctions episode.

Panel B reports the corresponding event study estimates. The coefficients show no evidence of differential trends and remain statistically indistinguishable from zero throughout the post-treatment period. Panels C and D present analogous evidence for cornflour sales. Trends in per capita sales are closely aligned across oil and non-oil municipalities throughout the period, while the event study estimates reveal no statistically significant relative declines in food access in oil-producing areas following sanctions.

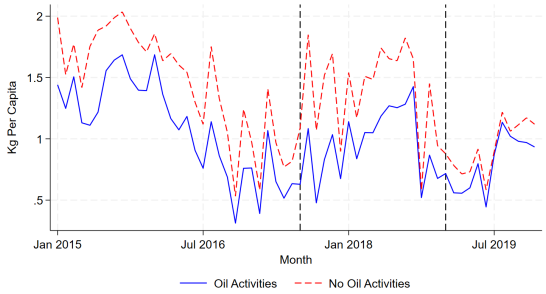
Figure 3: Descriptive Trends and Event Studies for Economic Outcomes



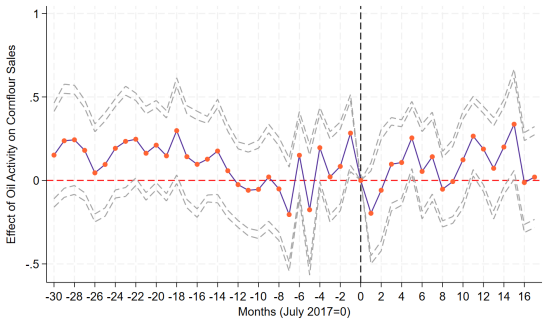
(a) Nighttime Lights by Oil Status



(b) Event Study: Nighttime Lights



(c) Cornflour Sales by Oil Status



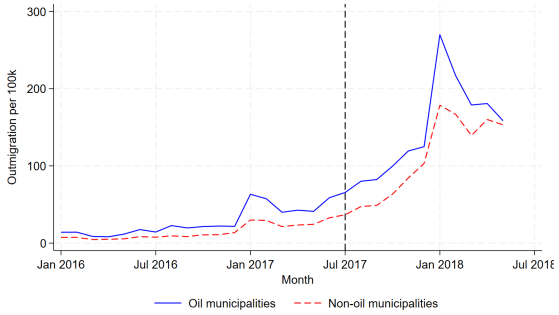
(d) Event Study: Cornflour Sales

Note: Panels A and C display average outcome trajectories for oil municipalities (38) and non-oil municipalities (297), excluding the Caracas metropolitan area. Panel A shows monthly average nighttime light radiance per capita (log scale) from NASA VIIRS, January 2015–December 2019. Panel C shows monthly average cornflour sales in kilograms per capita over the same period. Vertical dashed lines indicate the imposition of financial sanctions (August 2017) and oil sanctions (January 2019). Panels B and D display event study coefficients from interactions of period indicators with the oil municipality indicator, with the last pre-treatment period (July 2017) normalized to zero. These correspond to the baseline specification (Column 1) of the respective panels in Table 1. Shaded areas represent 95% confidence intervals based on standard errors clustered at the municipality level. *Sources:* NASA VIIRS; proprietary cornflour sales data; authors' calculations.

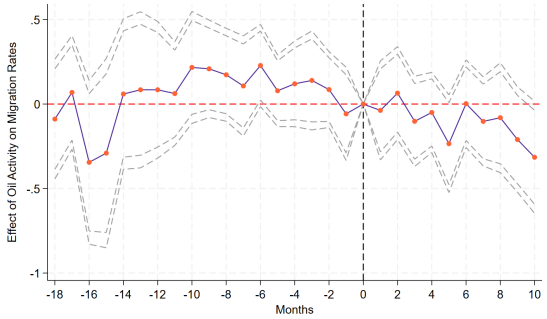
Figure 4 presents analogous evidence for migration and electoral turnout. Panel A plots outmigration rates per 100,000 inhabitants for oil and non-oil municipalities. Both groups exhibit nearly identical migration dynamics, including the sharp acceleration in outflows observed during 2017–2018. The event study estimates in Panel B likewise shows parallel pre-treatment migration trends and no statistically significant post-treatment effect. Panels C and D report electoral turnout rates and the corresponding event study estimates. Turnout

declines substantially between the pre-2017 elections and the 2018 and 2024 contests in both groups, consistent with broad emigration, the 2018 opposition boycott, and worsening conditions for electoral participation. However, there is no evidence that oil municipalities experienced relatively larger declines in turnout following the sanctions episodes. Event study coefficients remain small and statistically indistinguishable from zero throughout.

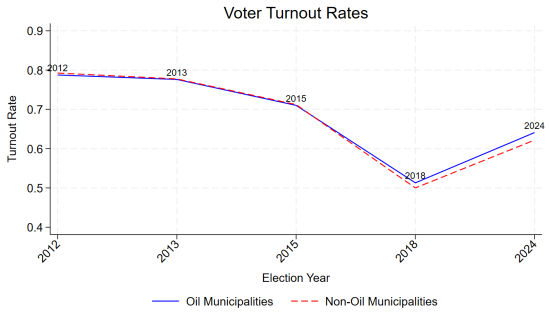
Figure 4: Descriptive Trends and Event Studies for Migration and Turnout



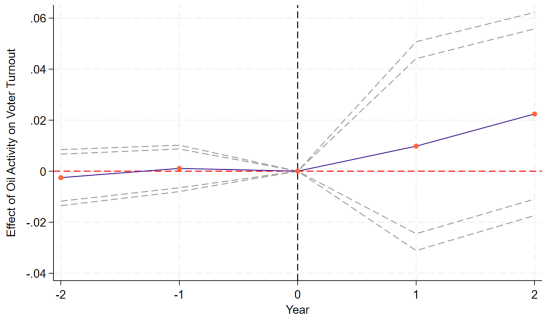
(a) Outmigration by Oil Status



(b) Event Study: Outmigration



(c) Voter Turnout by Oil Status



(d) Event Study: Voter Turnout

Note: Panels A and C display average outcome trajectories for oil municipalities (38) and non-oil municipalities (297), excluding the Caracas metropolitan area. Panel A shows monthly entries to Colombia per 100,000 inhabitants at the municipality-of-origin level, constructed from RAMV/VenRePS data; the series ends in mid-2018 when data collection became sparse. Panel C shows voter turnout rates (total votes cast as a share of registered voters) for five national elections: the 2012 and 2013 presidential elections, the 2015 parliamentary election, the 2018 presidential election, and the 2024 presidential election. Vertical dashed lines indicate the imposition of financial sanctions (August 2017) and oil sanctions (January 2019). Panels B and D display event study coefficients from interactions of period indicators with the oil municipality indicator, with the last pre-treatment period normalized to zero. These correspond to the baseline specification (Column 1) of the respective panels in Table 1. Shaded areas represent 95% confidence intervals based on standard errors clustered at the municipality level. *Sources:* RAMV via VenRePS (Rozo et al., 2023); CNE; ResultadosConVenezuela (2024); authors' calculations.

Taken together, these patterns reinforce the baseline regression results. Despite Venezuela's profound economic and humanitarian collapse during this period, the deterioration does not appear spatially concentrated in oil-producing municipalities after sanctions were imposed. The parallel evolution of outcomes across oil and non-oil municipalities supports the identifying assumption underlying the DiD design and suggests that the broader economic collapse and migration crisis were driven primarily by forces that predated – or operated independently of – the sanctions episodes.

4.3 Cross-Sectional Migration

Because the RAMV panel ends in mid-2018, we complement the panel migration analysis with two cross-sectional measures of cumulative outmigration that capture longer-run displacement patterns. Figure A.3 in the Appendix presents the distributions of (log) cumulative migration rates per 100,000 inhabitants for oil and non-oil municipalities using the EPM survey data (Panel A) and the geolocalized Twitter data (Panel B). In both cases, the distributions overlap substantially, with no visible rightward shift among oil municipalities that would indicate disproportionate outmigration from these areas.

We formalize this comparison using OLS regressions of cumulative migration rates on the oil municipality indicator, reported in Tables A.2 and A.3 in the Appendix. Across specifications – with no controls, demographic controls, and the inclusion of both demographic and geographic controls – the oil coefficient remains statistically insignificant for both the EPM and Twitter measures. These cross-sectional results reinforce the panel evidence: oil-producing municipalities do not exhibit disproportionately higher cumulative outmigration despite being more directly exposed to potential disruptions affecting the oil sector.

4.4 Compensatory Redistribution

One potential explanation for the absence of differential effects is that the Venezuelan government responded to sanctions by increasing redistribution toward oil-producing areas after

sanctions, thereby attenuating economic deterioration and outmigration. We evaluate this possibility using registration data from the Carnet de la Patria (CdlP), the government's primary mechanism for administering targeted social transfers. As described in Section 3, the data include three enrollment drives, two conducted before the 2017 financial sanctions (April 2016 and January 2017) and one conducted afterward (October 2017).

Figure A.4 and Table A.4 in the Appendix report descriptive trends, event-study estimates, and DiD regression results for CdlP registration rates. We find no evidence that the post-sanction enrollment drive disproportionately targeted oil-producing municipalities. If anything, point estimates suggest relatively larger increases in registration rates in non-oil municipalities following the 2017 sanctions, opposite to what would be predicted under a compensatory redistribution mechanism. These findings suggest that the absence of differential effects in economic activity and migration is unlikely to reflect redistribution policies offsetting sanction-related shocks in oil-producing areas.

5 Conclusion

This paper evaluates the claim that U.S. sanctions first imposed in 2017 were a primary driver of Venezuela's economic collapse and refugee crisis, as suggested by a prominent and influential literature arguing that sanctions reduced the country's capacity to sustain essential imports, economic activity, and living standards by limiting oil production. We test this mechanism using a difference-in-differences design exploiting the geographic concentration of oil production across Venezuelan municipalities. Across multiple measures of economic activity and outmigration, we find no evidence favoring this interpretation. Instead, the evidence is more consistent with a crisis driven predominantly by national economic trends and political events that predated or coincided with the sanctions episodes, including prolonged macroeconomic distortions, institutional deterioration, and the collapse of state capacity.

Several limitations of our analysis should be acknowledged. First, our empirical strategy

identifies relative effects between oil-producing and non-oil-producing municipalities. To the extent that sanctions generated purely aggregate national effects that were geographically diffuse, these would not be captured by our design. This possibility is especially concerning for the 2019 sanctions, which could have plausibly affected export revenues not only through reduced oil production, but also by forcing PDVSA to sell its oil at discount prices. Finding no economic or migration effects of the 2017 sanctions before 2019 attenuates this concern. Second, the sanctions coincided with other major political and economic shocks – including the 2017 protests, constitutional assembly and militarization of PDVSA, and the 2019 constitutional crisis and nationwide prolonged electrical blackouts. To the extent that some of these concurrent shocks could have disproportionately affected oil-producing areas, estimates from our analyses should be interpreted as an upper bound of the effects of sanctions operating through the oil sector. Still, our upper bound estimates of the effects of sanctions are mostly null. Finally, some dimensions of the analysis are constrained by data availability, particularly the limited post-2018 migration panel and the absence of more direct measures of local employment or production.

Our paper contributes to the literature on sanctions by illustrating how subnational variation can help evaluate mechanisms that are difficult to isolate using aggregate data alone. Recent work in the sanctions' literature has emphasized important identification challenges in estimating the economic effects of sanctions. Our findings are consistent with a broader pattern in the cross-country literature: once identification challenges are addressed more carefully, estimated effects of sanctions appear more limited than initially understood. Future research combining cross-country analyses with carefully identified subnational case studies may help in clarifying the conditions under which sanctions generate effects consistent with a collective punishment narrative.

References

Ades, A. F. and Glaeser, E. L. (1995). Trade and circuses: explaining urban giants. *The Quarterly Journal of Economics*, 110(1):195–227.

Bahar, D., Bustos, S., Morales-Arilla, J. R., and Santos, M. A. (2019). Impact of the 2017 sanctions on venezuela: Revisiting the evidence. Working paper, Brookings Institution.

Felbermayr, G., Syropoulos, C., Yalcin, E., and Yotov, Y. V. (2019). On the effects of sanctions on trade and welfare: New evidence based on structural gravity and a new database. Structural gravity analysis using Global Sanctions Database.

Hernández, I. and Monaldi, F. (2016). Weathering collapse: An assessment of the financial and operational situation of the venezuelan oil industry. *CID Working Paper Series 2016.327*.

Ibañez, A. M., Moya, A., Ortega, M. A., Rodríguez, M., and Rozo, S. (2022). The impact of temporary working and residence permits for migrants in colombia. Working paper, Innovations for Poverty Action (IPA) Study. Online: https://poverty-action.org/study/impact-temporary-working-and-residence-permits-migrants-colombia-0, accessed 2025-11-17.

International Monetary Fund (2015). *World Economic Outlook, April 2015: Uneven Growth*. International Monetary Fund.

Kronick, D. (2024). On the validity of vote counts published by the venezuelan opposition. *University of California Berkley*.

Kwon, O., Syropoulos, C., and Yotov, Y. (2020). Pain and gain: The short-and long-run effects of economic sanctions on growth. *Also available at https://www. semanticscholar. org/paper/Painand-Gain% 3A-The-Short-and-Long-run-Effects-of-on-Kwon-Syropoulos/72e2f76cc08e84ca374223e813b009588caba679*.

Llorens, M. (2018). Dolor país, versión venezuela. *Nueva Sociedad*, 274.

Lopez, V. (2013). Venezuela toilet paper shortage sends ordinary lives around the bend.

Morales-Arilla, J. (2021). Autocrats in crisis mode: Strategic favoritism during economic shocks. Technical report, Mimeo. https://scholar. harvard. edu/josemorales-arilla/publications/% E2 ....

Morales-Arilla, J., Martin, D., and Morales, A. (2025). Escaping from hardship, searching for comfort: Climate matching in refugees' destination choices. *Journal of Development Economics*, page 103500.

Morgan, T. C., Syropoulos, C., and Yotov, Y. V. (2023). Economic sanctions: Evolution, consequences, and challenges. *Journal of Economic Perspectives*, 37(1):3–30.

Reinhart, C. M. and Santos, M. A. (2016). From financial repression to external distress: The case of venezuela. *Emerging Markets Finance and Trade*, 52(2):255–284.

ResultadosConVenezuela (2024). Resultadosconvenezuela.

Reuters (2018). Special report: Oil output goes awol in venezuela as soldiers run pdvsa. *Reuters*.

Rodríguez, F. (2019). Sanctions and the venezuelan economy: What the data say. Working paper, Torino Capital.

Rodríguez, F. (2022). Sanctions and oil production: Evidence from venezuela's orinoco basin. *Latin American Economic Review*, 31:1–31.

Rodríguez, F. (2025). *The Collapse of Venezuela: Scorched Earth Politics and Economic Decline, 2012-2020*. Kellogg Institute Series on Democracy and Development. University of Notre Dame Press, Notre Dame, IN.

Rozo, S. V., Ibañez, A. M., Moya, A., and Urbina Flórez, M. J. (2023). Venezuelan refugees panel study (venreps): A longitudinal survey of forced migrants from venezuela in colombia. Dataset, World Bank / Inter-American Development Bank. Available at: https://www.venreps.com/, accessed 2025-11-17.

Sachs, J. and Weisbrot, M. (2019). Punishing civilians: U.s. sanctions on venezuela. *Challenge*.

Santos, M. (2017). Venezuela: Running on empty. In *Lasa Forum*, volume 48.

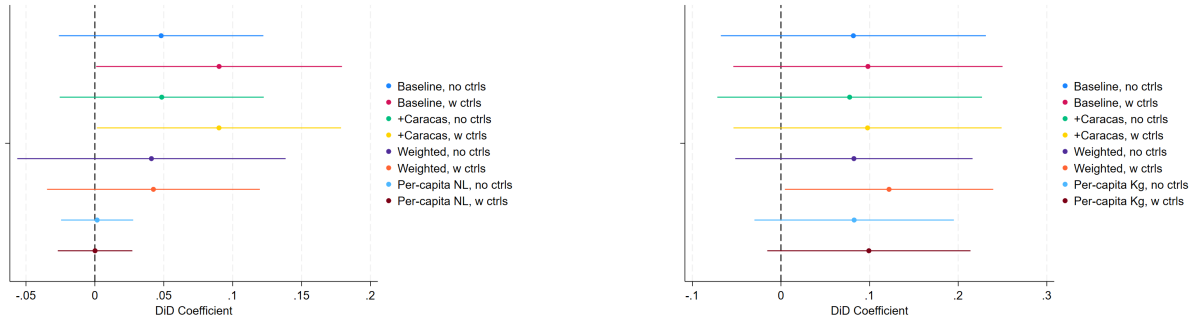
Santos, M. A., Morales-Arilla, J., and Cornielles, Z. P. (2026). From collective punishment to constraints on authority: Rethinking the impact of us sanctions on venezuela. *Elements in the Economics of Emerging Markets*.

The Carter Center (2024). Final report on the 2024 venezuelan presidential election. Independent audit and analysis of electoral tallies.

Zambrano, D. A. (2019). Guaidó, not maduro, is the de jure president of venezuela. Reposted by Stanford Law School; originally published at Lawfare on Feb. 1, 2019.

Online Appendix

Figure A.1: Robustness Checks for Economic Outcomes

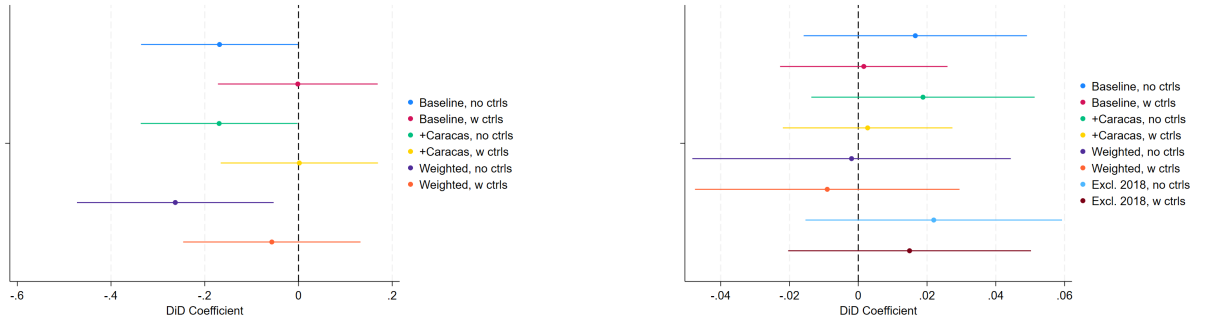


(a) Nighttime Lights.

(b) Cornflour Sales.

Note: Each panel displays point estimates and 95% confidence intervals for the $After_t \times Oil_i$ coefficient from multiple permutations of the baseline DiD specification. Permutations vary the inclusion of demographic and geographic controls, the treatment of the Caracas metropolitan area, functional form choices (log vs. per capita levels), and sample restrictions. Panel A corresponds to nighttime light radiance and Panel B to cornflour sales. The horizontal dashed line at zero indicates the null hypothesis of no differential effect. All specifications include municipality and month-year fixed effects with standard errors clustered at the municipality level. *Sources:* NASA VIIRS; proprietary cornflour sales data; authors' calculations.

Figure A.2: Robustness Checks for Migration and Turnout Outcomes

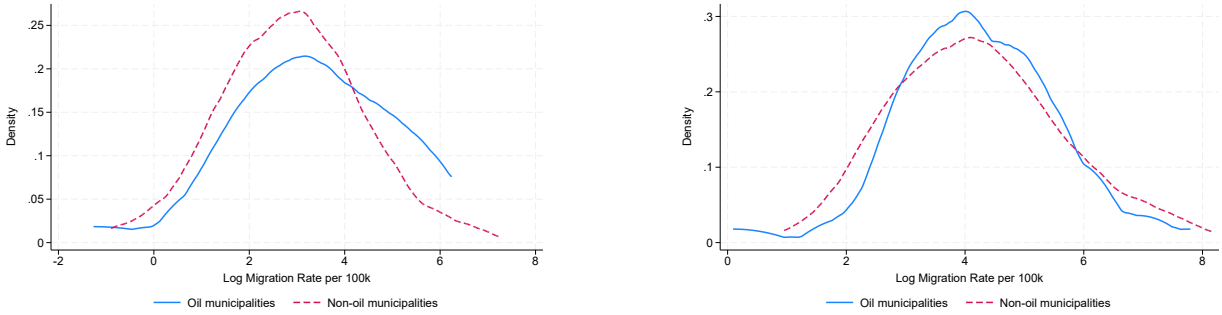


(a) Migration Rates

(b) Turnout Rates

Note: Each panel displays point estimates and 95% confidence intervals for the $After_t \times Oil_i$ coefficient from multiple permutations of the baseline DiD specification. Permutations vary the inclusion of demographic and geographic controls, the treatment of the Caracas metropolitan area, functional form choices, and sample restrictions. Panel A corresponds to monthly entries to Colombia per 100,000 inhabitants (RAMV data) and Panel B to voter turnout rates. The horizontal dashed line at zero indicates the null hypothesis of no differential effect. Migration specifications include municipality and month-year fixed effects; turnout specifications include municipality and election fixed effects. Standard errors are clustered at the municipality level. *Sources:* RAMV via VenRePS (Rozo et al., 2023); CNE; ResultadosConVenezuela (2024); authors' calculations.

Figure A.3: Distribution of Cumulative Migration Rates by Oil Status

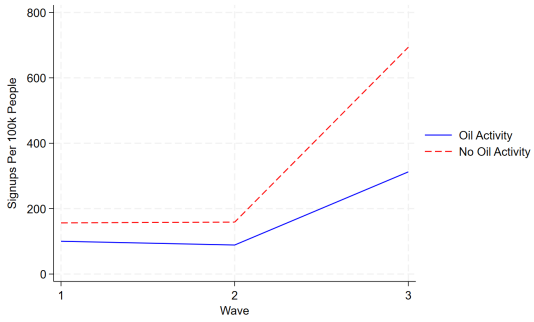


(a) Encuesta Pulso de la Migración (EPM)

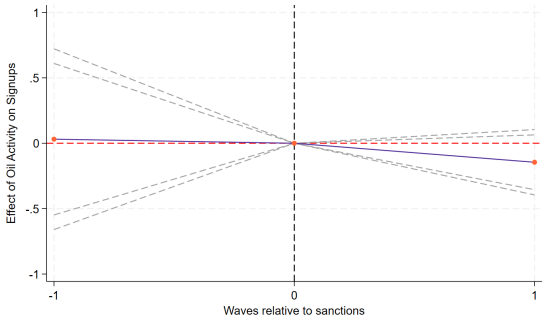
(b) Geolocalized Twitter Data

Note: Kernel density estimates of the distribution of (log) cumulative migration rates per 100,000 inhabitants across municipalities, separately for oil municipalities (38) and non-oil municipalities (297). Panel A uses data from Colombia's *Encuesta Pulso de la Migración* (EPM), a nationally representative survey of Venezuelan migrants in Colombia conducted by DANE. Panel B uses data from geolocalized Twitter users identified by Morales-Arilla et al. (2025) as having moved abroad from Venezuela. Substantial overlap between the oil and non-oil distributions in both panels indicates no disproportionate cumulative emigration from oil-producing areas. *Sources:* EPM (DANE); Morales-Arilla et al. (2025); authors' calculations.

Figure A.4: Carnet de la Patria Sign-Up Rates: Descriptive Trends and Event Study



(a) Sign-Up Rates by Oil Status



(b) Event Study: CdlP Sign-Ups

Note: Panel A displays average *Carnet de la Patria* (CdlP) sign-up rates per 100,000 inhabitants for oil and non-oil municipalities across three registration drives: April 2016, January 2017 (both pre-sanctions), and October 2017 (post-sanctions). Panel B displays event study coefficients from interactions of registration-drive indicators with the oil municipality indicator, with the January 2017 drive (last pre-treatment period) normalized to zero. Shaded areas represent 95% confidence intervals based on standard errors clustered at the municipality level. The five municipalities of the Caracas metropolitan area are excluded. *Sources:* CdlP registration data; Venezuelan electoral registry; authors' calculations.

Table A.1: Summary Statistics

Panel A: Municipality-Time Outcomes				
	Non-Oil Pre	Non-Oil Post	Oil Pre	Oil Post
Night Lights	3057.85	2624.20	7061.73	6540.90
	(6992.13)	(6301.08)	(6205.81)	(6311.83)
Cornflour Sales (kg)	111699.50	92583.35	106075.61	89189.26
	(246949.47)	(233825.35)	(182435.91)	(164877.90)
Migrants	18.27	85.54	40.22	149.50
	(95.98)	(397.56)	(78.06)	(282.13)
Turnout Rate	0.76	0.56	0.76	0.58
	(0.07)	(0.11)	(0.06)	(0.10)
Signups	162.05	704.24	136.17	450.31
	(365.20)	(1035.50)	(220.56)	(350.11)
Panel B: Municipality-Level Variables				
	Control (Non-oil)	Treated (Oil)		
Migration Rate (EPM)	22.314	28.762		
	(63.227)	(32.892)		
Migration Rate (Twitter)	191.805	143.625		
	(936.149)	(223.493)		
Percent poor	0.294	0.346		
	(0.131)	(0.096)		
Population density	0.000	0.000		
	(0.001)	(0.000)		
Baseline Chavismo support (2013)	0.559	0.558		
	(0.120)	(0.094)		
Coastal municipality (share)	0.188	0.450		
	(0.391)	(0.504)		
Border municipality (share)	0.065	0.150		
	(0.247)	(0.362)		
Distance to Caracas (km)	348.015	426.035		
	(203.219)	(114.517)		
Observations (Twitter base)	293	40		

Note: Panel A reports means with standard deviations in parentheses for municipality-time panel outcomes, split by oil status and pre/post-sanction periods (pre: before August 2017; post: August 2017 onward). Panel B reports unweighted municipality-level means with standard deviations in parentheses for cross-sectional and baseline variables. Binary indicators (e.g., coast, border) are reported as proportions. The difference column reports the treated (oil) minus control (non-oil) difference. *Sources:* NASA VIIRS; proprietary cornflour sales data; RAMV via VenRePS; CNE; EPM (DANE); Morales-Arilla et al. (2025); CdlP registration data; Venezuelan electoral registry; 2011 census; authors' calculations.

Table A.2: Cross-Sectional OLS Estimates: Cumulative Migration and Oil Status (EPM)

	Log Migration Rate		
	(1)	(2)	(3)
Oil Indicator	0.474	0.376	0.298
	(0.394)	(0.383)	(0.393)
Observations	227	227	227
R-Squared	0.008	0.081	0.124
Demographic Controls		X	X
Geographic Controls			X

Note: Table reports OLS estimates of the association between cumulative migration rates and oil municipality status using data from Colombia's *Encuesta Pulso de la Migración* (EPM). The dependent variable is the log of the number of migrants per 100,000 inhabitants who left Venezuela from each municipality. The coefficient of interest is the oil municipality indicator. Column 1 includes no controls; Column 2 adds demographic controls (population, poverty rate, and *chavismo* vote share in 2013); Column 3 adds geographic controls (border and coastal municipality indicators, population density, and distance to Caracas). Robust standard errors in parentheses. Caracas is included in the sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Sources:* EPM (DANE); authors' calculations.

Table A.3: Cross-Sectional OLS Estimates: Cumulative Migration and Oil Status (Twitter)

	Log Migration Rate		
	(1)	(2)	(3)
Oil Indicator	-0.001	0.073	-0.124
	(0.237)	(0.242)	(0.275)
Observations	309	309	309
R-Squared	0.000	0.244	0.285
Demographic Controls		X	X
Geographic Controls			X

Note: Table reports OLS estimates of the association between cumulative migration rates and oil municipality status using geolocalized Twitter data from Morales-Arilla et al. (2025). The dependent variable is the log of the number of Twitter users per 100,000 inhabitants identified as having emigrated from each municipality. The coefficient of interest is the oil municipality indicator. Column 1 includes no controls; Column 2 adds demographic controls (population, poverty rate, and *chavismo* vote share in 2013); Column 3 adds geographic controls (border and coastal municipality indicators, population density, and distance to Caracas). Robust standard errors in parentheses. Caracas is included in the sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Sources:* Morales-Arilla et al. (2025); authors' calculations.

Table A.4: Difference-in-Differences Estimates: Carnet de la Patria Sign-Ups

	Log of Signups		
	(1)	(2)	(3)
DiD Term	-0.161	-0.194	-0.243
	(0.152)	(0.146)	(0.155)
Observations	683	683	683
Adjusted R-Squared	0.743	0.744	0.745
Demographic Controls		X	X
Geographic Controls			X
Control Group Mean (Pre)		3.980	
Control Group Mean (Post)		6.046	

Note: Table reports difference-in-differences estimates from Equation 1 applied to CdlP sign-up rates. The dependent variable is the log of sign-ups per 100,000 inhabitants in each registration drive. The coefficient of interest is $After_t \times Oil_i$, where $After_t$ equals one for the October 2017 registration drive (post-financial sanctions). Column 1 includes only municipality and registration-drive fixed effects; Column 2 adds demographic controls (population, poverty rate, and *chavismo* vote share in 2013) interacted with $After_t$; Column 3 adds geographic controls (border and coastal municipality indicators, population density, and distance to Caracas) interacted with $After_t$. Standard errors clustered at the municipality level are reported in parentheses. The five municipalities of the Caracas metropolitan area are excluded. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Sources:* CdlP registration data; Venezuelan electoral registry; authors' calculations.