The Effects of Cartel Infiltration on International Remittances in Mexico

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Abstract

This paper investigates the impact of localized criminal shocks on transnational capital flows using a cross-sectional sample of 2,443 Mexican municipalities. We implement a Linear Probability Model for model selection and construct a standardized Deprivation Index to avoid multicollinearity. OLS estimates show that the presence of a cartel is associated with a statistically significant 41.0% increase in household remittance inflows. A joint horse-race specification indicates that the behavioral mechanism operates on the extensive margin rather than subsequent market fragmentation. These findings support the hypothesis that migration serves as a safety net mechanism to alleviate the effects of criminal organizations in targeted Mexican municipalities.

1 Introduction

Mexican cartels engage in diverse illicit operations, extortion, and forced community displacement (Hernandez 2024; Hernandez 2025b; Hernandez 2025a; Janetsky and Pesce 2026). This violence compels international migration to the United States (Navarro López 2026; Giovanna et al. 2023; Pérez Mendoza 2022; Cantor 2014; Ratha 2022). While remittances serve as an indicator of migration flows (Jose 2025a; Jose 2026), their systematic relationship with localized cartel infiltration remains unexamined.

We address this gap by asking: **to what extent does the territorial infiltration of organized crime affect household remittance inflows at the municipal level?** To isolate this effect from confounding geographic features, we control for spatial sorting along the *Zona Libre de la Frontera Norte* (ZLFN) border corridors alongside municipal demographic and socioeconomic characteristics. For robustness, we evaluate alternative dimensions of criminal intensity using continuous cartel counts and indicators for multi-cartel territorial contestation.

2 Literature Review and Theoretical Framework

The link between criminal infiltration and migration is well-documented (Navarro López 2026; Giovanna et al. 2023; Pérez Mendoza 2022; Cantor 2014). Cartel presence induces economic paralysis, heightens local risk aversion, and reduces formal domestic labor participation (VoxDevLit 2025), increasing household reliance on external capital.

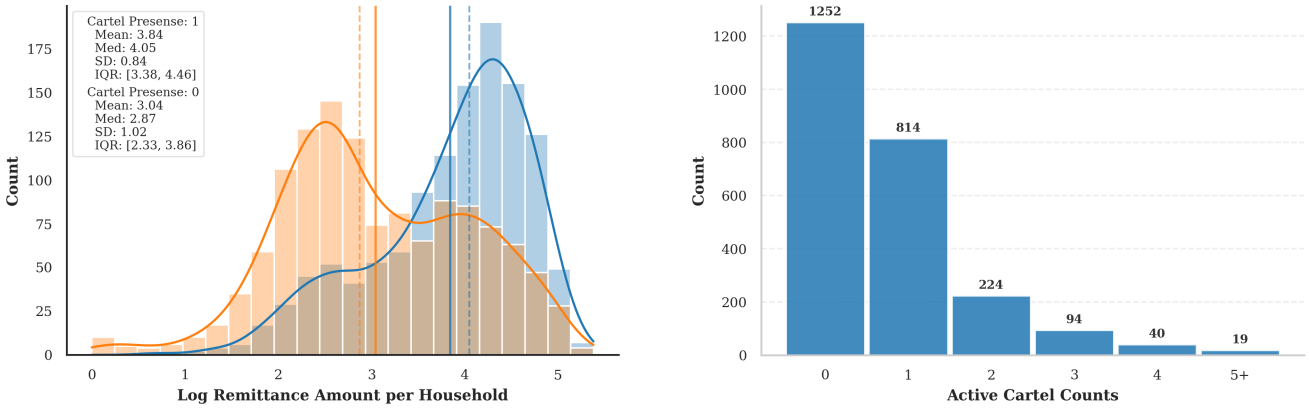
Remittances represent a vital informal consumption-smoothing and co-insurance network (Ratha 2022; CONAPO 2012). They yield significant poverty-alleviation effects that frequently outperform local social programs (Librado-Gonzalez et al. 2025; González and Ortega 2026). Averaging $401 USD per transfer as of 2026 (Jose 2026), remittances constitute approximately 4% of Mexico's GDP (CONAPO 2026). Over 96% originate in the United States (Jose 2025b), with specific states like Chiapas and Guerrero displaying a structural dependency near 13.8% of state GDP (Jose 2025a; Jose 2026). We hypothesize that as cartel infiltration heightens household economic vulnerability, international migrants increase capital transfers to mitigate risks faced by home households.

3 Data and Summary Statistics

Here we use cross-sectional data composed of socioeconomic variables, which are compiled from Data Mexico and INEGI (INEGI 2016; Data Mexico 2020); and organized crime data, which is obtained from the SEDENA national defense military leaks compiled by El Universal Mexico (El Universal Mexico 2023). Our sample consists of the 2463 Mexican municipalities included in El Universal dataset. From those, 20 were filtered out due to missing data on the Gini coefficient (12), Altitude (1), and Remittance Information (7). We end up with 2443 territories, which represent 98.6% of the 2478 total municipalities in Mexico.

3.1 Descriptive Statistics

We partition our cross-sectional sample of 2,443 municipalities by organized crime presence ($N = 1,191$ active, $N = 1,252$ peaceful). Figure 1(a) illustrates a bimodal distribution for logged household remittances, with the cartel-active sub-sample shifted visibly to the right. Figure 1(b) illustrates the categorical frequency distribution of criminal intensity, highlighting a sharp exponential decay. Monopolistic structures dominate: 1,252 municipalities record zero cartels, roughly 800 contain a single faction, approximately 220 contain two cartels, and fewer than 200 observations fall into the highly fragmented 3, 4, and 5+ bins.



(a) Log Remittances by Cartel Status (b)

Figure 1: Distributional Profiles of Household Remittances and Criminal Treatment Intensity
Notes: Panel (a) displays the smooth empirical density of logged household remittance inflows. Panel (b) illustrates the discrete categorical frequency distribution of active criminal factions across the 2,443 sample municipalities, showcasing a sharp exponential decay.

Summary statistics in Table 1 reveal an economic sorting paradox: peaceful municipalities exhibit higher structural extreme poverty rates (27.153%) than cartel-active ones (13.760%), reflecting criminal sorting into more integrated northern municipal corridors (Guadarrama 2023). Cartel-active zones display systematically higher population (85,048 vs. 19,346) and household (24,122 vs. 5,074) averages.

4 Geographic Sorting and Treatment Selection

Pairwise Pearson correlation diagnostics (Figure 2) flagged two severe collinearity channels:

1. **Demographic Identity Confound ($r = 1.000$):** We drop *Log Population* and retain *Log Total Households*. Households match the recipient metric of our dependent variable.

2. **Multidimensional Deprivation Overlap ($r = 0.720$):** To overcome multicollinearity between *Pct Extreme Poverty* and *Pct Educational Backwardness*, we implement Principal Component Analysis (PCA) to extract a single latent dimension of structural vulnerability. The resulting weights of the first principal component (PC_1) are $w_{educ} = 0.7071$ and $w_{pvty} = 0.7071$ with a captured variance of 85.94%. We call this the Deprivation Index.

Table 1: Descriptive Statistics and Balance Tests by Cartel Presence

Variables	Cartel Presence = 1 Mean (N = 1,191)	Cartel Presence = 1 Std. Dev. (1)	Cartel Presence = 0 Mean (N = 1,242)	Cartel Presence = 0 Std. Dev. (2)	Difference t-stat (1) − (2)
Dependent Variable					
Remittance Amount per Household (MXN)	21,190.992	27,140.310	9,521.872	21,880.272	11.66***
Robustness: Cartel Intensity Metrics					
Cartel Counts	1.521	0.951	0.000	0.000	55.19***
Multi-Cartel Presence	0.317	0.465	0.000	0.000	23.48***
Demographic Controls					
Total Population †	85,047.880	199,737.200	19,345.870	50,381.040	11.02***
Total Households	24,121.799	57,587.154	5,074.462	13,728.921	11.12***
State GDP per Capita (MXN)	97,041.373	38,665.977	70,570.777	28,545.242	19.17***
Males Pct	49.196	1.445	48.436	1.544	12.54***
GINI Coefficient	0.388	0.032	0.376	0.030	9.94***
Income Rate	0.141	0.021	0.156	0.029	-14.48***
Pct 20 to 39 yo	27.918	6.359	27.497	7.218	1.53
Pct Educational Backwardness ‡	25.501	9.132	30.824	10.243	-13.54***
Pct Extreme Poverty ‡	13.760	13.480	27.153	17.670	-21.07***
Deprivation Index	-0.682	1.534	0.643	0.030	-18.99***
Geographic & Policy Controls					
ZLFN State (Border Zone)	0.196	0.397	0.030	0.170	13.30***
ZLFN Municipality	0.091	0.287	0.040	0.197	5.03***
Mean Altitude (Meters)	1,222.031	813.456	1,380.518	824.250	-4.78***

Notes: This table presents the baseline sample means and standard deviations partitioned by the municipal indicator of cartel presence. Column (5) reports the calculated Welch's independent two-sample t-statistic evaluating the equality of means across the two subgroups.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
† dropped from the empirical model due to high-correlation with other variables $\rho > 0.8$
‡ dropped from the empirical model in favor of Deprivation Index.

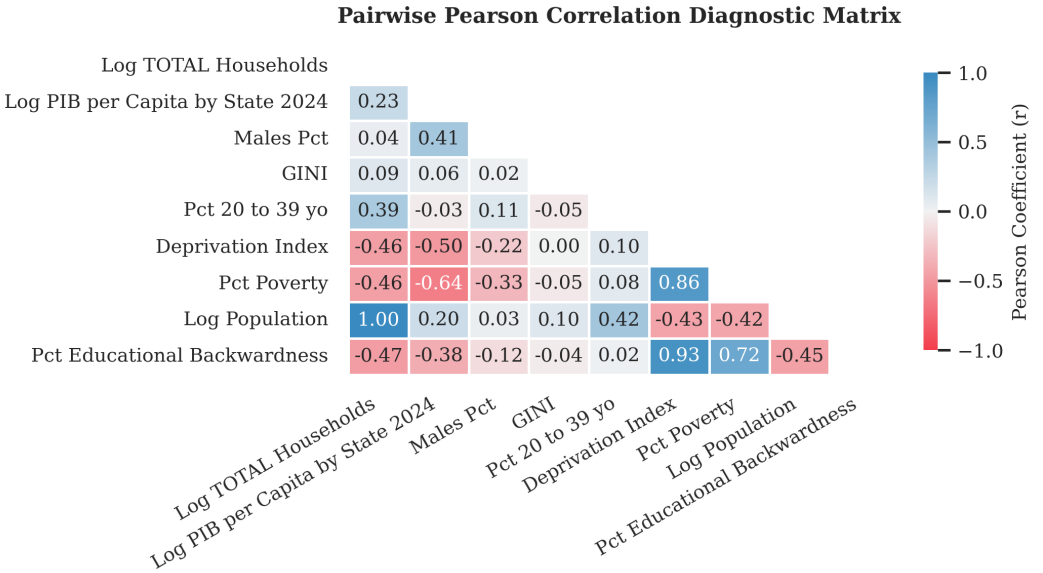


Figure 2: Pairwise Pearson Correlation Matrix Coefficients

Notes: Table displays pairwise Pearson correlation coefficients (r) computed across the full sample of 2,443 municipalities. Retained variables span rows (1) through (6); rows (7) through (9) reflect variables omitted from downstream regressions to prevent severe multicollinearity.

To model strategic sorting, we estimate a Linear Probability Model (LPM) of cartel placement using $HC1$ standard errors (Table A.1, Appendix A). Geographic sorting is highly predictable ($F = 109.6$): location within a border zone state (*ZLFN State*) expands cartel entry likelihood by 41.22 ($p < 0.01$) percentage points, and explicit border designation (*ZLFN Municipality*) adds an independent 16.92 ($p < 0.01$) percentage points. Topography exhibits no statistical effect ($\beta = 0.0019, p = 0.895$).

5 Economic Method and Empirical Model

Our baseline ordinary least squares specification is:

$$\ln(\text{Remittances}_i) = \beta_0 + \beta_1 \text{Cartel Presence}_i + \mathbf{X}_i'\mathbf{\Gamma} + \mathbf{Z}_i'\mathbf{\Phi} + \varepsilon_i \tag{1}$$

where $\ln(\text{Remittances}_i)$ is log municipal remittances per household, Cartel Presence_i is the treatment dummy, $\mathbf{X}_i'$ captures demographic and socioeconomic controls, and $\mathbf{Z}_i'$ contains spatial controls. Inference is conducted via heteroskedasticity-robust Huber-Eicker standard errors ($HC1$).

6 Empirical Findings

Table 2 reports progressive OLS estimates. Percentage changes are calculated via semi-elasticity transformations: $\%\Delta Y = (e^{\beta} - 1) \times 100$.

The unadjusted parameter in Column (1) is 0.7968 ($p < 0.01$). Under full conditioning (Column 4), the coefficient stabilizes at 0.3436 ($p < 0.01$). This establishes our main finding: other factors being equal, that means, spatial sorting, wealth, and structural deprivation (ceteris paribus), **cartel presence is associated with a statistically significant 41.0% increase in household remittance inflows**.

In Column (4), we observe that a 1% increase in households is associated with 0.64% increase in remittances ($\beta = 0.6389, p < 0.01$), similarly, inequality also shows a significant correlation where a 0.01 point increase in wealth inequality (Gini coefficient) is associated with a 6.18% surge in remittance inflows ($\beta = 6.1755, p < 0.01$). Conversely, a 1 percentage point increase in working-age individuals (20 to 39-year-olds) remaining within the municipality *relative to the local population* is associated with a lower yet small association on remittance volumes by 1.40% ($\beta = -0.0140, p < 0.01$).

7 Robustness Checks

Robustness checks using $HC1$ errors are compiled in Appendix A. Replacing binary presence with continuous *Cartel Counts* (Column 2) yields a significant positive parameter ($\beta = 0.0645, p < 0.01$), indicating a 6.66% remittance increase per additional criminal organization. Standing alone, the *Multi-Cartel Presence* dummy captures a 10.64% positive association ($\beta = 0.1011, p < 0.05$).

When both variables enter a joint specification (Column 4), the baseline binary indicator remains highly stable at 0.3480 ($p < 0.01$), while the multi-cartel competitive margin completely loses statistical significance ($\beta = -0.0199, p = 0.707$). These results are consistent with the hypothesis that remittance responses occur primarily due to initial cartel infiltration.

8 Limitations and Conclusion

Because cartel infiltration is unlikely to be randomly assigned across municipalities, our estimates should be interpreted as conditional associations rather than definitive causal effects. Tracking criminal presence via cartel counts also serves as a proxy but it lacks the high-frequency variation needed to capture differences in operational violence across distinct cartel organizations. Lastly, while the ZLFN policy variables capture large-scale spatial sorting, unobserved municipal traits like historical smuggling routes could still influence entry. Future work exploiting panel data, exogenous shocks, or instrumental variables would be necessary to establish causality.

The conclusion of this paper can be summarized as follows: territorial infiltration by organized crime is strongly associated with household economic dependency toward transnational networks, suggesting that international remittances serve as a safety net within targeted Mexican municipalities.

Table 2: The Impact of Cartel Presence on Log Remittance Amount per Household

	Dependent Variable: Log Remittance Amount per Household			
	(1)	(2)	(3)	(4)
Variables	Baseline	Geographic	Demographic	Full Model
Cartel Presence	0.7968***	0.8255***	0.3807***	0.3436***
	(0.038)	(0.039)	(0.041)	(0.040)
Geographic & P. Controls				
ZLFN State		-0.1939***		-0.0917
		(0.062)		(0.069)
ZLFN Municipality		0.1603**		0.0504
		(0.077)		(0.068)
Log Mean Altitude		0.1651***		0.2178***
		(0.028)		(0.026)
Demographic Controls				
Log Total Households			0.5843***	0.6389***
			(0.034)	(0.035)
Log State GDP per Capita (2024)			0.2360*	0.3857***
			(0.130)	(0.146)
Males Pct			-0.0668***	-0.0317**
			(0.012)	(0.013)
GINI Coefficient			6.5778***	6.1755***
			(0.553)	(0.547)
Pct 20 to 39 yo			-0.0108***	-0.0140***
			(0.003)	(0.003)
Deprivation Index †			-0.0299*	-0.0138
			(0.012)	(0.012)
Constant	3.0454***	2.5699***	1.0623	-1.9272**
	(0.026)	(0.084)	(0.766)	(0.940)
Observations	2,443	2,443	2,443	2,443
R-squared	0.154	0.172	0.338	0.357
Adj. R-squared	0.154	0.170	0.336	0.354
F-statistic	444.8	126.3	177.6	134.8
Prob (F-statistic)	7.72e-91	4.51e-98	7.56e-213	1.92e-224
Df Residuals	2,441	2,438	2,435	2,432
Df Model	1	4	7	10

Notes: Heteroskedasticity-robust standard errors are reported in parentheses below the coefficients.
† The *Deprivation Index* is a composite metric constructed by taking the first principal component of the PCA between Pct Educational Backwardness and Pct Poverty.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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Appendices

A Alternative Selection and Robustness Models

Table A.1: Determinants of Cartel Presence (Linear Probability Model)

Dependent Variable:	Cartel Presence (=1)				
Variables	Coefficient	(Std. Err.)	Variables	Coefficient	(Std. Err.)
ZLFN State (Border Zone)	0.4122***	(0.024)	Log Mean Altitude	0.0019	(0.014)
ZLFN Municipality	0.1692***	(0.038)	Constant	0.4257***	(0.042)
Observations	2,443		F-statistic	109.6***	
R-squared	0.077				

Notes: OLS Linear Probability Model estimates. Heteroskedasticity-robust standard errors ($HC1$) are reported in parentheses next to the coefficients.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.2: Robustness Checks: Alternative Definitions of Crime and Cartel Intensity

	Dependent Variable: Log Remittance Amount per Household			
Variables	(1) Baseline	(2) Counts	(3) Multi-Cartel	(4) Joint Specification
Cartel Presence (Binary)	0.3436***			0.3480***
	(0.042)			(0.042)
Cartel Counts (Continuous)		0.0645***		
		(0.021)		
Multi-Cartel Presence			0.1011**	-0.0199
			(0.049)	(0.053)
Demographic Controls	Yes	Yes	Yes	Yes
Deprivation Index	Yes	Yes	Yes	Yes
Geographic & Policy Controls	Yes	Yes	Yes	Yes
Observations	2,443	2,443	2,443	2,443
R-squared	0.357	0.340	0.338	0.357

Notes: OLS specifications. Heteroskedasticity-robust standard errors are reported in parentheses below the coefficients. The explicit control variables embedded within each block via the checkmarks match your full primary model framework precisely (*Log Total Households*, *Log State GDP per Capita*, *Males Pct*, *GINI*, *Pct 20 to 39 yo*, *Deprivation Index*, *ZLFN State*, *ZLFN Municipality*, and *Log Mean Altitude*).
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.