Market Structure and Extortion

Evidence from 50,000 Extortion Payments

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Gangs & Extortion

- Organized crime and associated extortion is a common aspect of life in many countries
- Extortion acts as a driving force behind violence and competition between gangs:
  - Extortion is the main revenue source for gangs in El Salvador
  - Estimated that 70% of firms pay extortion (Martínez et al., 2016)

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≫ Little is known about the effect of gang competition on extortion, and the pass-through to consumers

- Understanding coordination between gangs is particularly important
  - Governments often facilitate cooperation between criminal organizations
  - Enforcement may affect incentives for gangs to collude

Challenge: Measuring Extortion

- Gang extortion is difficult to measure systematically
  - It is difficult to observe and is rarely reported to the police
  - In El Salvador, very small share of extortion victims ever report incidents to police (FUSADES, 2016)

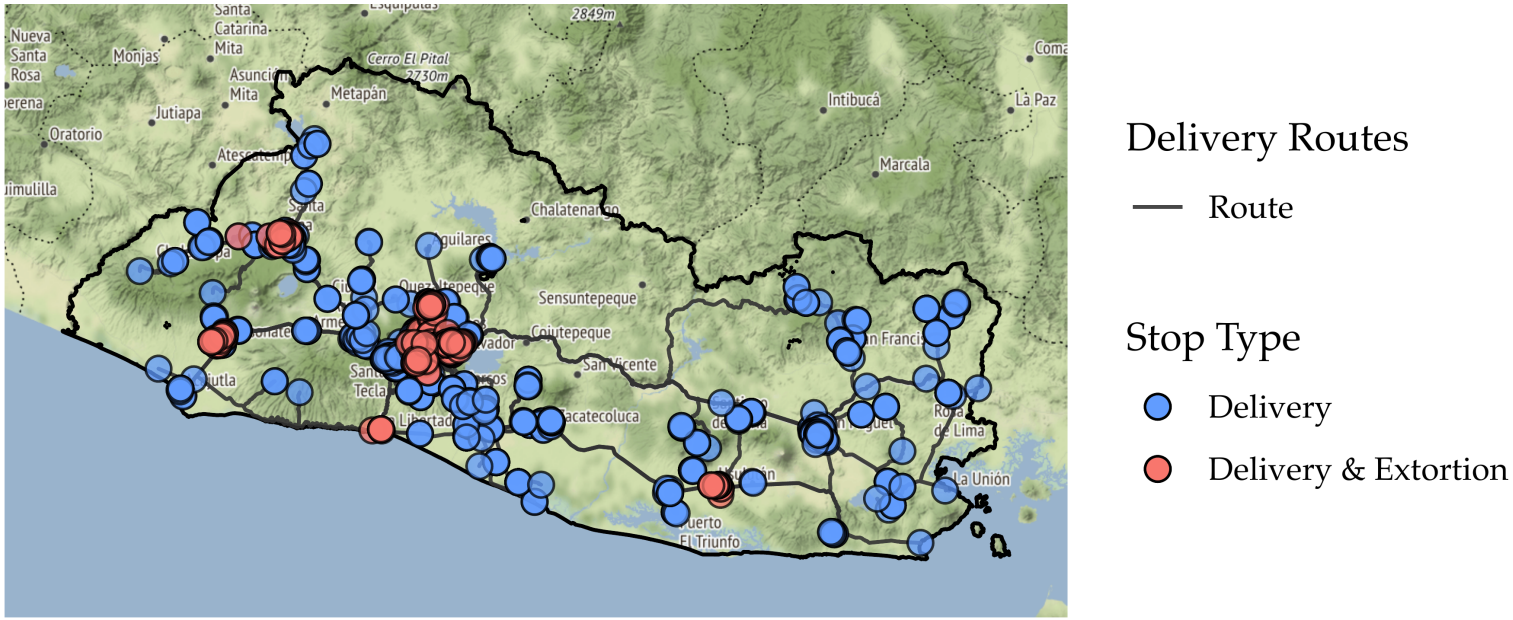
Challenge: Measuring Extortion

- Gang extortion is difficult to measure systematically
  - It is difficult to observe and is rarely reported to the police
  - In El Salvador, very small share of extortion victims ever report incidents to police (FUSADES, 2016)
- This has meant that we lack a complete understanding of the economics of extortion by organized gangs:
  - How do gangs determine extortion rates?
  - How does gang competition matter for extortion?
  - What are the downstream effects/incidence of extortion?

Our Approach I

- Leverage data from a leading wholesale distributor in El Salvador
  - Detailed sales data with revenue and cost for each product/retailer
  - Location and payment amount of >50,000 extortion incidents
  - Gangs required trucks to pay extortion in order to deliver to an area

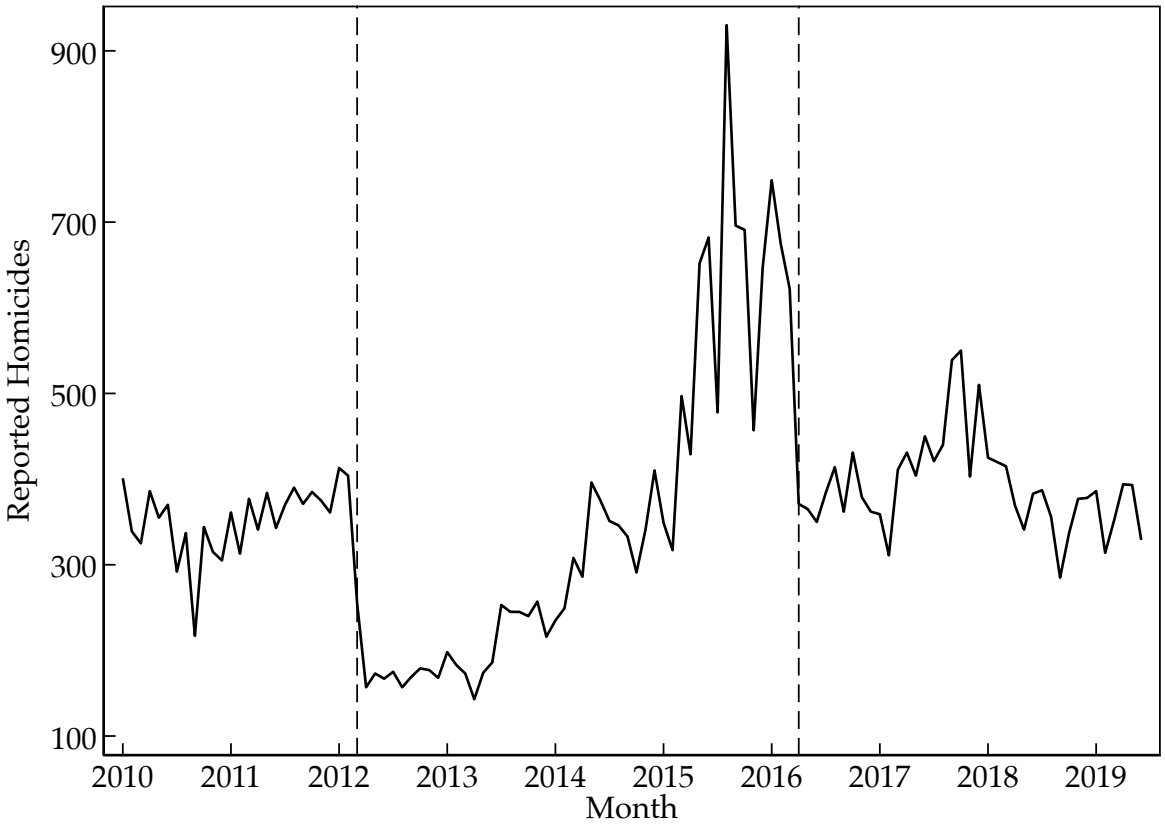
Figure 1: Routes, Deliveries, & Extortion Payments on a Single Day



Our Approach II

- Examine the 2016 non-aggression pact between gangs in El Salvador

Figure 2: Homicides and Gang Collusion



Research Questions & Findings

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  - Simple theoretical framework highlights the role of competition in the market for extortion
  - Empirical evidence consistent with price discrimination by gangs
- How does gang competition affect extortion?
  - Non-aggression pact increased extortion by about 19% percent in areas with previous gang competition
- What are the downstream effects of extortion?
  - Find substantial pass-through of extortion to retailers
  - For pharmaceuticals, non-aggression pact increased prices and hospital admissions for associated diseases

Outline

Gang Violence & Extortion in El Salvador

- El Salvador is known as one of the most violent peacetime countries in the world
  - Homicide rate of 103 per 100,000 people in 2015 (Gagne, 2016)
- Largely due to two gangs: MS-13 and Barrio 18
  - Account for 87% of gang membership
  - Gangs are present in almost all of the 262 municipalities (International Crisis Group, 2017a)
- Much of the violence in El Salvador can be traced back to extortion
  - Extortion is the "economic engine" behind the gangs and violence (International Crisis Group, 2017b)
  - Gangs fight and compete for territory in order to extort firms
  - Gangs use violence to collect extortion

Gang Extortion & Distribution Firms

- Transportation and distribution firms are often a target for extortion (Martínez et al., 2016)
- Gangs require trucks to pay extortion in order to deliver to an area:
  - Payments described as "rights to deliver" (rather than rights to pass through) (Reyes, 2021)
  - Trucks are often stopped on side streets prior to a delivery rather than on main roads

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  - Payments described as "rights to deliver" (rather than rights to pass through) (Reyes, 2021)
  - Trucks are often stopped on side streets prior to a delivery rather than on main roads
  - Distributors in general cannot stop delivering to a location
- Distributors generally only pay one gang to make a delivery:
  - Gangs have exclusive control of territory
  - Gangs compete over territory rather than directly compete to provide "protection"

Gang Extortion: Failure to Pay Extortion

La Prensa

Pandilleros incendian camión repartidor de pan

Crime · Incidents

4 Feb 2017 +1 more Gabriel García/jonathan Funes judicial@laprensagrafica.com

Por impago. Pandilleros incendiaron el camión repartidor de pan. Según las autoridades, el hecho se debe al impago de la "renta".

Una de las hipótesis de la policía es que el conductor del vehículo fue atacado por el impago de la extorsión para los pandilleros de la colonia Alta Vista.

Guzmán Hernández, de 44 años, se encontraba en el polígono 4 de Alta Vista cuando se le acercaron cuatro hombres con armas de fuego, quienes lo forzaron a que les entregara

Según las autoridades, los hechores del ataque son pandilleros que mantienen el control de esa zona de la colonia Alta Vista.

Al cierre de esta nota las autoridades de la subdelegación de la Policía Nacional Civil (PNC) de Alta Vista no registraron ninguna captura de presuntos implicados en el hecho.

Los agentes policiales que custodiaron la escena del siniestro afirmaron que es posible que el atentado haya ocurrido por el impago de la "renta" que ha ordenado la pandilla en la zona a los comerciantes y las empresas distribuidoras.

El pasado 18 de enero fue atacado en esa zona un joven que había llegado a visitar a sus familiares residentes en la colonia Alta Vista. La víctima fue asesinada a tiros.

En el ataque también resultó lesio-

En llamas. El carro repartidor de pan fue incendiado por cuatro pandilleros ayer, cerca de las 2 de la tarde, en la colonia Alta Vista de Ilopango. El motorista logró huir de la escena.

La Fiscalía General de la República (FGR) reportó ayer en la tarde el homicidio de una persona del sexo masculino en la colonia Tepeyac de San Ramón, en San Salvador. La víctima presentó lesiones en el rostro.

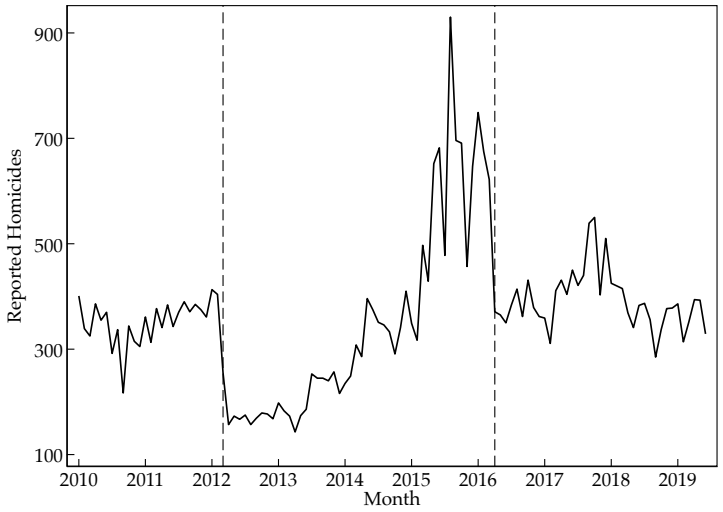
Hasta el pasado jueves las autoridades reportaron 273 homicidios en todo el país, 17 de los cuales se cometieron en los primeros dos días de febrero.

Source: La Prensa Grafica (2017)

Gang Cooperation

- Government negotiated controversial truce in March 2012
- Gangs negotiated non-aggression pact in April 2016
  - Gangs agreed not to fight & compete for existing territory
- Cooperation drastically reduced gang violence

Figure 3: Homicides and Gang Truces



Notes: Chart shows reported homicides across time. Vertical lines show start of gang truce (March 2012) and non-aggression pact (April 2016).

Potential Effect on Extortion

- Some speculate that cooperation between gangs increased extortion:
  - "One theory [is] that the gang truce was really an effort by larger criminal interests to grant the MS-13 and Barrio 18 more breathing room for their operations." (Dudley, 2013)
- Anecdotal evidence suggests that this is because it is costly for gangs to both fight rival gang and collect extortion
  - Gangs have limited resources (Papadovassilakis and Dudley, 2020)
  - Collecting extortion is costly
  - Especially costly when gang members are targeted by rival gang
- In surveys, Salvadoreans largely believe the truce benefited the gangs

▸ Record Keeping

Outline

Distributor Data: Sales & Extortion

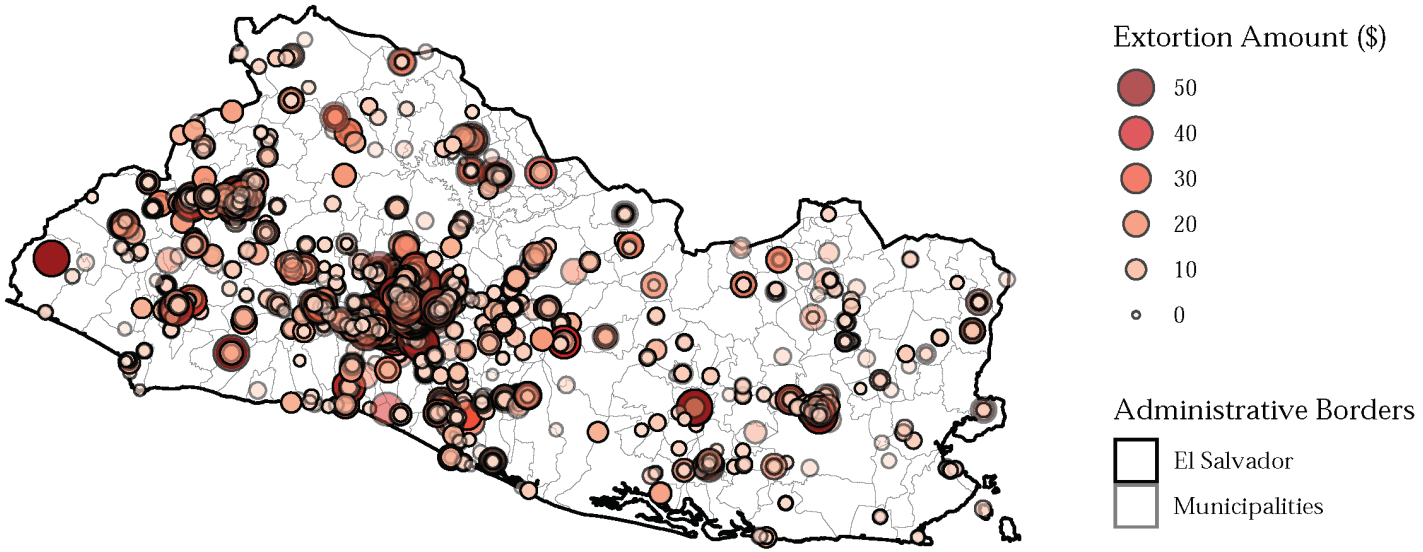
- We use extortion payment data and sales data from a leading wholesale distributor from 2012 to 2019
  - Major supplier of both consumer products and pharmaceuticals
  - Buys goods in bulk and resells them to local retailers and pharmacies
- For distribution, the company sub-contracts drivers and trucks
  - Bare of visible advertisement or company identification
  - Must leave and return to warehouses each day
- Over the sample period: 93,387 trips, 2.2 million deliveries to a retailer or pharmacy

Distributor Data: Extortion

- Robust security team monitors trucks and negotiate with gangs
  - Common approach in El Salvador (Martínez et al., 2016)
- Mechanics of extortion payments:
  - Prior to deliveries in a gang controlled territory, driver meets with a gang representative who collects extortion
  - Call the security team, confirm amount and receipt of payment
  - In some cases, the extortion amount is pre-negotiated for a given period (e.g. biweekly or monthly)
- Security team emphasized that this system ensures safety of drivers and reduces fraud by drivers
- Distributor has reported extortion to Attorney General's Office

Distributor Data: Extortion

Figure 4: Geography of Extortion



- Data contains a total of 51,576 extortion payments between March 2012 and March 2019

Distributor Data: Combined Data

- Large variation in extortion payments
  - > Individual extortion payments: \$0.50 to \$140 (mean \$7, sd \$9)
  - > Average extortion in municipalities: \$2 to \$60 (mean \$7, sd \$6)
- The average truck pays extortion totalling \$14 per route in a day, equal to roughly half the daily labor cost of a truck driver
- We combine extortion data with sales data using information on the route, truck, and location to examine correlates of extortion
  - > Focus on nearest sale
  - ⇒ Find evidence consistent with price discrimination: higher value deliveries pay more extortion ▸

▸ Summary Statistics ▸ Trends

Outline

Empirical Strategy: DiD

- Exploit two sources of variation:
  - Unexpected timing of the 2016 non-aggression pact
  - Cross-sectional variation in gang competition prior to the pact

- Estimating equation:

$$y_{dtri} = \beta(NonAggr_t \times Comp_d) + \theta X_{dt} + \gamma_d + \gamma_t + \epsilon_{dtri} \tag{1}$$

  - y_{dtri} is the outcome of interest (e.g. extortion rate) for an extortion payment i made along route r in municipality d at month t
  - $NonAggr_t = 1$ if t is after non-aggression pact agreement made on April, 2016
  - $Comp_d = 1$ if d had gang competition prior to the pact
  - X_{dt} are time-varying covariates
  - Include municipality fixed effects, γ_d, and time fixed effects, γ_t

Defining Gang Competition

- Police reports contain detailed data on homicides
  - Police determine gang responsible for each homicide if possible
- Both gangs commit homicides in an area $\Rightarrow$ gangs are competing

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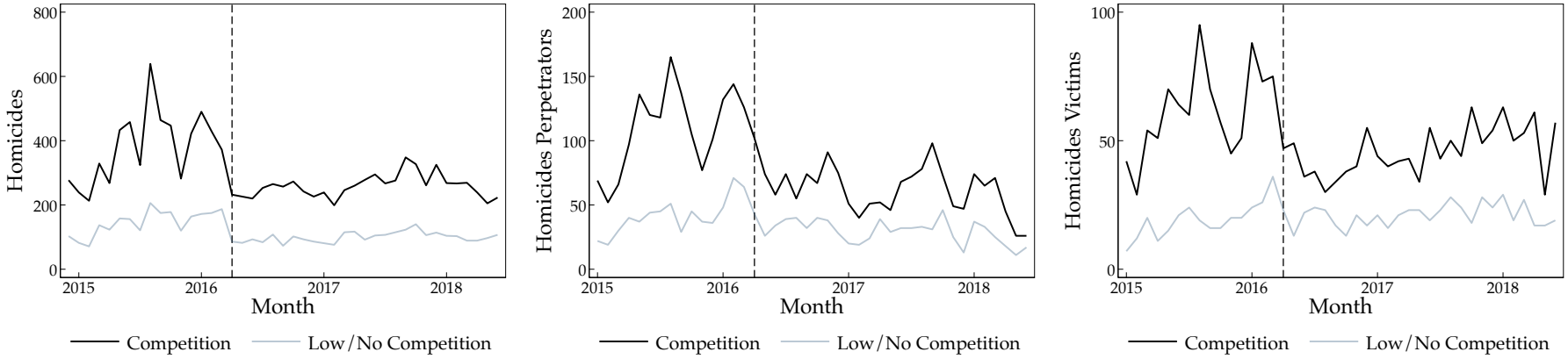
- Both gangs commit homicides in an area $\Rightarrow$ gangs are competing
- Construct Herfindahl-Hirschman Index (HHI) using share of homicides committed by each gang in the 3 years prior to non-aggression pact
- For baseline specifications, $Comp_d$ is equal to 0 if HHI_d is in top quartile and 1 otherwise
  - Show robustness to alternative cut-offs and continuous measures
  - Also show HHI_d is correlated with other measures of competition

▸ Maps ▸ Histogram ▸ Alternative HHI using inmate composition

Validating the Measure of Competition

Figure 5: Homicides by Gang Competition



a. All Homicides

b. MS-13 or Barrio 18 Perpetrator

c. MS-13 or Barrio 18 Victim

- Non-aggression pact led to a 25% reduction in homicides:
  - Decrease is mainly in areas defined as having competition in pre-period
  - Municipalities have similar trends prior to non-aggression pact ▸ Table
- Did not affect non-gang crime levels more generally ▸ Other Crimes

Effect on Extortion: Event-Study Plot

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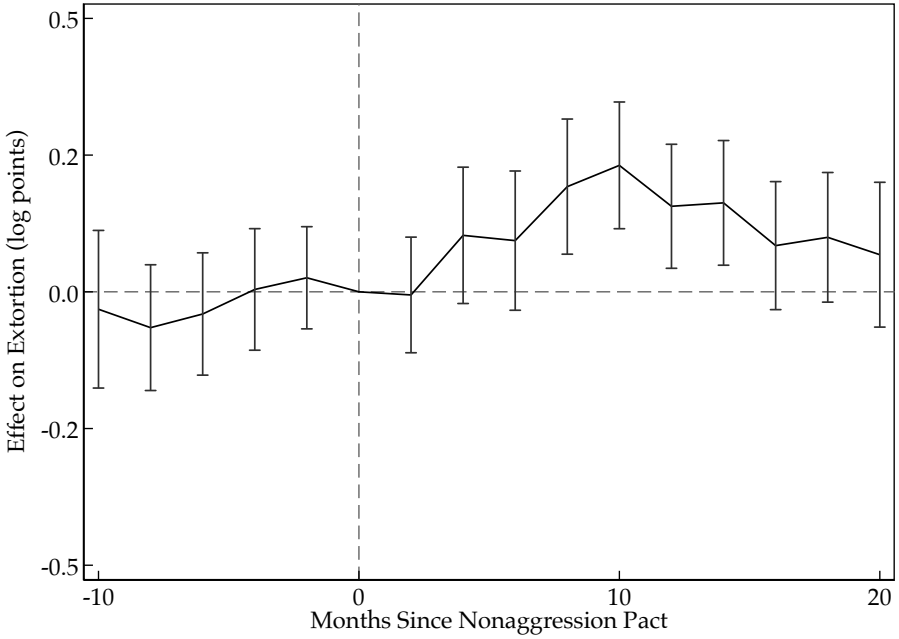
Figure 6: Impact of Non-Aggression Pact on Extortion



Notes: Vertical line shows start of non-aggression pact (April 2016). Figure shows bi-monthly point estimates using the difference-in-difference baseline specification (1). The omitted period is the period prior to the start of the non-aggression pact between MS-13 and Barrio 18. Error bars indicate 95% confidence interval using standard errors clustered at the municipality level.

▸ Longer pre-period

Effect on Extortion

Table 1: Effect of Non-Aggression Pact on Extortion in Municipalities with Gang Competition

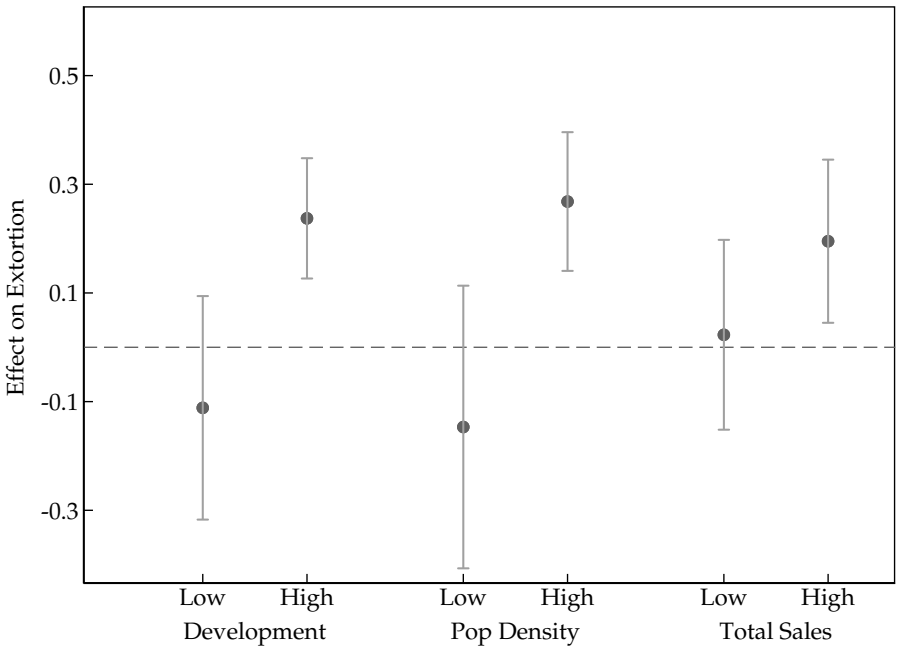
	Outcome: log(Extortion)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{NonAggr}_t \times \text{Comp}_d$	0.209^{***}	0.171^{***}	0.192^{***}	0.150^{***}	0.198^{***}	0.224^{**}
	(0.048)	(0.066)	(0.065)	(0.056)	(0.066)	(0.093)
Municipality FEs	Yes	Yes	Yes	Yes	No	No
Month-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route FEs	No	Yes	No	Yes	No	No
Municipality-Route FEs	No	No	No	No	Yes	Yes
Route-NonAggr_t FEs	No	No	No	No	No	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Outcome Mean	1.60	1.60	1.60	1.60	1.60	1.60
Adjusted R2	0.188	0.271	0.191	0.272	0.323	0.325
Observations	15,001	15,001	15,001	15,001	14,924	14,924

Notes: The unit of observation is an extortion payment. Covariates include nightlights, population density, and census municipality characteristics interacted with year. The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Expansion ▸ Aggregated

Heterogeneous Effects on Extortion

Figure 7: Effect of Non-Aggression Pact on Extortion
Heterogeneous Effect by Geographic Characteristics



Notes: Shows point estimates and 95% confidence interval for difference-in-difference model. Low (high) characteristics are defined as being below (above) the median value in the pre-period. Standard errors are clustered at the municipality level. All specifications include municipality fixed effects, month fixed effects, and controls for nightlights, population density, and census municipality characteristics interacted with year.

≫ Gangs increase extortion most in regions with higher downstream demand

Effects on Extortion: Mechanisms & Alternative Explanations

- Qualitative evidence and conceptual framework highlight the importance of gang-side diseconomies of scope
- Empirical evidence:

Effects on Extortion: Mechanisms & Alternative Explanations

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- Empirical evidence:
  1. More resources to extortion: find an increase in gang threats due to extortion and kidnappings or deprivation of liberty following pact
  2. Higher degree of price discrimination: show more price discrimination after the pact, consistent with gangs having better information on retailers and associated demand for delivered goods
  3. Longer delivery times: find some evidence for an increase in delivery times between extortion payments, consistent with more negotiations and hold-up by gangs after the pact

Effects on Extortion: Mechanisms & Alternative Explanations

- We also explore other explanations:
  1. Downstream Demand: find no effect of the pact on hh incomes, expenditures, or firm product values
  2. Less Firm Choice Following Pact: conversations with the firm highlight that firms cannot choose which gang to pay; instead, firms must pay whichever gang is in control of the territory
  3. Firm Delivery Changes: find evidence that firms mostly adjust via prices and not on the extensive margin; find no effect on the number of retailers, deliveries and cost of goods
     - Firm often has long-standing delivery relationships with retailers

Effects on Extortion: Summary & Extensions

- Results show that gang collusion increases extortion rates
- Suggestive evidence that effects are driven by a shift in resources towards extortion
- Extensions:
  - Alternative HHI cut-offs: similar estimates, ranging from 17% (50th percentile) to 24% (80th percentile) ▸ Alternative Cut-Offs
  - Continuous treatment using HHI: imply that if a municipality were to go from a duopoly to fully collusive, extortion would increase by 30-50% ▸ Continuous Measure
  - Canton-level analysis: replicate the results at the canton-level with statistically indistinguishable point estimates ▸ Canton-Level Analysis

Outline

Firm Response to Extortion: Effects on the Distribution Margin

≫ What are the downstream consequences of extortion?

- We use two approaches and data sources:

  1. Distributor's sales data
     - Pro: Large variety of consumer goods linked to extortion payments
     - Con: Observe revenue/margin rather than prices; only one firm
  2. Pharmacy sales data
     - Pro: Observe final consumer prices and health outcomes; multiple firms
     - Con: Smaller segment of goods

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- Today: will focus on the downstream effects on pharmaceutical markets

Outline

Pass-through to Consumers: Effects on Pharmacy Prices

- Use data on pharmacy sales, a subset of the market with detailed information at the retail level
- El Salvador has had among the highest drug prices in Central America (Yamagiwa, 2015)
  - Potentially reduces access to drugs and affects health
- Data provided by the National Directorate of Medicines (DNM) of El Salvador from 2014 to 2017
  - Contains information on quantity and revenue by pharmacy for over 10,000 pharmaceutical products, defined as a specific molecule-brand-size
  - Standardize across sizes to define products as molecule-brand

Pass-through to Consumers: Effects on Pharmacy Prices

Table 2: Effect of Non-Aggression Pact on Consumer Prices at Pharmacies

	All Pharmacies		Pharmacies/Brands Supplied by Distribution Firm		Drugs for Managing Chronic Diagnoses	
	Price	log(Price)	Price	log(Price)	Price	log(Price)
$\text{NonAggr}_t \times \text{Comp}_d$	0.079**	0.072***	0.054***	0.073**	0.073***	0.054**
	(0.031)	(0.023)	(0.020)	(0.029)	(0.026)	(0.024)
$\text{NonAggr}_t \times \text{Comp}_d \times \text{Distr}$	−0.008	0.005	0.004	0.009	0.005	−0.010
	(0.023)	(0.023)	(0.028)	(0.031)	(0.030)	(0.035)
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Drug FEs	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	-1.11	-1.11	-1.11	-0.93	-0.93	-0.95
Adjusted R2	0.870	0.880	0.931	0.823	0.834	0.900
Observations	1,755,366	1,755,366	1,617,314	122,100	122,100	112,325

Notes: Standard errors clustered at the municipality level in parentheses. Chronic diagnosis includes diabetes, respiratory issues, hypertension, and coronary heart disease. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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- ≫ Gang collusion resulted in 8% increase in retail prices for pharmaceuticals
- ≫ For drugs for **chronic conditions**, prices increased by 7%

▸ Event Study Plot ▸ By Categories ▸ Pharma x Drug FEs ▸ Margins

Effect on Health: Data

- To examine how changes in pharmaceutical prices affect health, we use individual-level data on admissions at public health facilities
  - Time-frame: 2012 to 2019
  - Source: Health Ministry of El Salvador (MINSAL)
- Public health facilities cover majority of people (only 5% have private insurance)
- Contains information on: hospital, municipality, admittance date, patient characteristics (age and gender), and diagnosis code as defined by the International Classification of Diseases (ICD-10).

Effect on Health: Results

Table 3: Effect of Non-Aggression Pact on Hospital Admissions

	All Diagnoses		Injuries		Chronic Diagnoses Affected by Drug Adherence	
	Admissions	Admissions	Admissions	Admissions	Admissions	Admissions
$\text{NonAggr}_t \times \text{Comp}_d$	0.017	0.010	−0.017	−0.015	0.083***	0.081***
	(0.014)	(0.012)	(0.023)	(0.024)	(0.031)	(0.028)
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	No	Yes	No	Yes
Outcome Mean	233.11	233.11	12.29	12.29	13.27	13.27
Observations	4,588	4,588	4,588	4,588	4,588	4,588
Clusters	148	148	148	148	148	148

Notes: Results from Poisson regressions. Chronic diagnosis includes diabetes, respiratory issues, hypertension, and coronary heart disease. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- ≫ No general increase in hospital admissions due to gang collusion
- ≫ Increased hospital admissions for **chronic conditions** treated by the drugs analyzed in Table 2 by 9%

▸ Event Study Plot ▸ By Diagnosis

Outline

Conclusion

- In countries with organized crime, governments have often facilitated cooperation between criminal organizations in order to reduce violence
- We show that cooperation allows gangs to increase extortion rates:
  - Increase in extortion was passed-through to retailers and consumers
  - Double marginalization likely exacerbates negative effects of extortion
  - Consumers bear large burden from upstream extortion
- Provide insight into the economics of gangs:
  - Price discrimination by gangs has implications for incidence of extortion
  - Violence is closely connected to economic incentives of the gang
- Market structure for extortion may be important for the design of anti-extortion policies

Thank you!

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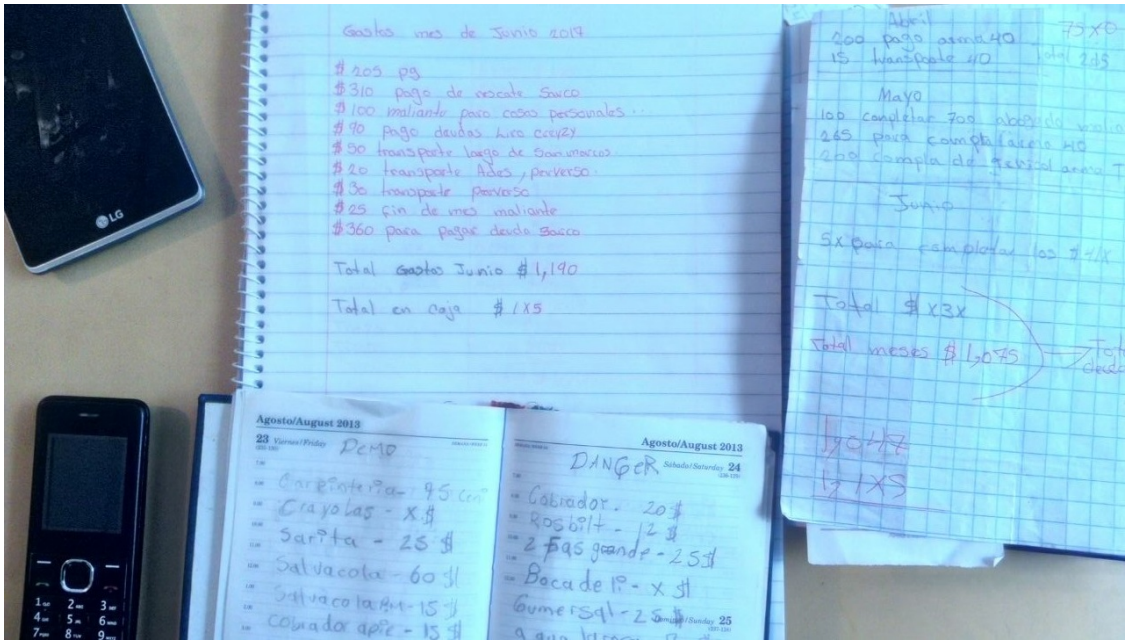
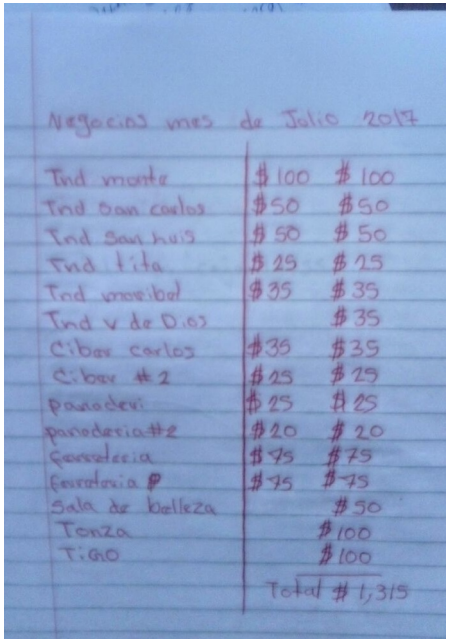
Gang Extortion Accounting

Figure 8: Gangs' Accounting



a. Gang's Record Keeping



b. Monthly Payments

Notes: Gangs keep detailed records of their inflows and outflows. The first line in Figure b. documents two USD$100 payments from "Tnd [store] Monte" in July 2017.

▸ Gang Extortion: Return

Model Details

- Non-cooperative equilibrium (competition)
  - Violence and Extortion:

$$h_{gt}^{NC} = \left(\frac{\alpha}{12}\right)^2, \quad e_{gt}^{NC} = \frac{\alpha}{3\beta}$$

  - Gang profits of $\pi_{gt}^{O} = \alpha^3/(432\beta)$ on offensive
  - Gang profits of $\pi_{gt}^{D} = -\alpha(\alpha^2 - 16\alpha + 48)/(144\beta)$ on defensive

- Cooperative equilibrium (collusion)
  - No violence and extortion $e_{gt}^{C} = \frac{\alpha}{2\beta}$
  - Gang profits of $\frac{\alpha^2}{32\beta}$
  - Critical discount factor is $\bar{\delta} = \frac{\alpha(2\alpha-27)}{3(2\alpha^2-23\alpha+96)}$

◂ Return: Model Implications

Summary Statistics: Extortion & Sales

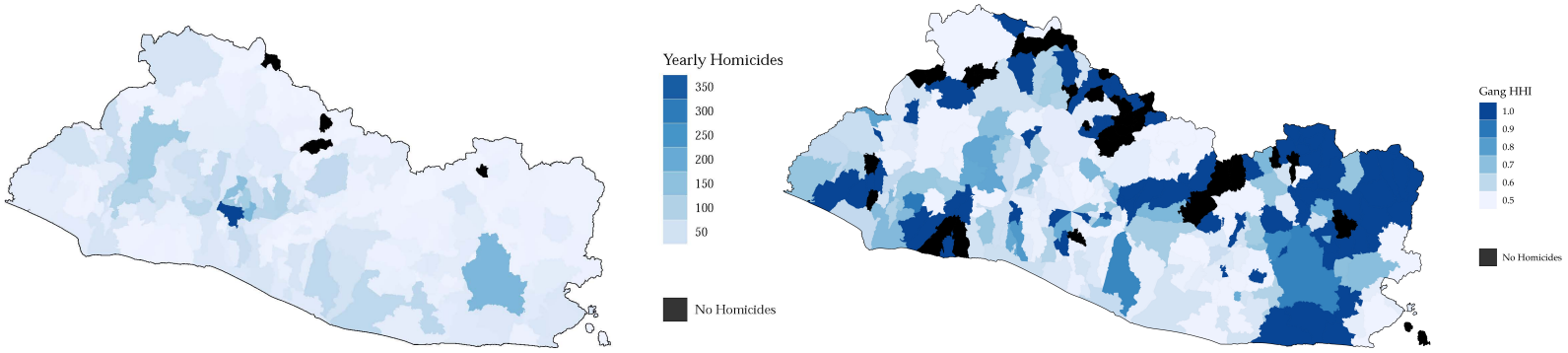
Table 4: Summary Statistics

	Mean	SD	Min	Max
Panel A. Extortion payments:				
Extortion payment	8.10	10.62	0.50	140.0
Total extortion by trip	15.60	19.07	1.00	290.0
Total extortion by route-month	127.12	129.97	1.00	745.0
Total observations		50,695		
Panel B. Distributor sales by retailer-product-trip:				
Amount charged to retailer	31	369	0.0	189,276
Cost	26	335	0.0	187,317
Amount by trip	3,467	9,548	0.0	357,849
Cost by trip	2,921	8,154	0.0	293,858
Amount by route-month	107,362	264,033	28.8	2,773,948
Cost by route-month	90,444	211,085	23.4	2,117,466
Unique products		6,038		
Unique retailers		36,020		
Total trips		93,387		
Total observations		10,552,876		

◂ Return: Extortion Data ◂ Return: Descriptive Analysis

Gang Competition Across Space

Figure 9: Homicides and Gang Competition Across Municipalities



a. Yearly Homicides

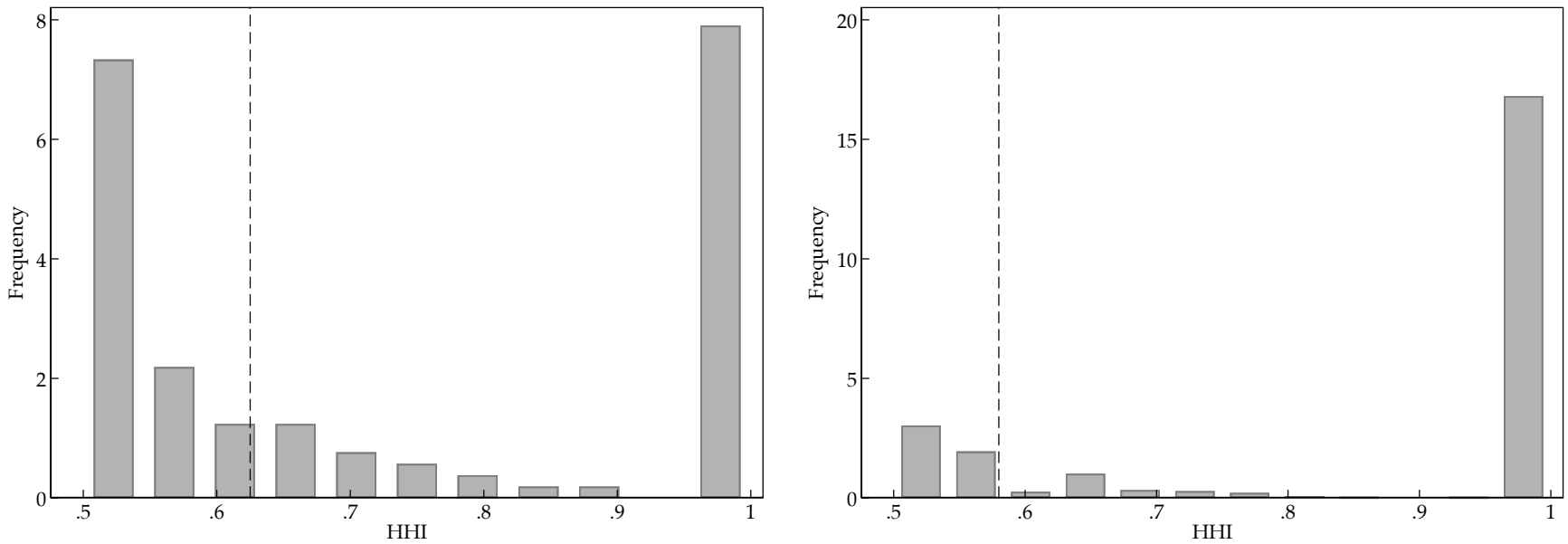
b. Gang HHI

Notes: Gang HHI defined using MS-13 and Barrio-18 homicides.

Return

Defining Competition: Homicide HHI

Figure 10: Histogram of Homicide HHI prior to Non-Aggression Pact



a. Municipality level

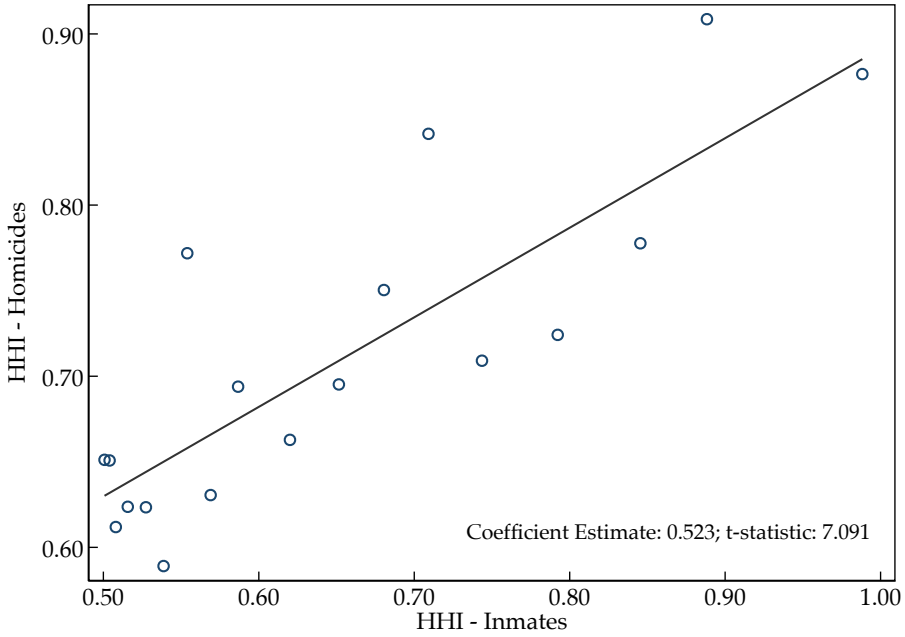
b. Canton level

Notes: Vertical line shows preferred cutoff for defining areas with competition.

◂ Return

Defining Competition: Homicide HHI vs. Inmate HHI

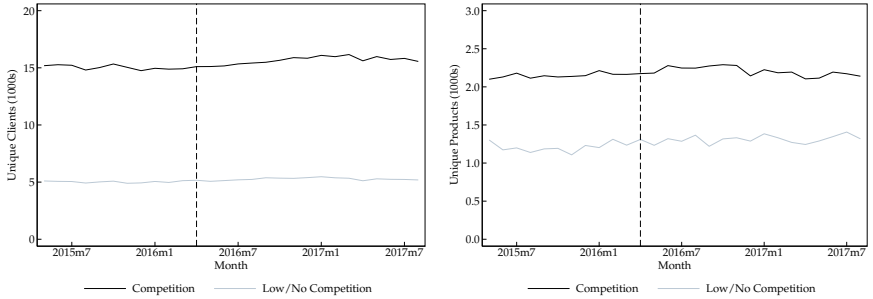
Figure 11: Municipality Level Correlation between Homicide HHI and Inmate HHI



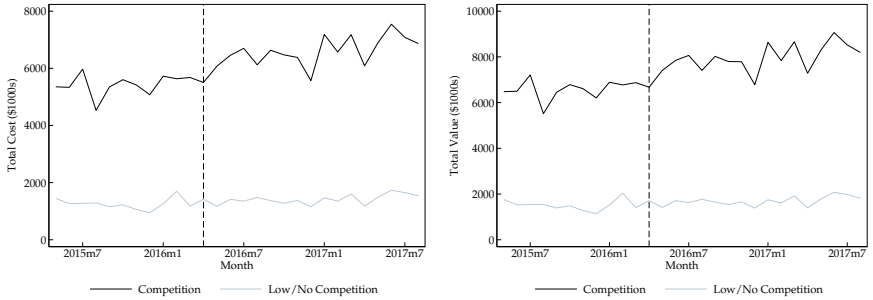
Return

Delivery and Sales Trends by Gang Competition

Figure 12: Delivery and Sales Trends by Gang Competition



a. Unique retailers b. Unique products



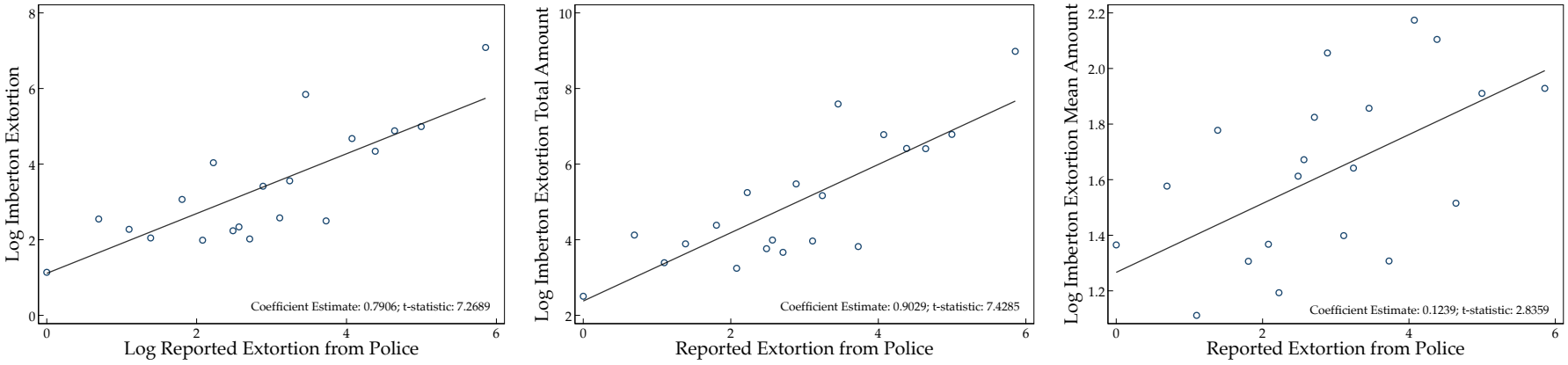
c. Total cost d. Total revenue

Notes: Vertical line shows start of non-aggression pact (April 2016).

◂ Return: Descriptive ◂ Return: Pass-Through

Extortion: Firm vs. Police Reports

Figure 13: Municipality Level Correlation between Extortion Reported by Delivery Firm and Extortion Reported to Police



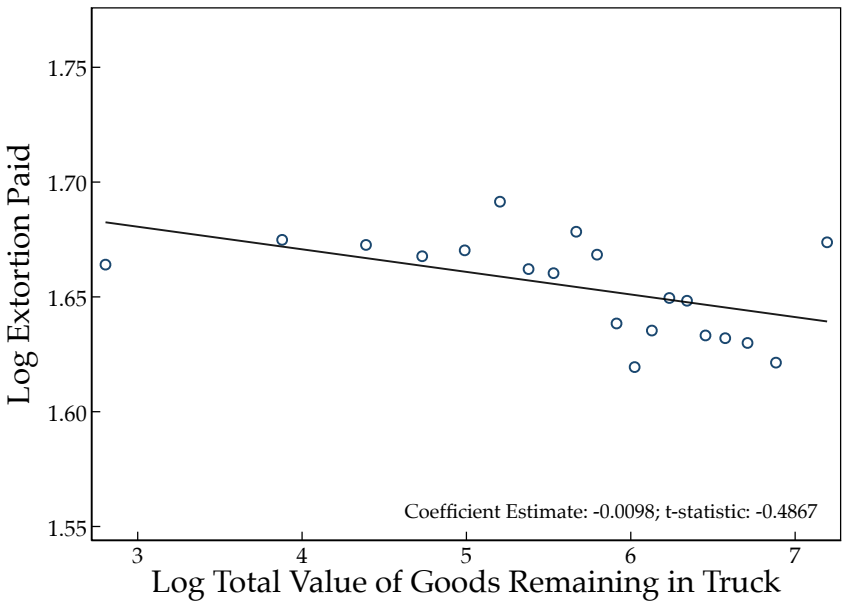
a. Frequency b. Total Amount c. Mean Amount

◂ Return: Extortion Map

Descriptive Analysis: Price Discrimination (1/2)

≫ Extortion is increasing in delivery values but not total value in truck

a. Value of Goods at Delivery



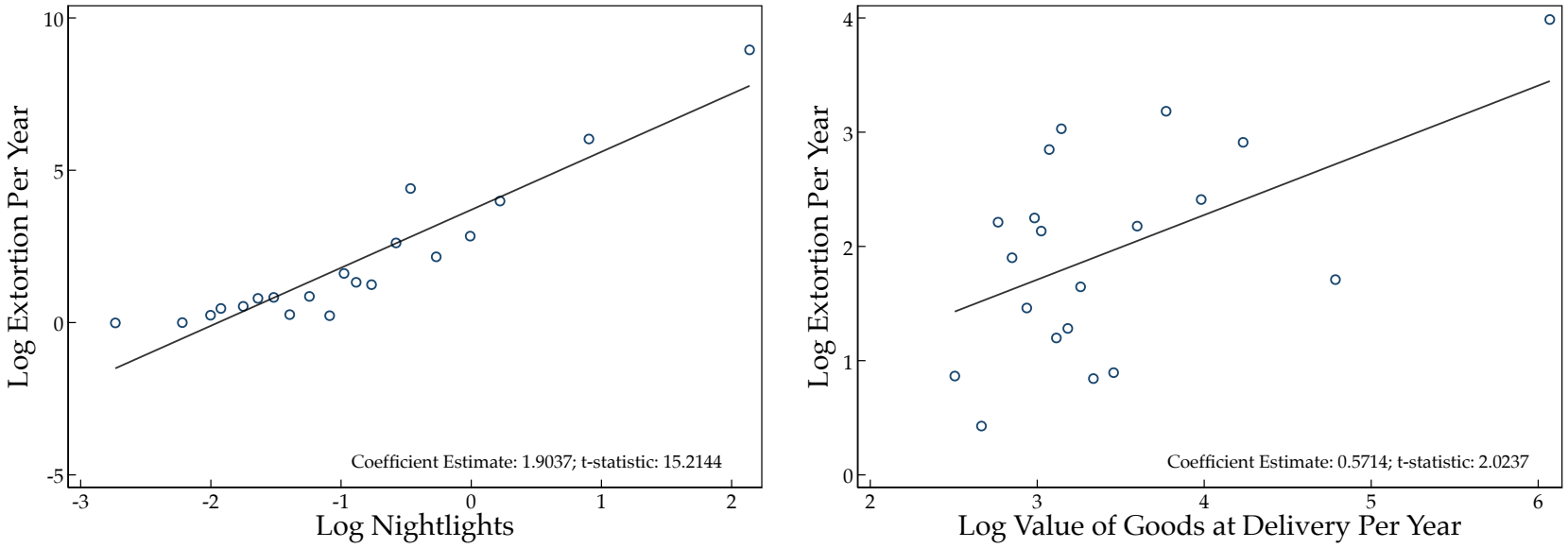
b. Value of Goods in Truck

▸ Table ▸ Vehicle Characteristics ▸ Number of Stops

Descriptive Analysis: Price Discrimination (2/2)

≫ Extortion is positively correlated with proxies for downstream demand

Figure 14: Municipality-Level Correlates of Extortion Rates



a. Nightlights

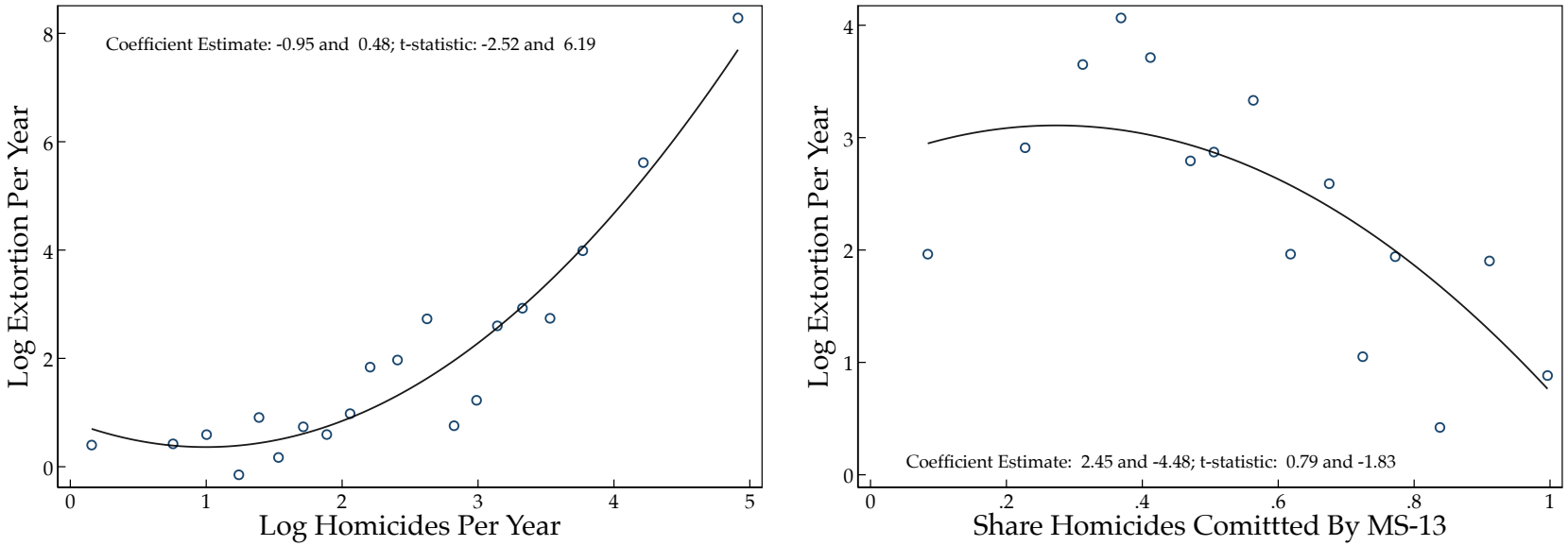
b. Value of Deliveries

▸ Table

Descriptive Analysis: Extortion & Competition

≫ Extortion is positively correlated with gang violence and competition

Figure 15: Relationship Between Extortion Rates and Gang Violence



a. Homicides

b. Share Committed by MS-13

▸ Table

Descriptive Analysis: Summary

- Gangs price discriminate:
  - Extortion rates are increasing in delivery values and development
  - Consistent with gangs setting higher extortion when observable characteristics indicate higher downstream demand (third-degree price discrimination)
- Extortion is positively correlated with gang violence and competition
  - Difficult to determine whether gang competition causes higher extortion rates
  - Omitted variables may determine both extortion and competition (e.g. downstream demand)
  - Causal effects of competition could go in the opposite direction

◂ Return: Data

Descriptive Analysis: Price Discrimination

≫ Extortion rates depend on local characteristics: Much of the variation explained by time-invariant local characteristics

Table 5: Relationship between Extortion & Delivery Values

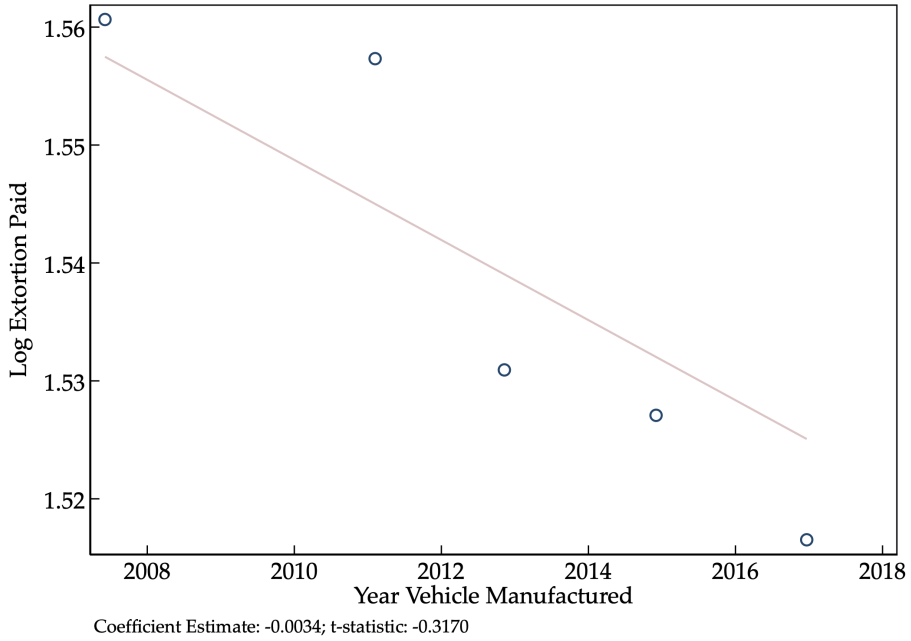
	log(Extortion)	log(Extortion)	log(Extortion)	log(Extortion)
log(Value of Delivery)	0.040**	0.023**	0.014*	0.022***
	(0.017)	(0.011)	(0.008)	(0.006)
Municipality FEs	No	Yes	Yes	Yes
Route FEs	No	No	Yes	Yes
Retailer FEs	No	No	No	Yes
Outcome Mean	1.66	1.66	1.66	1.65
Adjusted R2	0.0013	0.1889	0.3630	0.5444
Observations	62,798	62,787	62,783	59,965
Clusters	119	119	115	113

Notes: The unit of observation is a delivery on a route. Sample period is limited to extortion payments made prior to the 2016 non-aggression pact. Standard errors clustered at the route level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Price Discrimination

Price Discrimination: Vehicle Year

Figure 16: Relationship Between Extortion Rates and Vehicle Characteristics



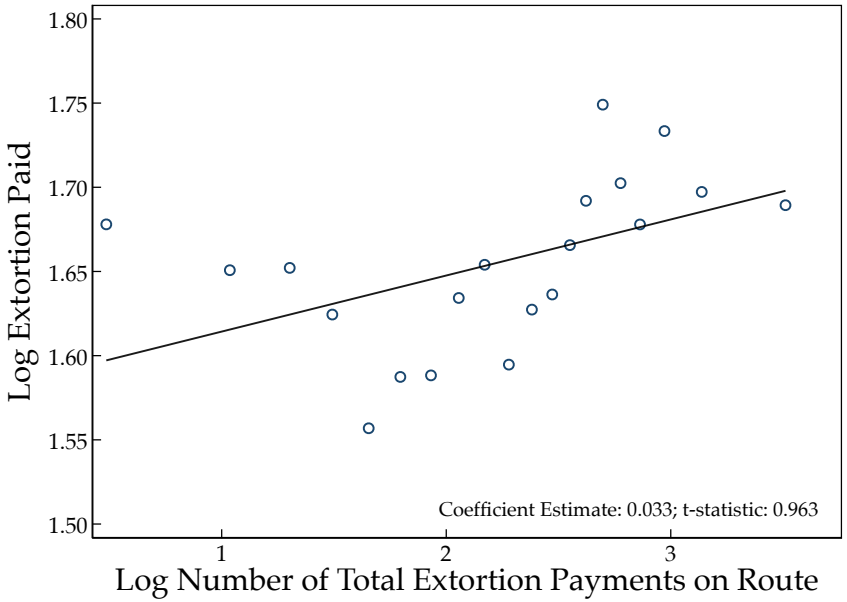
Notes: The figure presents binscatters between the log of the extortion amount paid by the firm upon delivery and the year the vehicle used to deliver was manufactured. The unit of observation is an extortion payment-delivery pair. The bottom-right of each figure presents the estimated bivariate coefficient and t-statistic. Standard errors are clustered at the delivery route level.

◂ Price Discrimination

Descriptive Analysis: Number of Extortion Stops

≫ Extortion is not decreasing in the number of stops along a route

Figure 17: Relationship Between Extortion Rates and Number of Extortion Payments



Notes: The figure presents binscatters between the log of the extortion amount paid by the firm upon delivery and the log number of extortion payments made on a route on the same day. The unit of observation is an extortion payment-delivery pair. The regressions include route fixed effects. The bottom-right of each figure presents the estimated coefficient and t-statistic. Standard errors are clustered at the delivery route level.

◂ Price Discrimination

Descriptive Analysis: Finding 3/4

≫ Extortion is positively correlated with proxies for downstream demand

Table 6: Relationship between Extortion Rates & Municipality Characteristics

	log(Extortion)	log(Extortion)	log(Extortion)	log(Extortion)
Delivery Characteristics:				
log(Value Delivered Per Year)	0.571**			0.019
	(0.282)			(0.182)
Development Characteristics:				
log(Nightlights)		1.221***		1.153***
		(0.252)		(0.230)
log(Population Density)		0.594**		0.452*
		(0.291)		(0.266)
% Literate		4.669		3.382
		(3.681)		(3.463)
% Employed		4.698**		1.855
		(2.193)		(2.023)
Violence Characteristics:				
log(Homicides Per Year)			1.694***	0.897***
			(0.182)	(0.148)
$\mathbb{1}$(Homicides By Both MS-13 & B18)			−1.118***	−1.344***
			(0.390)	(0.297)
Outcome Mean	0.78	1.95	0.79	1.96
Adjusted R2	0.021	0.514	0.343	0.575
Observations	231	231	230	230

Notes: The unit of observation is a municipality. $\mathbb{1}$(Homicides By Both MS-13 & B18) is an indicator variable equal to 1 if a municipality has homicides committed by both MS-13 and Barrio 18 in an average year. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return

Validating the Measure of Competition

Table 7: Effect of Non-Aggression Pact on Homicides and Assaults in Municipalities with Gang Competition

	All Homicides		By MS-13 & Barrio 18		Assaults			
	Homicides	log(Homicides)	Homicides	log(Homicides)	Assaults	log(Assaults)		
$\text{NonAggr}_t \times \text{Comp}_d$	-0.339^{**}	-0.293^{**}	-0.159	-0.150	-0.026	-0.122	0.150	0.313
	(0.142)	(0.124)	(0.375)	(0.289)	(0.277)	(0.251)	(0.639)	(0.577)
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes		
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes		
Outcome Mean	0.86	0.86	0.38	0.38	0.28	0.28	0.17	0.17
Observations	3,872	3,872	3,534	3,534	3,441	3,441	3,472	3,472

Notes: The unit of observation is a municipality-month. The sample period is 6/2015 to 1/2018. All specifications control for nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

$\gg$ Non-aggression pact led to a 25% reduction in homicides

▸ Return

Effect on Other Crimes

Table 8: Effect of Non-Aggression Pact on Other Crime in Municipalities with Gang Competition

	Theft	log(1+Theft)	Robbery	log(1+Robbery)	Domestic Violence	log(1+Domestic Violence)
$\text{NonAggr}_t \times \text{Comp}_d$	−0.150	−0.122	0.313			
	(0.289)	(0.251)	(0.577)			
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	0.38	0.28	0.17			
Observations	3,534	3,441	3,472			

Notes: The unit of observation is a municipality-month. All specifications control for nightlights, population density, and census municipality characteristics interacted with year. The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Homicides ▸ Return: Extortion

Effect on Extortion (Extensive Margin)

Table 9: Effect of Non-Aggression Pact on Extensive Margin of Extortion

	Outcome: Has Extortion					
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{NonAggr}_t \times \text{Comp}_d$	0.772^{***}	0.254	0.636^{***}	0.322^{*}	0.228	0.376
	(0.255)	(0.170)	(0.231)	(0.175)	(0.145)	(0.238)
Municipality FEs	Yes	Yes	Yes	Yes	No	No
Month-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route FEs	No	Yes	No	Yes	No	No
Municipality-Route FEs	No	No	No	No	Yes	Yes
Route-NonAggr_t FEs	No	No	No	No	No	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Outcome Mean	1.17	1.17	1.17	1.17	1.17	1.17
Observations	12,818	12,847	12,818	12,847	12,528	12,528

Notes: The unit of observation is a route-municipality-month. The outcome variable is an indicator variable equal to one if a route-municipality-month paid any extortion, and zero otherwise. Covariates include nightlights, population density, and census municipality characteristics interacted with year. The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Intensive

Effect on Extortion Aggregated Effects

Table 10: Effect of Non-Aggression Pact on Extortion Aggregated Effects

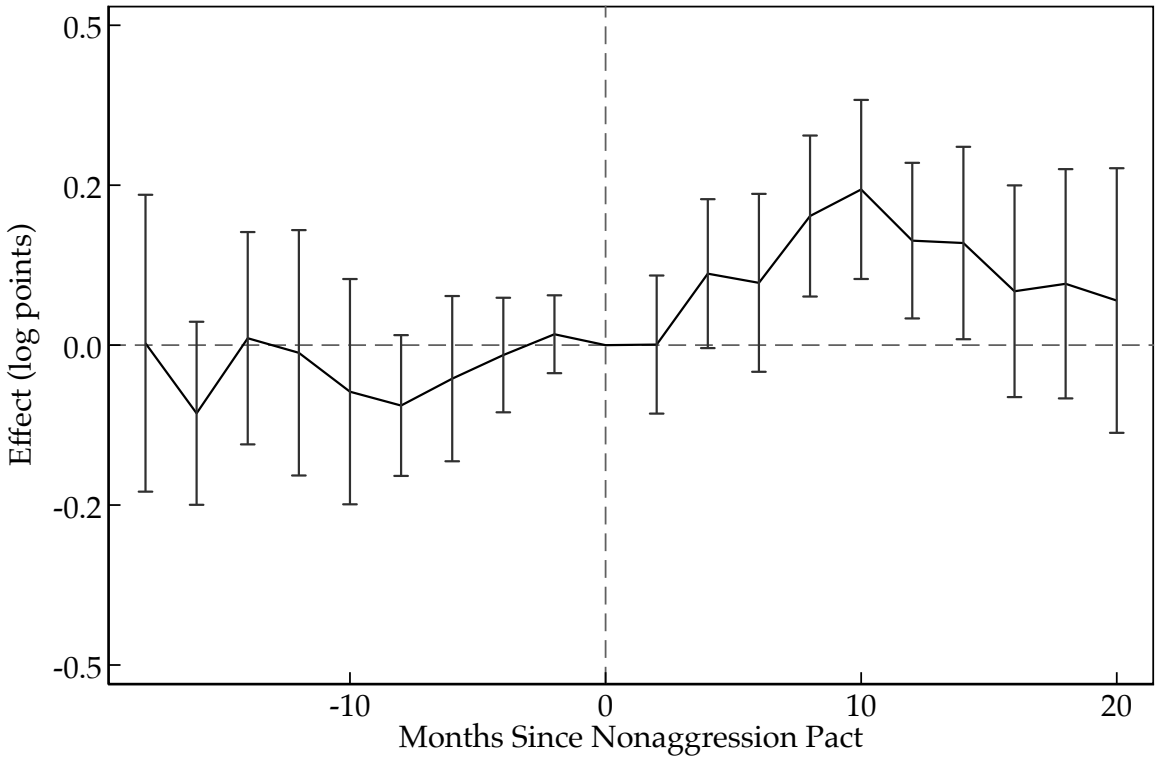
	Outcome: log(Total Extortion+1)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{NonAggr}_t \times \text{Comp}_d$	0.105*	0.101*	0.103***	0.099***	0.097***	0.090*
	(0.054)	(0.053)	(0.034)	(0.034)	(0.034)	(0.052)
Municipality FEs	Yes	Yes	Yes	Yes	No	No
Month-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route FEs	No	Yes	No	Yes	No	No
Municipality-Route FEs	No	No	No	No	Yes	Yes
Route-NonAggr_t FEs	No	No	No	No	No	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Outcome Mean	0.58	0.58	0.58	0.58	0.58	0.58
Adjusted R2	0.318	0.382	0.639	0.663	0.709	0.722
Observations	12,847	12,847	12,847	12,847	12,847	12,847

Notes: The unit of observation is a route-municipality-month. The outcome variable is the log of the total amount of extortion paid in a route-municipality-month in dollars plus one. All regressions control for the total number of deliveries and the total value delivered by the distributor firm in a given route-municipality-month. Covariates include nightlights, population density, and census municipality characteristics interacted with year. The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Intensive

Effect on Extortion: Trends

Figure 18: Impact of Non-Aggression Pact on Extortion



▸ Return: Event-Study Plot

Effects on Extortion: Extensive Margin

Table 11: Effect of Non-Aggression Pact on Extensive Margin of Extortion

	Has Extortion	N Extortion	log(N Extortion)
$\text{NonAggr}_t \times \text{Comp}_d$	0.016	−1.575	−0.014
	(0.019)	(1.379)	(0.165)
Municipality FEs	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
Outcome Mean	13.50	13.50	1.77
Adjusted R2	0.33	0.87	0.82
Observations	1,108	1,108	1,083
Clusters	66	66	65

Notes: The unit of observation is a municipality-month. Covariates include census municipality characteristics interacted with year. The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Return

Non-Aggression Pact: Alternative Cutoffs

Table 12: Effect of Non-Aggression Pact on Extortion
in Municipalities with Gang Competition
Specifications with Alternative Cutoffs for Defining Competition

	50th Percentile		60th Percentile		70th Percentile		80th Percentile	
	Extortion	log(Extortion)	Extortion	log(Extortion)	Extortion	log(Extortion)	Extortion	log(Extortion)
$\text{NonAggr}_t \times \text{Comp}_d$	0.191^{***}	0.171^{***}	0.199^{***}	0.192^{***}	0.209^{***}	0.192^{***}	0.231^{***}	0.237^{***}
	(0.053)	(0.063)	(0.050)	(0.067)	(0.048)	(0.065)	(0.037)	(0.053)
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Adjusted R2	0.188	0.190	0.188	0.191	0.188	0.191	0.188	0.191
Observations	15,001	15,001	15,001	15,001	15,001	15,001	15,001	15,001

Notes: The unit of observation is an extortion payment. The sample period is 6/2015 to 1/2018. Covariates include nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return

Non-Aggression Pact: Continuous Measure of Competition

Table 13: Effect of Non-Aggression Pact on Extortion in Municipalities with Gang Competition
Alternative Specification with Continuous Measure of Competition

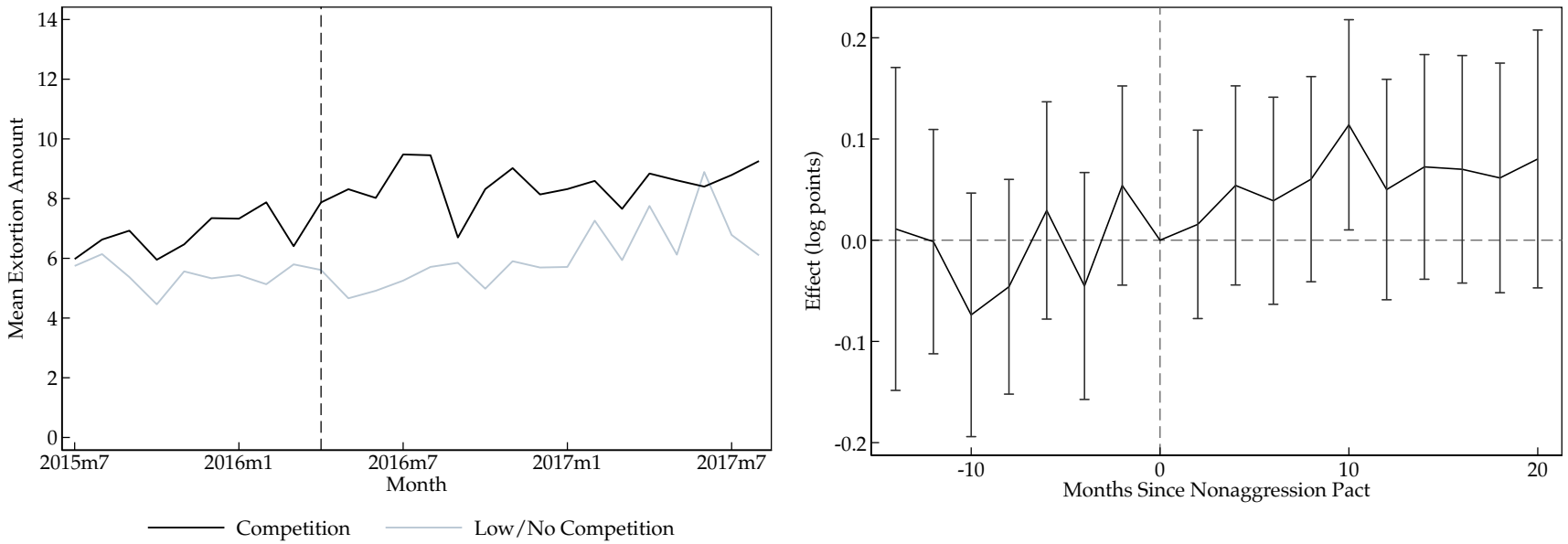
	Extortion	log(Extortion)	Extortion	log(Extortion)	Extortion	log(Extortion)
$\text{NonAggr}_t \times \text{HHI}_d$	-1.033^{***}	-0.969^{**}	-0.605^{**}			
	(0.261)	(0.369)	(0.282)			
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Route FEs	No	No	No	No	Yes	Yes
Outcome Mean	1.60	1.60	1.60			
Adjusted R2	0.188	0.191	0.271			
Observations	15,001	15,001	15,001			

Notes: The unit of observation is an extortion payment. The sample period is 6/2015 to 1/2018. Covariates include nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return

Non-Aggression Pact: Canton-Level Analysis

Figure 19: Extortion by Gang Competition
using Gang Competition Defined at Canton Level



a. Trends

b. Effect by Quarter

Notes: Vertical line shows start of non-aggression pact (April 2016).

◂ Return

Non-Aggression Pact: Canton-Level Analysis

Table 14: Effect of Non-Aggression Pact on Extortion
using Gang Competition Defined at Canton Level

	Extortion	log(Extortion)	Extortion	log(Extortion)	Extortion	log(Extortion)
$\text{NonAggr}_t \times \text{Comp}_d$	0.175^{**}	0.154^{***}	0.116	0.096^{*}		
	(0.076)	(0.051)	(0.079)	(0.051)		
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route FEs	No	No	No	No	Yes	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Outcome Mean	1.68	1.68	1.68	1.68		
Adjusted R2	0.193	0.315	0.223	0.333		
Observations	13,486	13,484	13,486	13,484		

Notes: The unit of observation is an extortion payment in columns 1 and 2. Covariates include nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return

Pass-through of Extortion: Sales within 1 km

Table 15: Effect of Extortion on Distributor Margin
Instrumental Variable Difference-in-Difference Model

	Reduced-Form		First-Stage	IVDD	
	Distributor Margin	log(Distributor Margin)	Extortion	Distributor Margin	log(Distributor Margin)
			Sale within 1km		
$\text{NonAggr}_t \times \text{Comp}_d$	0.639**	0.130**	2.998***		
	(0.237)	(0.055)	(0.780)		
Extortion				0.213***	0.045***
				(0.067)	(0.012)
Outcome Mean	3.81	0.99	8.21	3.81	0.99
Adjusted R2	0.465	0.444	0.589		
F-Stat				65.8	60.0
Observations	40,945	40,447	40,945	40,945	40,447

Notes: Distributor margin is defined as the difference between wholesale price and manufacturer price. All specifications include municipality fixed effects, month fixed effects, retailer fixed effects, and controls for nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the route level in parentheses for OLS regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- Reduced-form: collusion leads to a 13% increase in the distributor margin for deliveries within 1 km
- IVDD: a \$1 increase in extortion increases the firm's distributor margin by \$0.21 for the within 1 km ◂ Nearest Sales

Pass-through of Extortion: Sales within 5 km

Table 16: Effect of Extortion on Distribution Margin
Instrumental Variable Difference-in-Difference Model

	Reduced-Form		First-Stage	IVDD	
	Distributor Margin	log(Distributor Margin)	Extortion	Distributor Margin	log(Distributor Margin)
$\text{NonAggr}_t \times \text{Comp}_d$	0.237	0.051	1.488***		
	(0.277)	(0.061)	(0.390)		
Extortion				0.160***	0.034***
				(0.059)	(0.011)
Outcome Mean	3.76	0.99	8.63	3.76	0.99
Adjusted R2	0.492	0.439	0.284		
F-Stat				42.1	41.8
Observations	144,683	143,194	144,683	144,683	143,194

Notes: Distributor margin is defined as the difference between wholesale price and manufacturer price. All specifications include municipality fixed effects, month fixed effects, retailer fixed effects, and controls for nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the route level in parentheses for OLS regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- Reduced-form: collusion leads to a 5.1% increase in the distributor margin for deliveries within 5 km
- IVDD: a \$1 increase in extortion increases the distributor margin by \$0.16 for the within 5 km ◂ Nearest Sales

Effects on Development Outcomes:

Table 17: Effect of Non-Aggression Pact on Development and Population

	Nightlights	log(Nightlights)	Pop Density	log(Pop Density)
$\text{NonAggr}_t \times \text{Comp}_d$	0.003	−0.030	−0.048	−0.003
	(0.053)	(0.020)	(0.101)	(0.007)
Municipality FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Outcome Mean	1.32	-0.41	6.21	1.08
Adjusted R2	0.99	0.99	1.00	1.00
Observations	740	740	740	740
Clusters	148	148	148	148

Notes: The unit of observation is a municipality-year. Covariates include census municipality characteristics interacted with year. The sample period is 2014 to 2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Alternative Explanations

Effects on Development Outcomes:

Table 18: Effect of Non-Aggression Pact on Household Income and Expenditure

	Household Income	Income Per Capita	Household Expenditure	Expenditure Per Capita
$\text{NonAggr}_t \times \text{Comp}_d$	4.337	3.408	1.075	0.366
	(9.190)	(3.169)	(5.683)	(1.719)
Municipality FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Outcome Mean	514.77	159.98	349.28	109.27
Adjusted R2	0.06	0.06	0.13	0.12
Observations	88,255	88,255	88,255	88,255
Clusters	136	136	136	136

Notes: The unit of observation is a household-municipality-year. Covariates include census municipality characteristics interacted with year. The sample period is 2014 to 2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

▸ Return: Alternative Explanations

Pass-Through: Falsification Test

Table 19: Falsification Test Examining Effect of Non-Aggression Pact on Cost in Municipalities with Gang Competition

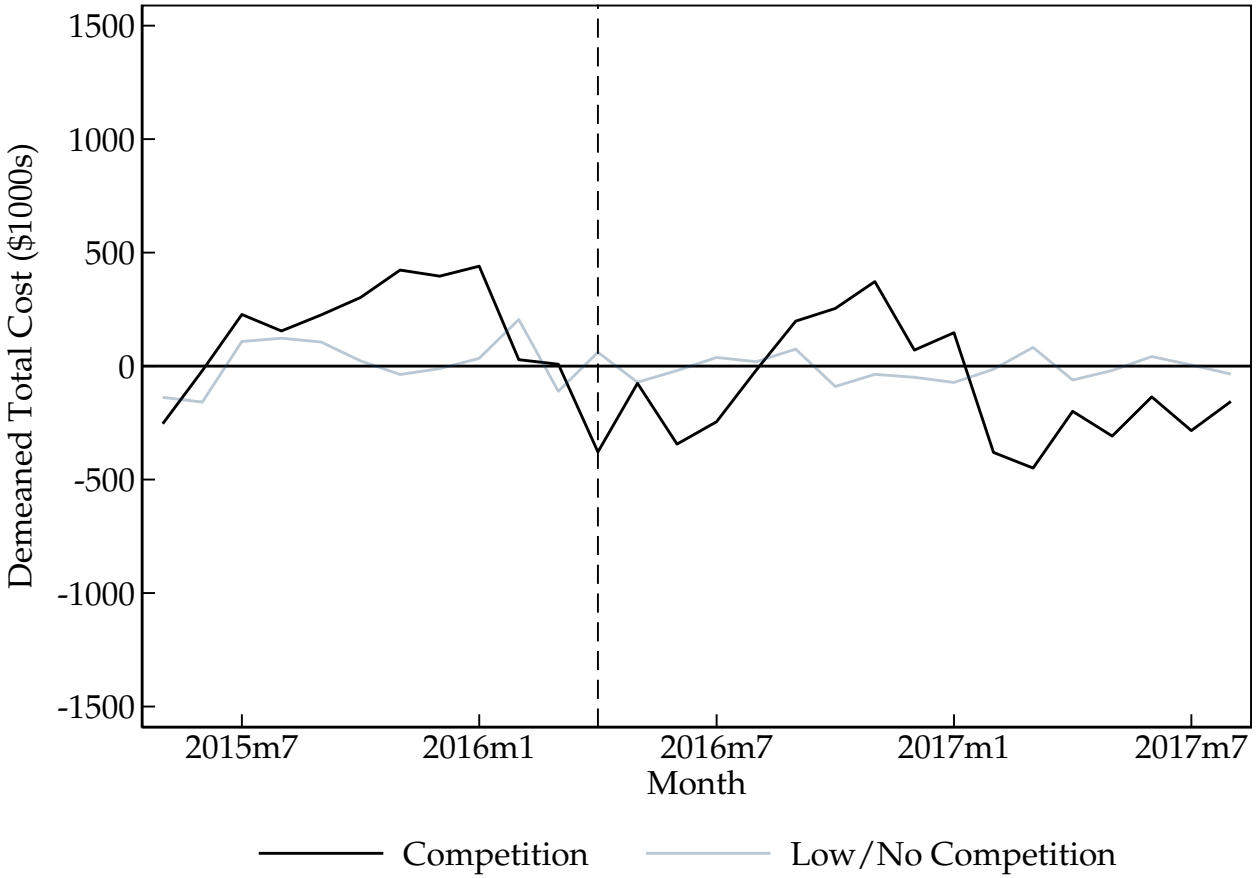
	Cost	log(Cost)	Cost	log(Cost)	Cost	log(Cost)
$\text{NonAggr}_t \times \text{Comp}_d$	0.026	0.020	0.010			
	(0.021)	(0.017)	(0.011)			
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes
Route FEs	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Product FEs	No	No	No	No	Yes	Yes
Covariates	No	No	Yes	Yes	Yes	Yes
Outcome Mean	1.24	1.24	1.24			
Adjusted R2	0.636	0.636	0.833			
Observations	10,241,127	10,241,127	10,240,911			

Notes: The sample period is 6/2015 to 1/2018. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Pass-Through: Nearest Sales

Pass-Through: Falsification Test

Figure 20: Demeaned Total Cost by Gang Competition



Notes: Shows cost after subtracting mean cost by product by retailer.

◂ Pass-Through: Nearest Sales

Effect of Non-Aggression Pact on Development

Table 20: Effect of Non-Aggression Pact on Development and Population

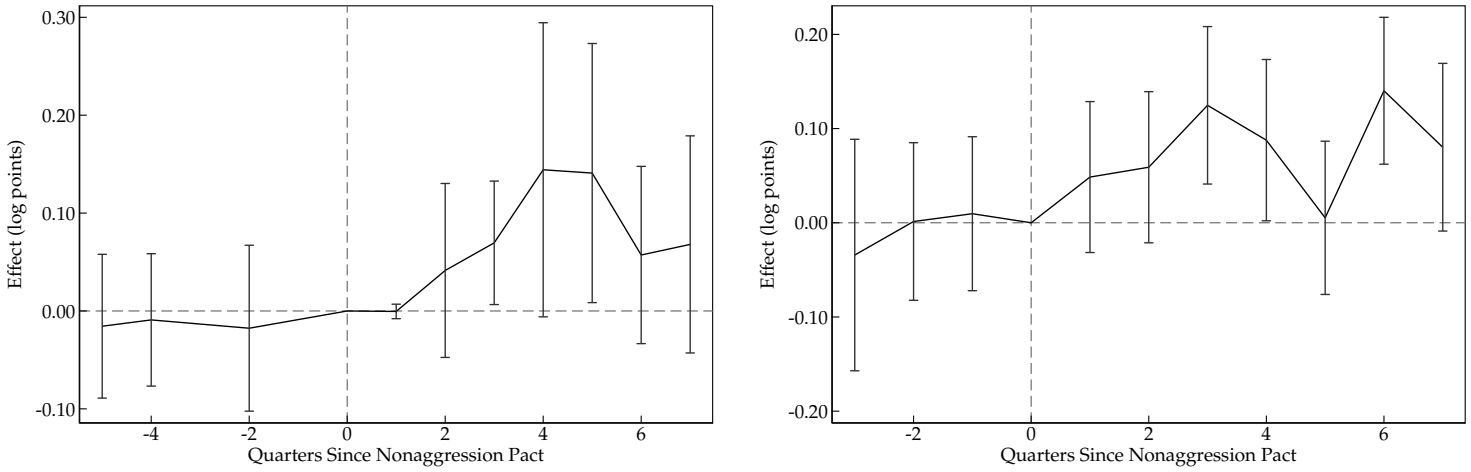
	Nightlights	log(Nightlights)	Pop Density	log(Pop Density)
$\text{NonAggr}_t \times \text{Comp}_d$	0.003	−0.030	−0.048	−0.003
	(0.053)	(0.020)	(0.101)	(0.007)
Municipality FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Outcome Mean	1.32	-0.41	6.21	1.08
Adjusted R2	0.99	0.99	1.00	1.00
Observations	740	740	740	740
Clusters	148	148	148	148

Notes: The unit of observation is a municpality-year. The sample period is 2014 to 2018. Covariates include census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Pass-Through: Nearest Sales

Effect on Drug Prices and Associated Admissions

Figure 21: Effect of Non-Aggression Pact on Drug Prices and Associated Admissions: Dynamic Effects



a. Drug Prices

b. Hospital Admissions

Notes: Shows point estimates for each period using the difference-in-difference model. Figure a. shows the effect on pharmaceutical prices. Figure b. shows the effect on hospital admissions for chronic conditions affected by drug adherence. The omitted period is the quarter prior to the start of the non-aggression pact between MS-13 and Barrio 18. Standard errors are clustered at the municipality level. All specifications include municipality fixed effects, month fixed effects, and controls for nightlights, population density, and census municipality characteristics interacted with year. Error bars indicate 95% confidence interval using standard errors clustered at the municipality level.

◂ Return: Pharma Prices ◂ Return: Health Results

Effect on Prices at Pharmacies: Alternative Specification

Table 21: Effect of Non-Aggression Pact on Consumer Prices at Pharmacies
Alternate Specification with Pharmacy by Drug Fixed Effects

	All Pharmacies		Pharmacies/Brands Supplied by Delivery Firm		Diabetes Drugs	
	Price	log(Price)	Price	log(Price)	Price	log(Price)
$\text{NonAggr}_t \times \text{Comp}_d$	0.054^{***}	0.043^{***}	0.052^{***}			
	(0.004)	(0.008)	(0.014)			
Pharmacy×Drug FEs	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	No	Yes	Yes	Yes
Outcome Mean	-1.11	-1.20	-0.95			
Adjusted R2	0.931	0.924	0.900			
Observations	1,617,314	313,893	112,325			

Notes: The unit of observation is a drug-municipality-month (or drug-municipality-semi-year for the period prior to 1/2016). Standard errors clustered at the Pharmacy×Drug level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return: Pharma Prices ◂ Return: Health Results

Effect on Pharmaceutical Distributor Margins

Table 22: Effect of Non-Aggression Pact on Distributor Pharmaceutical Margins

	Margin	log(Margin)	Amount	log(Amount)
$\text{NonAggr}_t \times \text{Comp}_d$	0.090	0.106	0.112	0.133
	(0.138)	(0.078)	(0.140)	(0.080)
Municipality FEs	Yes	Yes	Yes	Yes
retailer FEs	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Outcome Mean	1.60	1.60	3.47	3.47
Adjusted R2	0.419	0.421	0.473	0.474
Observations	629,112	629,112	639,151	639,151

Notes: Distributor margin is defined as the difference between wholesale price and manufacturer price. All specifications include municipality fixed effects, month fixed effects, retailer fixed effects, and controls for nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return: Pharma Prices ◂ Return: Health Results

Effect on Hospital Admissions: By Outcome

Table 23: Effect of Non-Aggression Pact on Consumer Prices at Pharmacies
Additional Drug Categories

	Diabetes Drugs		Respiratory Drugs		Hypertension Drugs		Coronary Drugs	
	Price	log(Price)	Price	log(Price)	Price	log(Price)	Price	log(Price)
$\text{NonAggr}_t \times \text{Comp}_d$	0.055**	0.057**	0.122**	0.108*	0.079**	0.074***		
	(0.023)	(0.022)	(0.058)	(0.058)	(0.033)	(0.026)		
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Drug FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outcome Mean	-1.10	-1.10	-0.38	-0.38	-0.87	-0.87		
Adjusted R2	0.877	0.882	0.778	0.807	0.770	0.791		
Observations	56,820	56,820	23,169	23,163	53,863	53,861		

Notes: The unit of observation is a drug-pharmacy-month (or drug-pharmacy-semi-year for the period prior to 1/2016). Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return: Pharma Prices ◂ Return: Health Results

Effect on Hospital Admissions: By Outcome

Table 24: Effect of Non-Aggression Pact on Hospital Admissions
Additional Diagnosis Categories

	Diabetes		Respiratory		Hypertension		Coronary	
	Admissions	Admissions	Admissions	Admissions	Admissions	Admissions	Admissions	Admissions
$\text{NonAggr}_t \times \text{Comp}_d$	0.117***	0.122***	0.030	0.018	0.077	0.092		
	(0.032)	(0.030)	(0.057)	(0.054)	(0.074)	(0.065)		
Municipality FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Outcome Mean	1.72	1.72	4.69	4.69	1.34	1.34		
Observations	4,588	4,588	4,588	4,588	4,557	4,557		
Clusters	148	148	148	148	147	147		

Notes: Results from Poisson regressions in which the outcome is the number of admissions in a municipality-month. Covariates include nightlights, population density, and census municipality characteristics interacted with year. Standard errors clustered at the municipality level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

◂ Return: Pharma Prices ◂ Return: Health Results