Commodity Price Shocks and Conflict

Samuel Bazzi

Selected Paper prepared for presentation at the International Agricultural Trade Research Consortium's (IATRC's) 2014 Annual Meeting: Food, Resources and Conflict, December 7-9, 2014, San Diego, CA.

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Samuel Bazzi

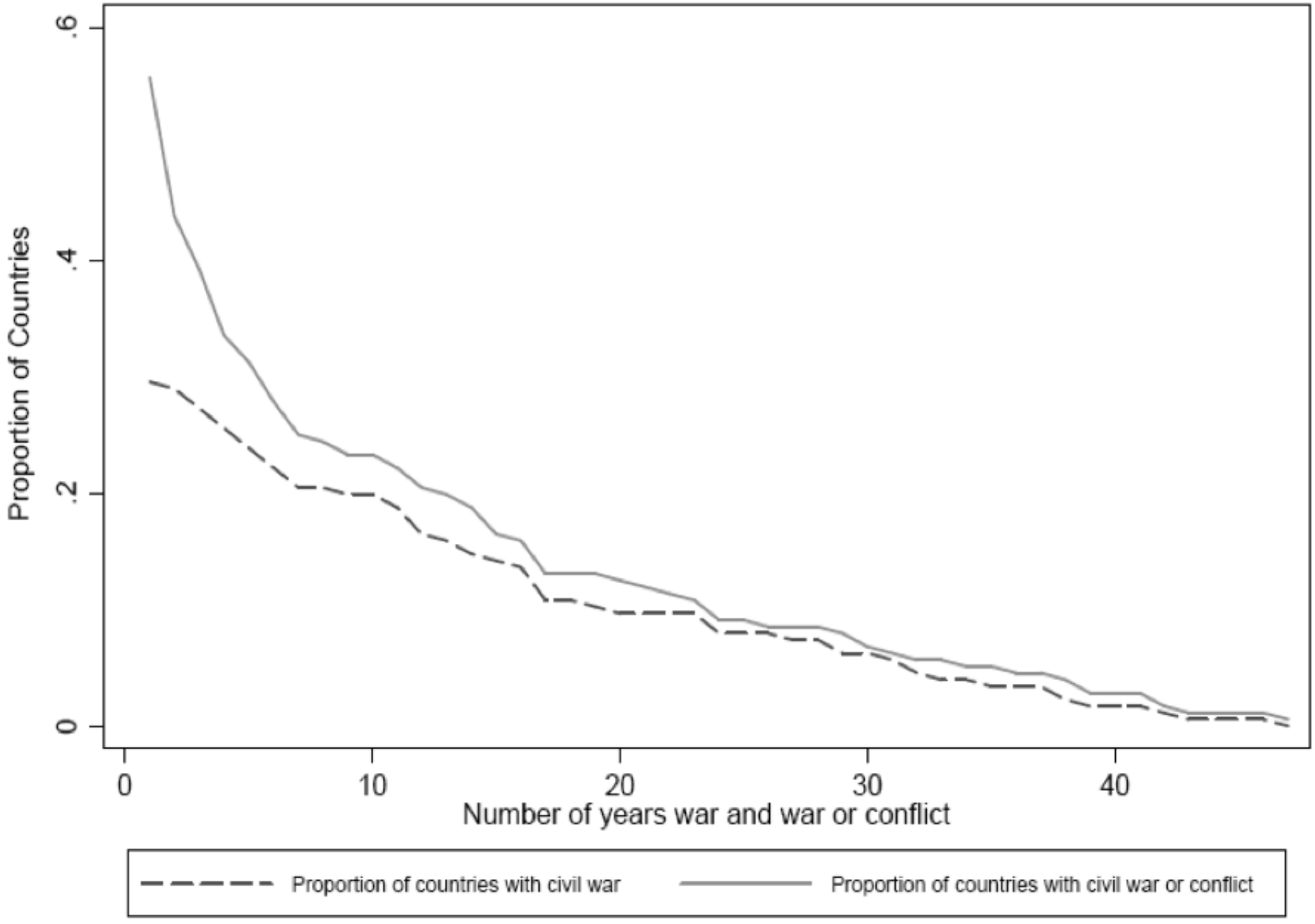
Boston University

(based on joint work with Christopher Blattman, Columbia Univ.)

7 December 2014

IATRC Annual Meeting

Most Countries Had Some Conflict in Last 50 Years



Source: Blattman and Miguel (2010).

But, Conflict is More Likely in Poorer Countries

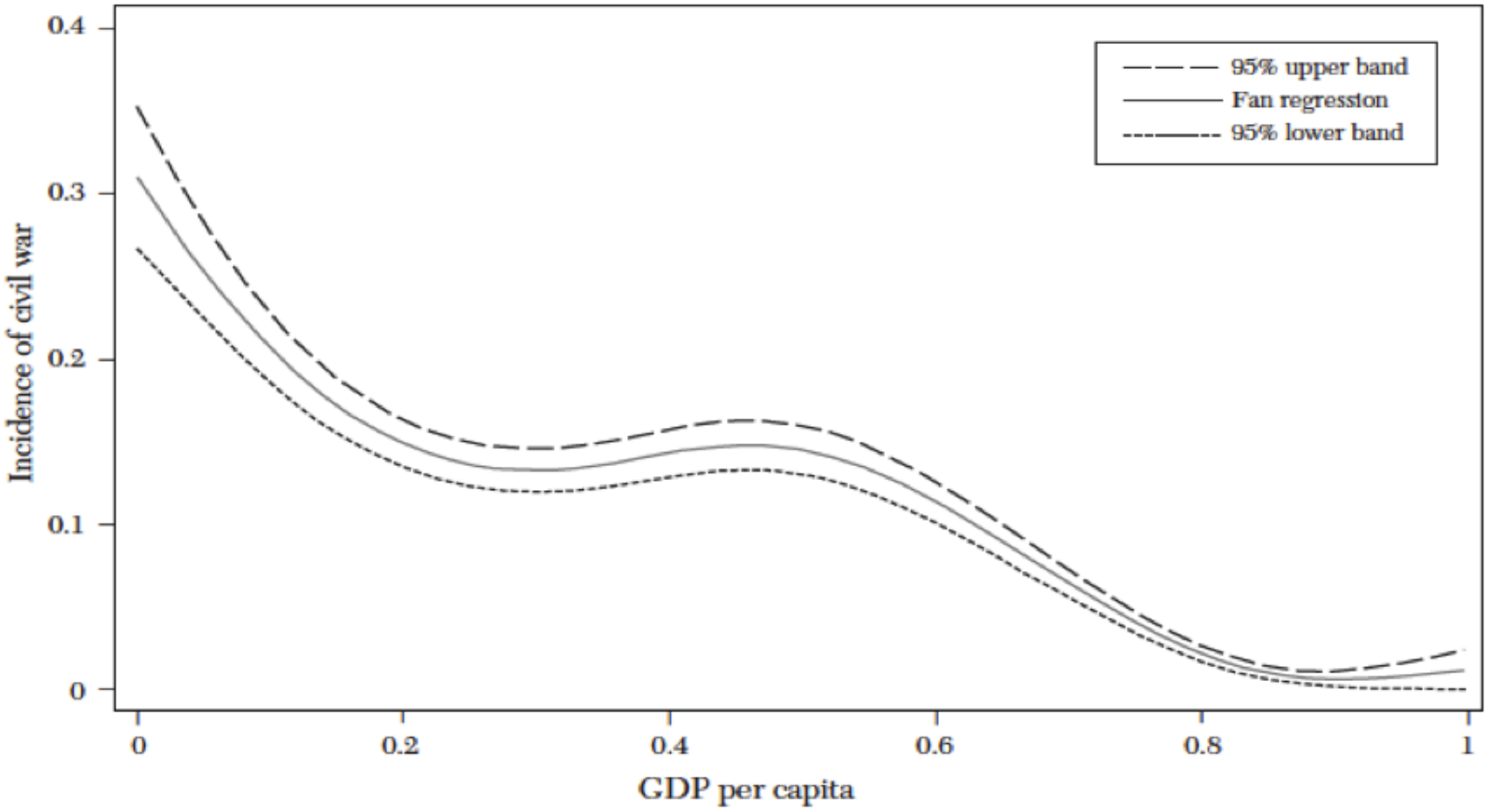


Figure 3: Incidence of Civil War by Country Income per Capita, 1960–2006

Sources: Figure displays the results of a Fan regression of the incidence of civil war on GDP per capita percentiles (bandwidth = 0.3, bootstrapped standard errors). Population and GDP data are drawn from the World Development Indicators (World Bank 2008). Civil war incidence is drawn from the UCDP/PRIO armed conflict database (Gleditsch et al. 2002; Harbom and Wallensteen 2007).

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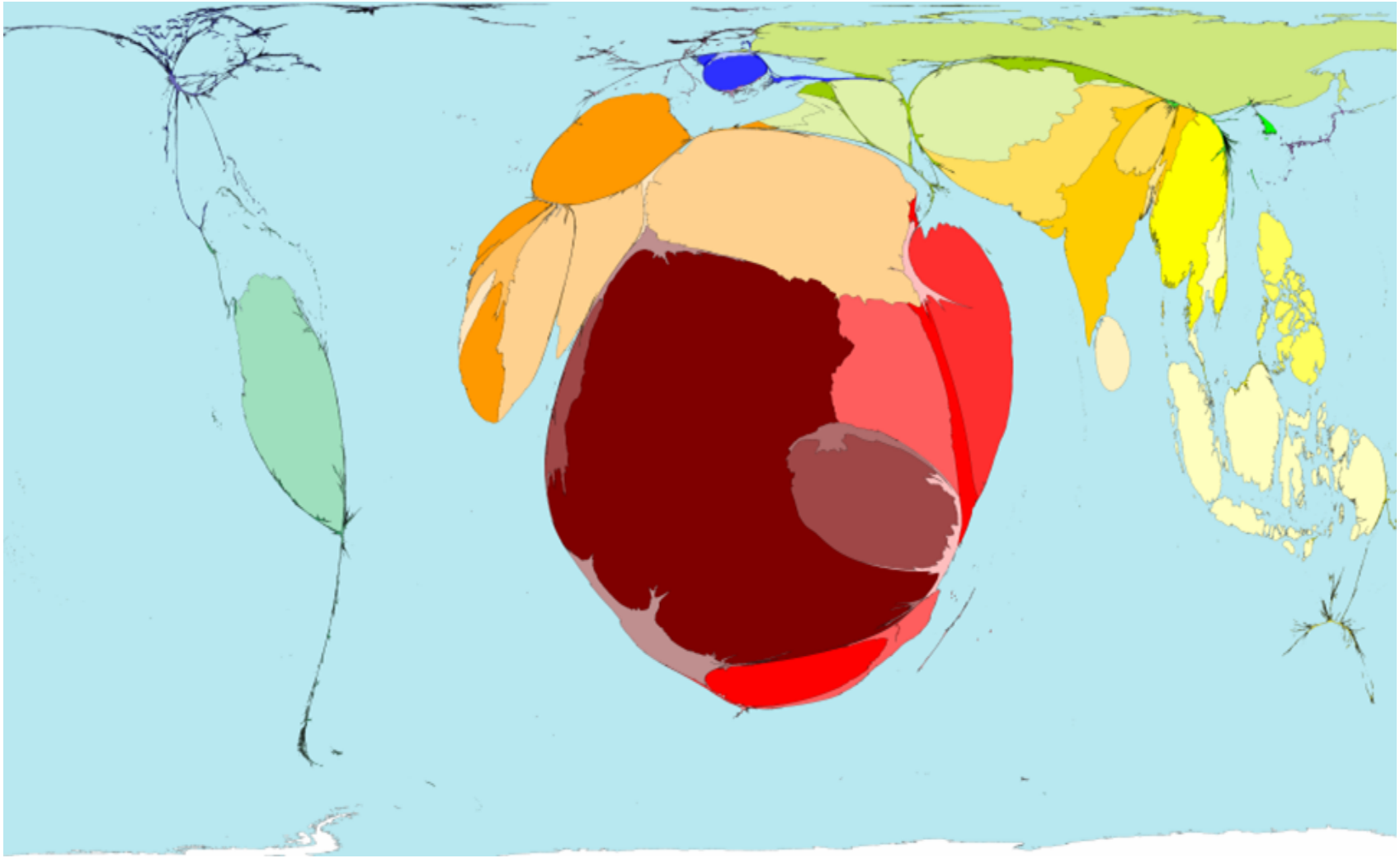

Source: WorldMapper.

What Role are Commodities Price Shocks Playing?

Today's Lecture

Longstanding view: resources are among deep drivers of conflict

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Longstanding view: resources are among deep drivers of conflict

"The International Grains Council estimates that inventories of soy, wheat, barley, and corn are reaching their highest volume in 30 years. ...

And what has caused this explosion in grain supplies? Prices. ...

Todays lower prices could discourage investment and reduce future production, ushering in another period of higher prices. This cycle is nothing new, but in recent years it has been shaped by new drivers (climate change, demographic change, volatile global economic conditions) that make the swings more frequent and the range of variation more extreme. ...

The problem with these developments is that **greater food-related volatility will bring about social and geopolitical instability**."

The Atlantic, October 2014

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  - huge impact on income and state revenues in poor countries

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     $\Uparrow$commodity prices $\Longrightarrow$ $\Uparrow$income/wages $\Longrightarrow$ $\Downarrow$conflict

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  4. **feasibility**
     $\Uparrow$commodity prices $\Longrightarrow$ $\Uparrow$capability to finance rebels $\Longrightarrow$ $\Uparrow$conflict

Basic Methodological Approach

Data

- country, subnational, or grid cell-level conflict measures
- world commodity prices

Regression (location i, commodity c)

$$conflict_{it} = \beta \underbrace{\Delta price_t^c \times exposure_i^c}_{\text{price shock}} + \theta_i + \theta_t + \varepsilon_{it}$$

- $exposure_i^c$ captures production intensity and linkage to export markets

Key Assumptions

- conflict in i does not affect world price
- exposure in i is predetermined
- exposure strong enough to affect incentives

Roadmap: Commodity Price Shocks and Conflict

1. Learning about mechanisms
   (Bazzi & Blattman, 2014 AEJ: Macro; Dube & Vargas, 2013 ReStud)

2. Vast heterogeneity and unpacking null results with better data
   (Berman & Couttenier, 2014 ReStat; Berman et al, 2014 Working Paper)

3. NAFTA, the decline of maize, and drug violence in Mexico
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Bazzi and Blattman (2014)

- Different commodity price shocks help distinguish mechanisms
  - **annual crops**: opportunity cost
    labor-intensive, low taxability (e.g., oilseeds, food crops, livestock)
  - **extractive products**: state prize/capacity
    capital-intensive, high taxability & licensing fees (e.g., tin, nickel, oil)
  - **perennial crops**: in between
    small & large holders, medium taxability (e.g., cocoa, lumber, palm oil)

- We reconcile disagreement in prior cross-country literature by
  - expanding coverage of commodities (65) and years (1957-2007)
  - consistent specification choices: time dependence, onset vs. continuation vs. intensity, shock persistence, robustness

Export Commodity Price Shocks

Index of real export prices for country i in year t

$$P_{it} = \left(\Pi_{j=1}^{65} \; p_{jt}^{w_{ij,t-k}} \right) / cpi_t$$

- p_{jt} is dollar-denominated world price of commodity j,
- $w_{ij,t-k}$ avg. share in primary exports $t-2$ to $t-4$ or fixed at 1980 value

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Price shock for country i in year t

$$shock_{it} = (\ln P_{it} - \ln P_{i,t-1}) \times \frac{X_{i\underline{T}}}{GDP_{i\underline{T}}},$$

- $X_{i\underline{T}}/GDP_{i,\underline{T}}$ is average commodity exports over GDP from 1978-1982

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Decomposing $shock_{it} = S_{it}^A + S_{it}^P + S_{it}^E$

- S_{it}^A: *annual* goods; S_{it}^P: *perennial* crops; S_{it}^E: *extractive* products

Key Specification Choices

Typical empirical specifications of the form

$$conflict_{it} = \tau_i + \tau_t + \delta_i \times t + \mathbf{shock}'_{it}\boldsymbol{\theta} + \varepsilon_{it}$$

constrain effects of shocks to have identical effects onset and continuation.

We relax this restriction and estimate each relationship separately

$$onset_{it} = \tau_i^o + \tau_t^o + \delta_i^o \times t + \mathbf{shock}'_{it}\boldsymbol{\theta^o} + \varepsilon_{it}^o$$
$$ending_{it} = \tau_i^e + \tau_t^e + \delta_i^e \times t + \mathbf{shock}'_{it}\boldsymbol{\theta^e} + \varepsilon_{it}^e$$

which is akin to a fully dynamic model (Beck and Katz, 2011).

We explore six conflict measures but view the episodic ones (UCDP/PRIO and COW) as most theoretically relevant.

Aggregate Price Shocks on Conflict Onset

Null Effects

	Dependent variable: Indicator for onset							
	UCDP/PRIO Civil War data			Other Civil War datasets			Coups	
	Low (1)	High cum. (2)	High (3)	FL (4)	S (5)	COW (6)	Archigos (7)	PT (8)
Panel A. No consumption shocks								
Price shock, t	−0.0002	0.0019	0.0006	0.0006	−0.0008	0.0017	0.0012	0.0007
	(0.0025)	(0.0017)	(0.0015)	(0.0012)	(0.0014)	(0.0019)	(0.0024)	(0.0026)
Price shock, $t-1$	0.0051	0.0014	0.0003	−0.0005	−0.0007	0.0025	−0.0022	−0.0008
	(0.0033)	(0.0018)	(0.0012)	(0.0015)	(0.0016)	(0.0017)	(0.0032)	(0.0033)
Price shock, $t-2$	−0.0014	−0.0007	−0.0004	0.0011	−0.0012	0.0015	−0.0041	−0.0054
	(0.0027)	(0.0014)	(0.0011)	(0.0011)	(0.0016)	(0.0018)	(0.0022)*	(0.0032)*
Sum of all shocks	0.003	0.003	0.001	0.001	−0.003	0.006	−0.005	−0.005
p-value of sum	[0.527]	[0.395]	[0.836]	[0.600]	[0.433]	[0.115]	[0.315]	[0.276]
Impact of shocks on risk (%Δ)	0.082	0.118	0.028	0.067	−0.124	0.201	−0.106	−0.092
Observations	4,106	4,352	4,748	4,088	4,092	4,398	4,647	5,079
R^2	0.108	0.142	0.086	0.108	0.086	0.068	0.054	0.070
Number of countries	117	117	117	114	117	116	114	117
Mean of dependent variable	0.042	0.022	0.019	0.018	0.022	0.029	0.048	0.06

Estimated by LPM including country and year FE and country-specific time trends. Standard errors clustered by country.

Disaggregated Price Shocks and Conflict Onset

Null Effects

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Panel A. No consumption shocks								
Annual crop shock								
Sum of all price shock coefficients	0.004	0.003	0.0002	0.001	−0.005	0.008	−0.002	−0.006
p-value of sum	[0.593]	[0.541]	[0.965]	[0.839]	[0.205]	[0.127]	[0.813]	[0.357]
Impact of shocks on risk (%Δ)	0.098	0.116	0.008	0.031	−0.245	0.268	−0.04	−0.097
Perennial crop shock								
Sum of all price shock coefficients	0.004	0.006	0.006	0.004	−0.001	0.003	−0.007	0.003
p-value of sum	[0.513]	[0.162]	[0.087]*	[0.316]	[0.790]	[0.589]	[0.276]	[0.774]
Impact of shocks on risk (%Δ)	0.097	0.269	0.321	0.227	−0.052	0.093	−0.136	0.045
Extractive crop shock								
Sum of all price shock coefficients	0.005	0.003	−0.0002	0.002	−0.003	0.008	−0.009	−0.01
p-value of sum	[0.573]	[0.469]	[0.954]	[0.65]	[0.584]	[0.117]	[0.179]	[0.136]
Impact of shocks on risk (%Δ)	0.108	0.146	0.011	0.085	−0.134	0.292	−0.196	−0.173
Observations	4,106	4,352	4,748	4,088	4,092	4,398	4,647	5,079
R^2	0.109	0.143	0.087	0.108	0.086	0.069	0.055	0.072
Number of countries	117	117	117	114	117	116	114	117
Mean of dependent variable	0.042	0.022	0.019	0.018	0.021	0.029	0.047	0.059

Estimated by LPM including country and year FE and country-specific time trends. Standard errors clustered by country.

Aggregate Price Shocks and Conflict Ending

Moderate Positive Effects but Robustness Unclear

	Dependent variable: Indicator for ending					
	UCDP/PRIO Civil War data			Other Civil War datasets		
	Low	High cum.	High	FL	S	COW
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. No consumption shocks						
Price shock, t	0.0119	0.0284	0.0378	−0.0131	−0.0168	0.0644
	(0.0181)	(0.0184)	(0.0378)	(0.0180)	(0.0143)	(0.0287)**
Price shock, $t-1$	−0.0002	0.0310	−0.0155	−0.0085	0.0103	0.0650
	(0.0265)	(0.0211)	(0.0534)	(0.0141)	(0.0176)	(0.0338)*
Price shock, $t-2$	−0.0344	−0.0031	0.1060	−0.0112	−0.0194	0.0273
	(0.0264)	(0.0252)	(0.0428)**	(0.0148)	(0.0151)	(0.0403)
Sum of all shocks	−0.023	0.056	0.128	−0.033	−0.026	0.157
p-value of sum	[0.617]	[0.176]	[0.211]	[0.223]	[0.385]	[0.053]**
Impact of shocks on risk (%Δ)	−0.141	0.515	0.503	−0.554	−0.295	0.821
Observations	995	749	353	1,013	907	665
R^2	0.207	0.255	0.355	0.256	0.283	0.293
Number of countries	83	52	42	56	61	59
Mean of dependent variable	0.161	0.109	0.255	0.059	0.088	0.191

Estimated by LPM including country and year FE and country-specific time trends. Standard errors clustered by country.

Disaggregated Price Shocks and Conflict Ending

Moderate Positive Effects for Specific Crops but Robustness Unclear

	Dependent variable: Indicator for ending					
	UCDP/PRIO Civil War data			Other Civil War datasets		
	Low (1)	High cum. (2)	High (3)	FL (4)	S (5)	COW (6)
Panel A. No consumption shocks						
Annual crop shock						
Sum of all price shock coefficients	−0.047	0.069	0.222	−0.046	−0.029	0.232
p-value of sum	[0.425]	[0.300]	[0.138]	[0.165]	[0.442]	[0.004]***
Impact of shocks on risk (%Δ)	−0.297	0.631	0.871	−0.772	−0.331	1.213
Perennial crop shock						
Sum of all price shock coefficients	0.012	0.075	0.190	−0.017	−0.026	0.173
p-value of sum	[0.778]	[0.029]**	[0.023]**	[0.597]	[0.364]	[0.005]***
Impact of shocks on risk (%Δ)	0.071	0.682	0.745	−0.285	−0.291	0.905
Extractive crop shock						
Sum of all price shock coefficients	−0.038	0.079	0.206	−0.043	−0.021	0.268
p-value of sum	[0.578]	[0.252]	[0.250]	[0.265]	[0.643]	[0.004]***
Impact of shocks on risk (%Δ)	−0.238	0.718	0.807	−0.717	−0.235	1.406
Observations	995	749	353	1,013	907	665
R^2	0.212	0.259	0.379	0.260	0.286	0.309
Number of countries	83	52	42	56	61	59
Mean of dependent variable	0.161	0.109	0.255	0.087	0.08	0.191

Estimated by LPM including country and year FE and country-specific time trends. Standard errors clustered by country.

Systematic Robustness Checks

- (1) drop the X/GDP rescaling; (2) include all "price-makers"; (3) use 3% price-maker cutoff instead of 10%; (4) use 20% price-maker cutoff; (5) replace time-varying weights with fixed 1980 weights; (6) censor price shocks at 1st and 99th percentile; (7) drop country-specific time trend; (8) drop year FE; (9) drop country FE, (10) **controlling for consumption/import price shocks**

$\Longrightarrow$ none appear to be driving the results

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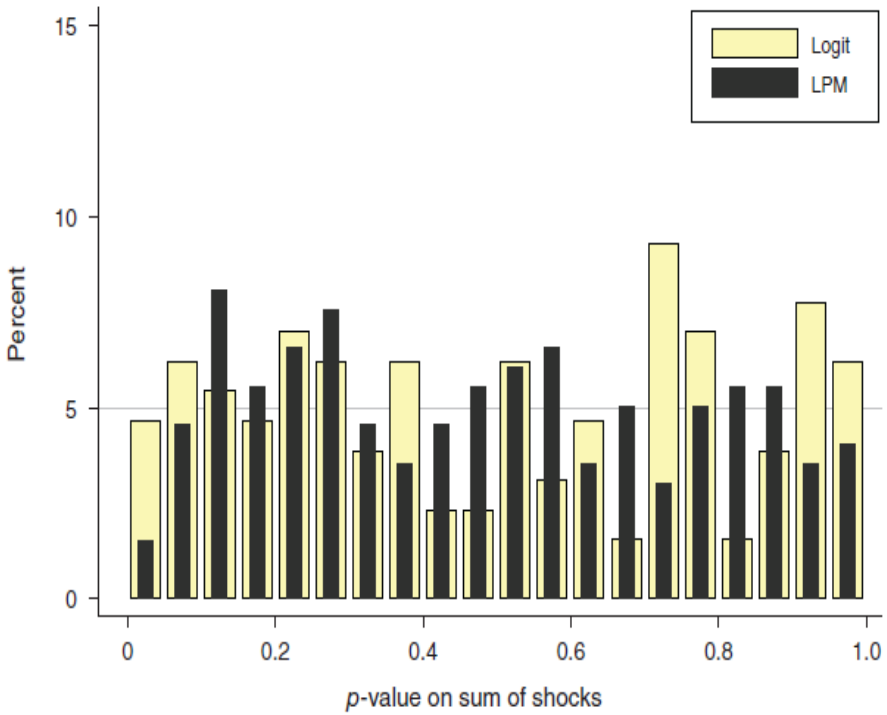
Conflict Onset



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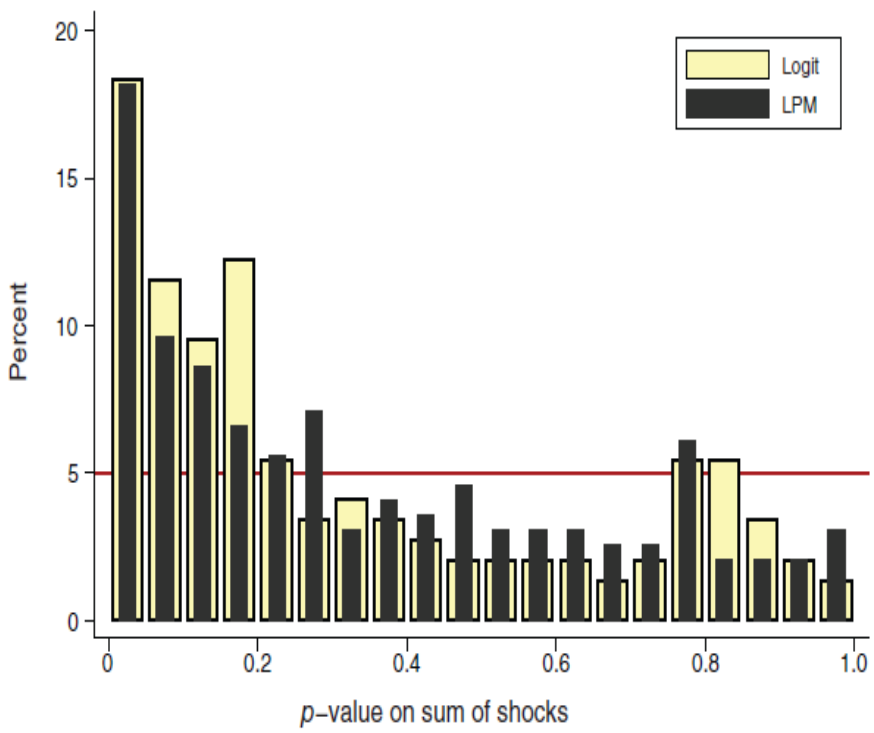

Absence of Heterogeneous Effects

- Also, test for differential effect of price shocks in high-risk countries
  - regime types: non-democracy, anocracy, factional partial democracy
  - high vs. low ethnic polarization
  - high vs. low initial income level
  - high vs. low income inequality
  - sub-Saharan Africa

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- No systematically different effects for conflict onset or ending in even the most at risk countries

What about conflict intensity?

Disaggregated Price Shocks and Battle Deaths

	Linear battle deaths			Natural log of battle deaths		
	Static (1)	Dynamic (2)	Omitting nonannual deaths data (3)	Static (4)	Dynamic (5)	Omitting nonannual deaths data (6)
Annual crop price shock, t	−782.0	−1,174.3	−799.6	−0.266	−0.315	−0.227
	(679.8)	(482.0)**	(574.2)	(0.154)*	(0.130)**	(0.157)
Annual crop price shock, $t-1$	−369.5	290.0	−114.4	−0.187	−0.107	−0.227
	(544.2)	(518.5)	(415.2)	(0.148)	(0.146)	(0.131)*
Annual crop price shock, $t-2$	−726.2	−331.8	−280.4	−0.278	−0.223	−0.184
	(742.7)	(467.8)	(669.0)	(0.187)	(0.147)	(0.183)
Perennial crop price shock, t	−184.2	−489.6	−81.6	−0.178	−0.215	−0.169
	(462.6)	(306.6)	(274.0)	(0.096)*	(0.083)***	(0.090)*
Perennial crop price shock, $t-1$	−26.1	412.2	215.0	−0.120	−0.067	−0.133
	(441.1)	(361.0)	(273.1)	(0.110)	(0.105)	(0.093)
Perennial crop price shock, $t-2$	491.1	391.1	542.2	−0.032	−0.034	−0.010
	(552.8)	(415.8)	(509.8)	(0.127)	(0.110)	(0.112)
Mineral, oil & gas price shock, t	−582.4	−1,176.5	−613.1	−0.271	−0.344	−0.266
	(659.2)	(491.0)**	(585.3)	(0.136)**	(0.104)***	(0.155)*
Mineral, oil & gas price shock, $t-1$	−402.5	492.8	−133.0	−0.215	−0.109	−0.260
	(726.1)	(695.3)	(523.7)	(0.182)	(0.184)	(0.152)*
Mineral, oil & gas price shock, $t-2$	−363.7	−371.6	−194.6	−0.294	−0.290	−0.218
	(988.0)	(569.3)	(811.3)	(0.230)	(0.179)	(0.218)
Duration	−57.8	−40.8	−13.6	0.008	0.010	0.011
	(51.3)	(27.6)	(19.7)	(0.015)	(0.013)	(0.015)
Indicator for first year of conflict	−2,647.8	294.9	416.2	−1.309	−0.955	−0.951
	(765.7)***	(656.4)	(471.4)	(0.199)***	(0.203)***	(0.239)***
Lagged battle deaths		0.729	0.900		0.0001	0.0001
		(0.1369)***	(0.0263)***		(0.0000)***	(0.0000)***
Annual crop shock						
Sum of all price shock coefficients	−1,878	−1,216	−1,194	−0.730	−0.645	−0.638
p-value of sum	[0.309]	[0.278]	[0.376]	[0.094]*	[0.067]*	[0.079]*
Impact of shocks on risk (%Δ)	−0.364	−0.236	−0.297	−0.103	−0.091	−0.095
Perennial crop shock						
Sum of all price shock coefficients	280.8	313.7	675.6	−0.330	−0.316	−0.312
p-value of sum	[0.823]	[0.693]	[0.421]	[0.267]	[0.213]	[0.197]
Impact of shocks on risk (%Δ)	0.0544	0.0608	0.168	−0.047	−0.045	−0.047
Extractive crop shock						
Sum of all price shock coefficients	−1,349	−1,055	−940.7	−0.780	−0.743	−0.743
p-value of sum	[0.547]	[0.437]	[0.564]	[0.104]	[0.048]*	[0.065]*
Impact of shocks on risk (%Δ)	−0.261	−0.205	−0.234	−0.110	−0.105	−0.111
Observations	1,009	1,009	690	1,009	1,009	690
Mean of dependent variable	5,159	5,159	4,016	7.065	7.065	6.706
Number of countries	82	82	74	82	82	74

Estimated by LPM including country and year FE and country-specific time trends. Standard errors clustered by country.

Key Takeaways

- Price shocks have no systematic or robust effect on *new* conflict
  - ▷ but, effects may exist conditional on import price shocks *and* heterogeneous w.r.t. ethnic dominance (Janus & Riera-Crichton, 2014)
- Consistent with new skepticism re resource *stocks* and conflict (e.g., Cotet & Tsui, 2013)
  - ▷ but, effects may exist heterogeneous w.r.t. ethnic resource control (Morelli & Rohner, 2014)
- Some evidence that shocks hasten end of existing conflicts
  - ▷ but, difficult to disentangle opportunity cost from state capacity
- Evidence is least supportive of state prize motive
- However, absence of evidence $\neq$ evidence of absence...

Exploring Mechanisms in Colombia

Dube and Vargas (2013)

- Case study of Colombia using rich microdata

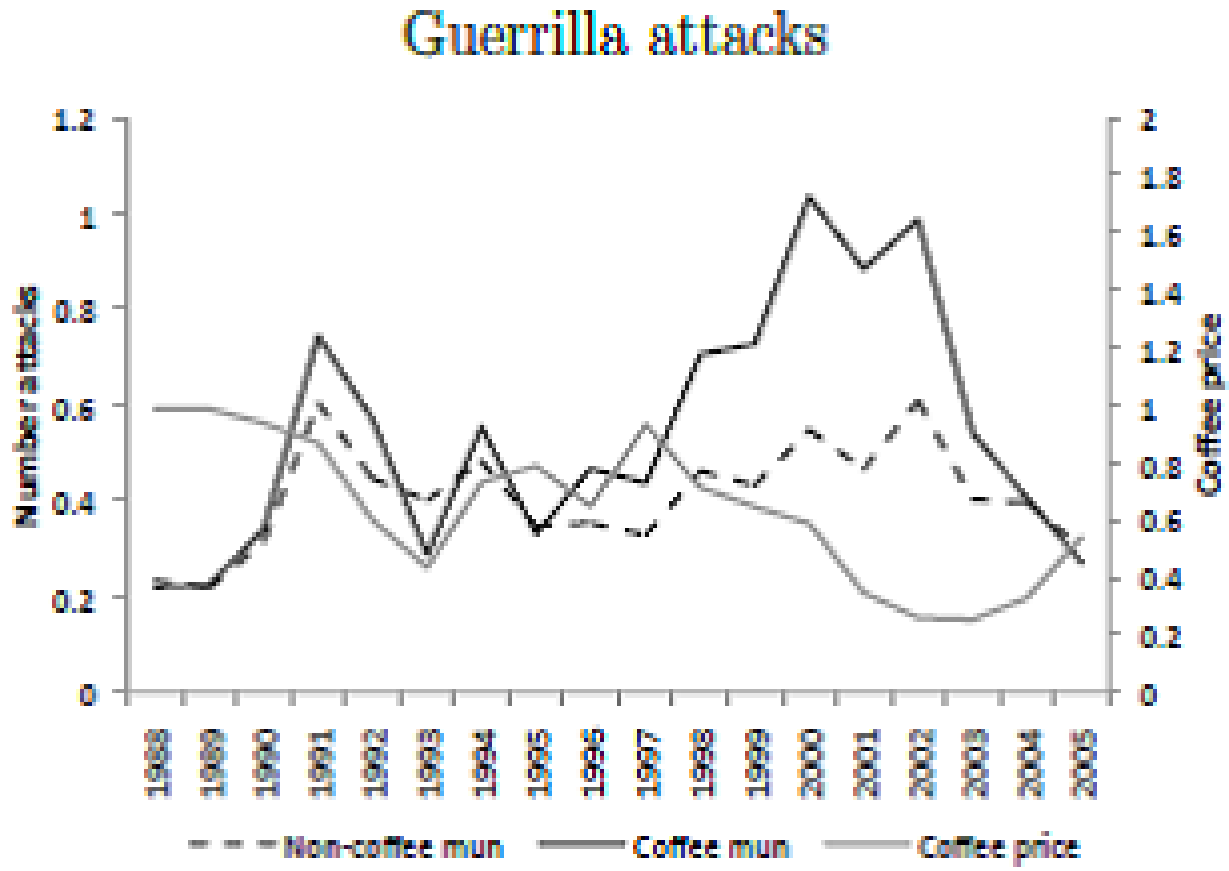
  $\Longrightarrow$ evidence of both state prize (oil) and opportunity cost (coffee)

$$\begin{aligned} conflict_{jrt} &= \alpha_j + \alpha_t + \delta_r t + \gamma coca_{jr} t + \mathbf{X}'_{jrt}\phi \\ &\quad + \lambda(oil_{jr} \times P_t^{oil}) + \rho(coffee_{jr} \times P_t^{coffee}) + \varepsilon_{jrt} \end{aligned}$$

  - $conflict_{jrt}$: number of guerilla attacks, paramilitary attacks, clashes or casualties in municipality j, region r, year t
  - $coca_{jr} = 1$ if coca growing region in 1994
  - oil_{jr} ($coffee_{jr}$): oil (coffee) production level
  - P_t^{oil}: log international price
  - P_t^{coffee}: log internal price (instrumented with other country exports)

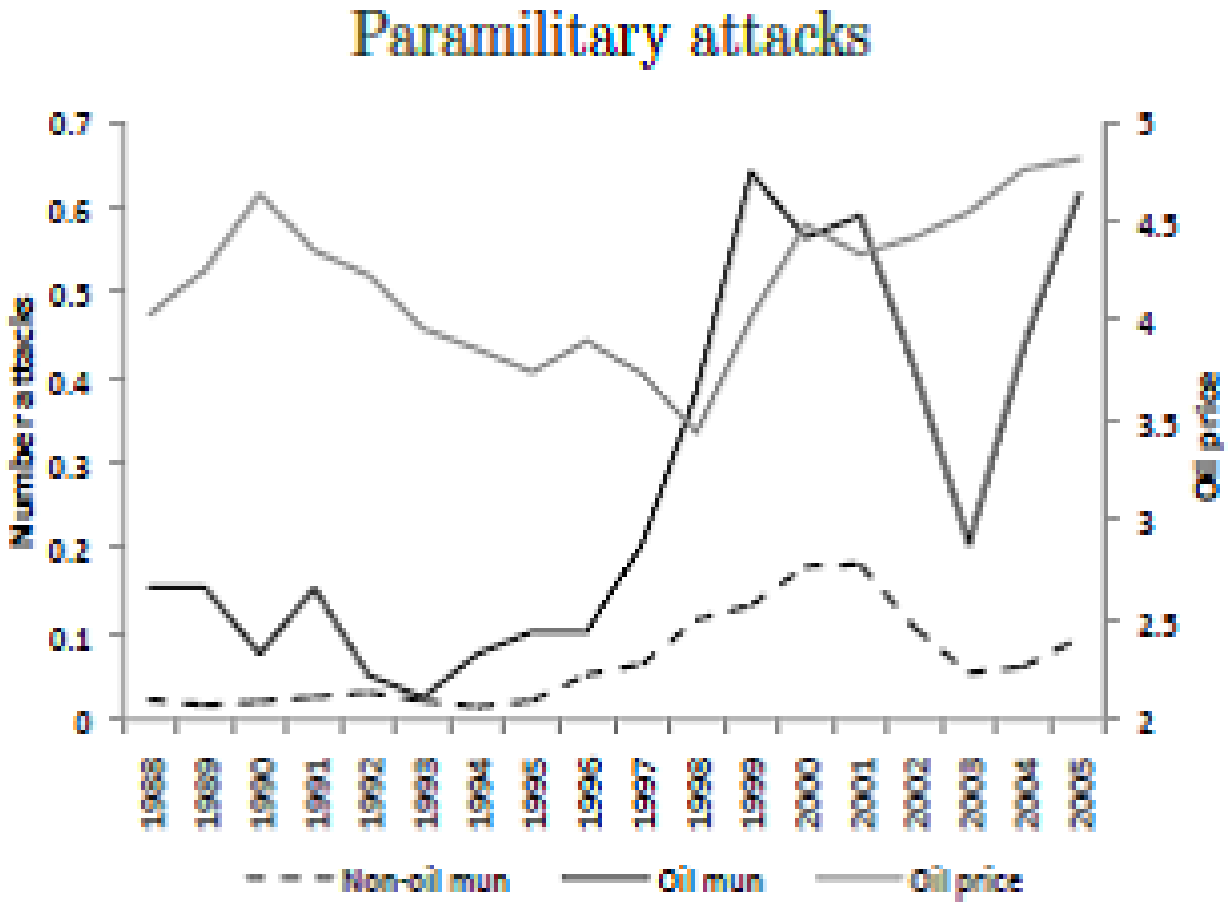
Results in Pictures: Coffee

Dube and Vargas (2013)



Results in Pictures: Oil

Dube and Vargas (2013)



Results in Numbers

Dube and Vargas (2013)

Table II

The Effect of the Coffee and Oil Shocks on Violence

Dependent variables:	(1) Guerrilla attacks	(2) Paramilitary attacks	(3) Clashes	(4) Casualties
Coffee int. x log coffee price	-0.611**	-0.160***	-0.712***	-1.828*
	(0.249)	(0.061)	(0.246)	(0.987)
Oil production x log oil price	0.700	0.726***	0.304	1.526
	(1.356)	(0.156)	(0.663)	(2.127)
Observations	17,604	17,604	17,604	17,604

Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effi of population, and linear trends by region and municipalities cultivating coca in 1994. The interaction of the internal coffee price with coffee inte instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rain temperature. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Roadmap: Commodity Price Shocks and Conflict

1. Learning about mechanisms
   (Bazzi & Blattman, 2014; Dube & Vargas, 2013)

2. **Vast heterogeneity and unpacking null results better data**
   (Berman & Couttenier, 2014; Berman et al, 2014)

3. NAFTA, the decline of maize, and drug violence in Mexico
   (Dube et al, 2014)

Salvaging the Cross-Country Approach with Better Data

Berman and Couttenier (2014)

- Observation unit: 0.5×0.5 degree latitude/longitude cells in sub-Saharan Africa, 1980–2006
- Granular geocoded conflict data: ACLED (II) and UCDP-GED
- More precise measures of exposure and duration of shocks
  - crop suitability and distance to ports
  - banking crises in trading partners

Refining the Measure of Shocks

1. World demand for agricultural output from cell c in country i

$$WD_{ct} = \sum_{p} \alpha_{pc} M^{W}_{(-i)pt}$$

where $M^{W}_{(-i)pt}$ is world import value of commodity p less i

- Measuring α: share of crop p in cell c
  - FAO Agro-Maps and -GAEZ suitability, M3-Crops (Monfreda et al, 2008)

2. Export-weighted exposure to banking crises

$$crisis\ exposure_{it} = \sum_{j} \overline{\left(\frac{export_{ij}}{export_{i}} \right)} \mathbf{1}(crisis_{jt})$$

- 1. transitory shock; 2. persistent shock (also consider AGOA)

Agricultural Commodity Demand Shocks Reduce Conflict

But, Shocks are Moderated by Proximity to Ports/Borders

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Conflict incidence		Conflict incidence		Conflict incidence	
Estimator	FE logit	FE-LPM	FE logit	FE-LPM	FE logit	FE-LPM
PANEL A						
ln agr. shock	-2.534^a	-0.044^a	-1.749^a	-0.003	-1.563^b	-0.020^b
	(0.628)	(0.012)	(0.583)	(0.012)	(0.675)	(0.009)
PANEL B						
ln agr. shock	-5.054^a	-0.234^a	-5.860^a	-0.106^b	-5.500^a	-0.263^a
	(1.079)	(0.062)	(1.551)	(0.043)	(1.604)	(0.072)
ln agr. shock × remoteness^1	0.495^a	0.031^a	0.758^a	0.017^a	0.676^a	0.039^a
	(0.153)	(0.009)	(0.225)	(0.006)	(0.243)	(0.011)
PANEL C						
ln agr. shock	-3.525^a	-0.100^a	-3.298^a	-0.040^a	-2.947^a	-0.072^a
	(0.567)	(0.024)	(0.872)	(0.014)	(0.880)	(0.025)
ln agr. shock × remoteness^2	2.660^a	0.101^a	2.769^a	0.068^a	2.705^a	0.089^a
	(0.495)	(0.026)	(0.794)	(0.017)	(0.972)	(0.031)
Sample	UCDP-GED		ACLED 1		ACLED 2	
Years	1989-2006	1989-2006	1989-2005	1989-2005	1997-2006	1997-2006
# of countries	39	45	12	12	41	44
Observations	27090	136026	6596	43435	14410	75520

Export Commodity Demand Shocks Reduce Conflict

But, Shocks are Moderated by Proximity to Ports/Borders

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Conflict incidence		Conflict incidence		Conflict incidence	
Estimator	FE logit	FE-LPM	FE logit	FE-LPM	FE logit	FE-LPM
PANEL A						
Exposure to crises	-0.534	-0.010	-0.372	-0.027[b]	1.846	0.039
	(0.507)	(0.011)	(1.030)	(0.011)	(1.465)	(0.035)
PANEL B						
Exposure to crises	6.376[a]	0.276[a]	10.766[a]	0.075	16.852[a]	0.783[a]
	(1.967)	(0.076)	(2.635)	(0.055)	(5.271)	(0.296)
Exp. to crises × remoteness[1]	-1.107[a]	-0.044[a]	-1.899[a]	-0.015[c]	-2.221[a]	-0.111[a]
	(0.319)	(0.012)	(0.521)	(0.008)	(0.770)	(0.041)
PANEL C						
Exposure to crises	1.895[a]	0.058[a]	1.559	-0.018	8.030[a]	0.186[b]
	(0.668)	(0.018)	(0.983)	(0.016)	(1.939)	(0.088)
Exp. to crises × remoteness[2]	-4.635[a]	-0.123[a]	-4.456[b]	-0.016	-9.783[a]	-0.259[b]
	(1.154)	(0.035)	(2.149)	(0.023)	(2.395)	(0.110)
Sample	UCDP-GED		ACLED 1		ACLED 2	
Years	1989-2006	1989-2006	1980-2005	1980-2005	1997-2006	1997-2006
# of countries	39	45	12	12	41	44
Observations	27126	137556	11128	66430	14420	76370

But, Results are Weak(er) at the Country Level...

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.	Incidence		Onset		Ending		Intens.
Source	UCDP-GED	PRIO	UCDP-GED	PRIO	UCDP-GED	PRIO	UCDP-GED
Estimator	FE-LPM		FE-LPM		FE-LPM		FE-LPM
PANEL A							
ln agr. com. shock	-0.160	0.098	-0.098	0.042	0.245[b]	-0.081	-44.577[a]
	(0.122)	(0.078)	(0.149)	(0.048)	(0.121)	(0.268)	(17.204)
Observations	774	774	443	733	509	122	774
PANEL B							
Exposure to crises	-0.115	0.012	0.065	0.039	0.123	0.146	-0.627
	(0.080)	(0.047)	(0.090)	(0.038)	(0.094)	(0.213)	(8.473)
Observations	1262	1262	930	1180	541	182	1262

But, Results are Weak(er) at the Country Level...

Due to Unmodeled Heterogeneity and Aggregation Bias

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.	Incidence		Intensity		Incidence		Intensity	
Condition	Country-level onset				Country-level onset			
Estimator	FE-LPM		FE-LPM		FE-LPM		FE-LPM	
ln agr. com. shock	0.016	-1.280[c]	0.221	-14.320				
	(0.069)	(0.772)	(0.379)	(11.607)				
ln agr. shock × ln dist. to closest port		0.184[c]		2.064				
		(0.105)		(1.657)				
Exposure to crises					0.508	1.153[b]	-0.385	1.219
					(0.392)	(0.502)	(2.649)	(2.701)
Exp. to crises × ln dist. to closest port						-0.097[b]		-0.242[b]
						(0.045)		(0.121)
Observations	3729	3729	3729	3729	3729	3729	3729	3729

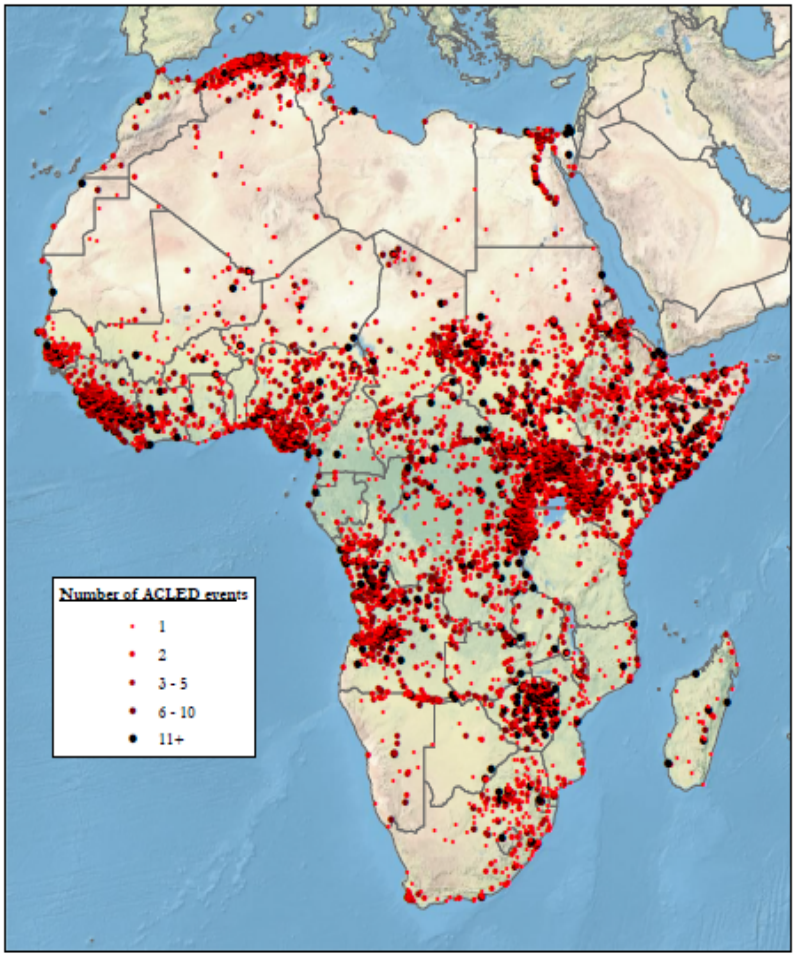
Unpacking Heterogeneity in Bazzi & Blattman (2014)

- Strong negative effect of shocks on local conflict
  - effect primarily on cells open to trade $\Longrightarrow$ null effects in aggregate cross-country
- external income shocks affect geography and intensity of ongoing conflict, but not necessarily onset
- evidence most supportive of opportunity cost mechanism
- but, agriculture less amenable to state prize/capacity mechanisms...

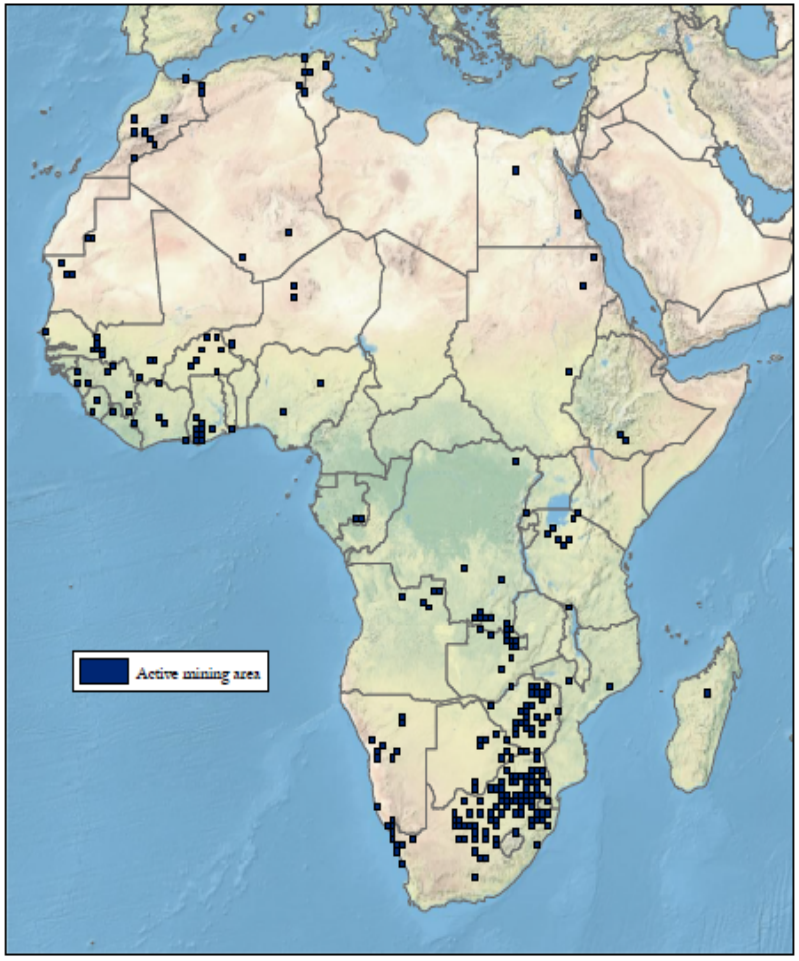
Berman, Couttenier, Rohner, and Thoenig (2014)

Mining Resources Analogue to Prior Paper

(a) ACLED data



(b) Mining areas (RMD)



- 700 mines 27 minerals, time-varying production 1997–2010 (*Raw Materials Database*)

Demanding Within-Cell Identification

Rising Prices $\Longrightarrow$ Rising Conflict

	(1)	(2)	(3)	(4)	(5)	(6)
Estimator	LPM		LPM		LPM	
Dep. var.	Conflict incidence		# conflicts		Conflict incidence	
Sample	All	$\text{Var}(M_{kt}) = 0$	All	$\text{Var}(M_{kt}) = 0$	All	$\text{Var}(M_{kt}) = 0$
mine > 0	0.055		0.043			
	(0.094)		(0.111)			
ln price main mineral	-0.029		-0.045^{c}		0.010	
	(0.019)		(0.024)		(0.012)	
ln price $\times$ mines > 0	0.093^{a}	0.073^{a}	0.148^{a}	0.099^{a}		
	(0.027)	(0.020)	(0.035)	(0.033)		
# mines					0.036^{b}	
					(0.015)	
ln price $\times$ # mines					0.017^{a}	0.004^{a}
					(0.004)	(0.001)
Observations	142817	141890	142817	141890	142926	141568
R^2	0.445	0.445	0.562	0.563	0.447	0.446
Country$\times$year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Cell FE	Yes	Yes	Yes	Yes	Yes	Yes

Spillovers Across Space

	(1)	(2)	(3)	(4)
Estimator	LPM		LPM	
Dep. var.	Conflict incidence		# conflicts	
Sample	All	$\text{Var}(M_{kt}) = 0$	All	$\text{Var}(M_{kt}) = 0$
mine > 0	0.056		0.040	
	(0.096)		(0.113)	
ln price main mineral	-0.041^{b}		-0.065^{b}	
	(0.019)		(0.026)	
ln price $\times$ mines > 0	0.094^{a}	0.059^{b}	0.152^{a}	0.087^{c}
	(0.028)	(0.026)	(0.034)	(0.048)
mine > 0 (neighboring cells)	-0.023		-0.037	
	(0.016)		(0.026)	
ln price $\times$ mine > 0 (neighbouring cells)	0.024^{a}	0.028^{a}	0.041^{b}	0.052^{a}
	(0.008)	(0.010)	(0.016)	(0.019)
Observations	134899	123466	134899	123466
R^2	0.442	0.440	0.554	0.557
Country$\times$year dummies	Yes	Yes	Yes	Yes
Cell FE	Yes	Yes	Yes	Yes

Key Takeaways

- Mineral price shocks explain 13-21% of average violence in sub-Saharan Africa over the sample period (!)
- Results are consistent with rich micro evidence on gold and coltan from DR-Congo (Sanchez de la Sierra, 2013)

$\Longrightarrow$ state prize mechanism may dominate in regions with weak states

- Also, spillovers evidence consistent with the feasibility mechanism

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3. **NAFTA, the decline of maize, and drug violence in Mexico**
   (Dube et al, 2014)

Dube, Garcia-Ponce, and Thom (2014)

- Explosion in drug trade and violence in Mexico since early 1990s
  $\Longrightarrow$ major economic costs and political upheaval

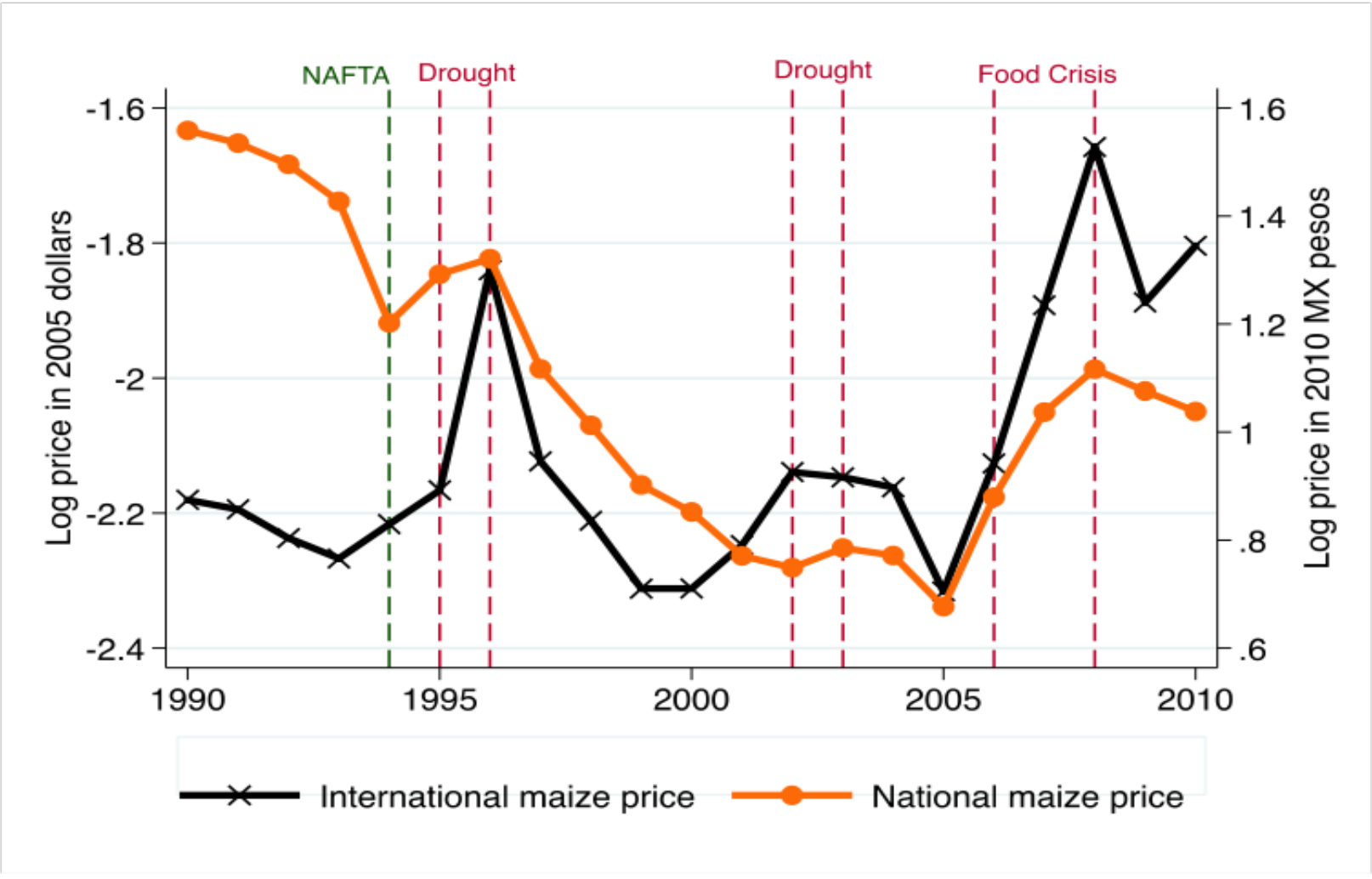
- Two major approaches to limiting drug production
  1. target and prosecute the cartels and traffickers
  2. raise the opportunity cost of growing drug crops in rural areas

- Did NAFTA cause the explosion in drug production and violence?

- Post-NAFTA, maize prices in Mexico collapsed and became susceptible to weather conditions in maize-growing states in the U.S. and exports from other major maize growers

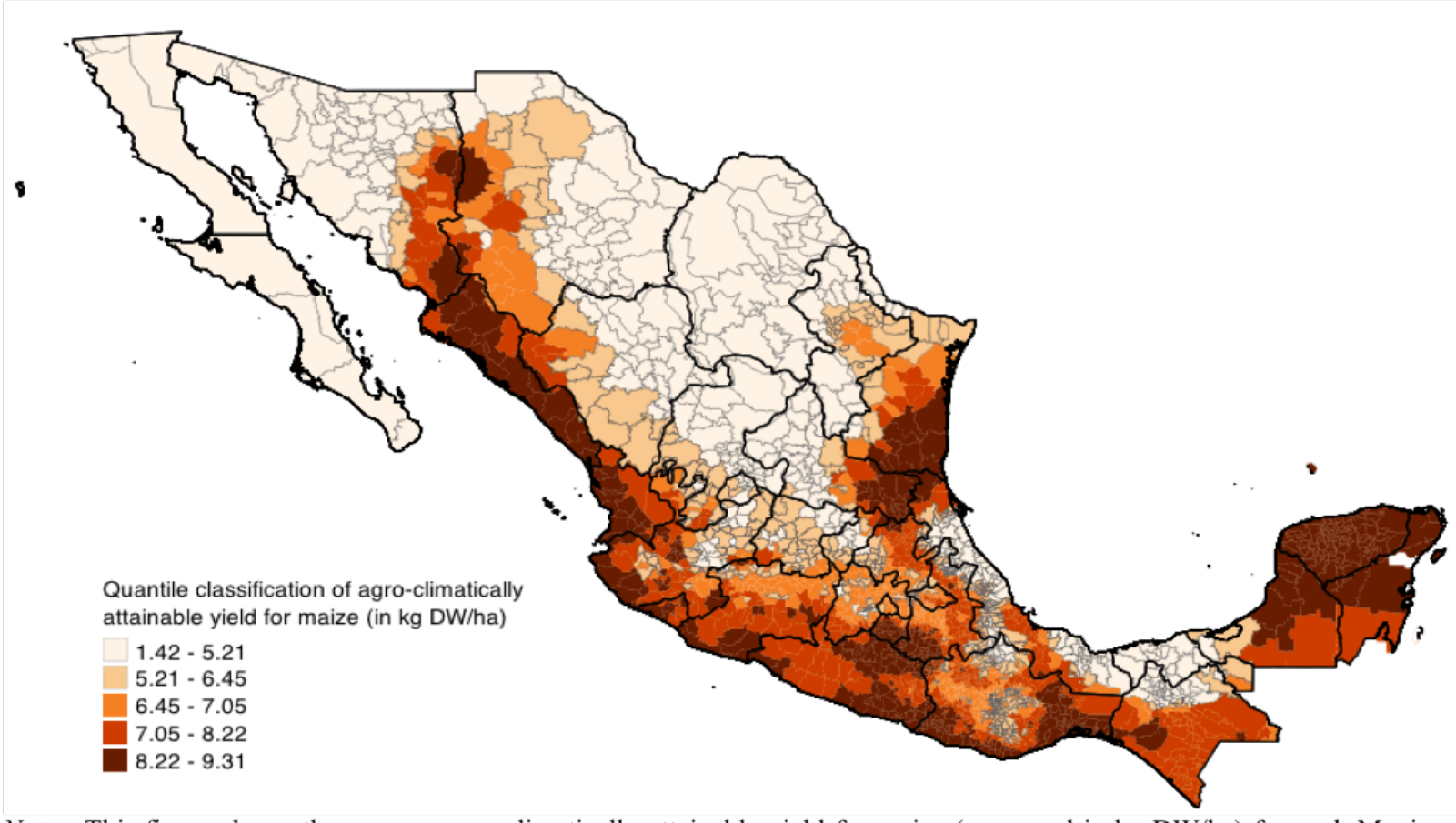
NAFTA and the Decline of Maize Fortunes

Figure 1: Maize Prices



Maize Suitability: Opportunity Costs

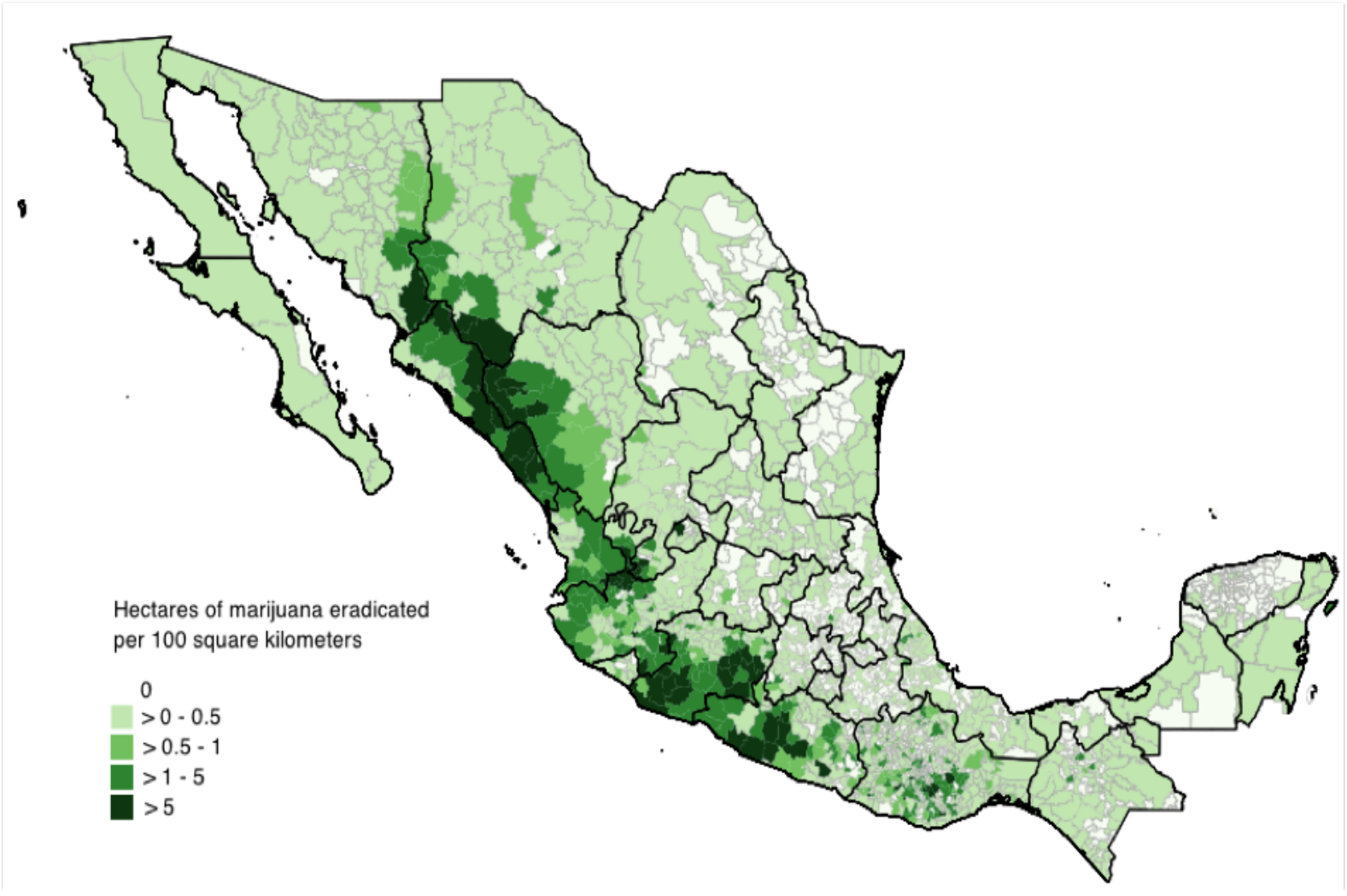
Figure 4: Maize Suitability



Notes: This figure shows the average agro-climatically attainable yield for maize (measured in kg DW/ha) for each Mexican municipio. This measure was constructed using 0.083-degree resolution data from the FAO's Global Agro-Ecological Zones (GAEZ v3.0). Darker colors denote higher suitability and potential yield for maize.

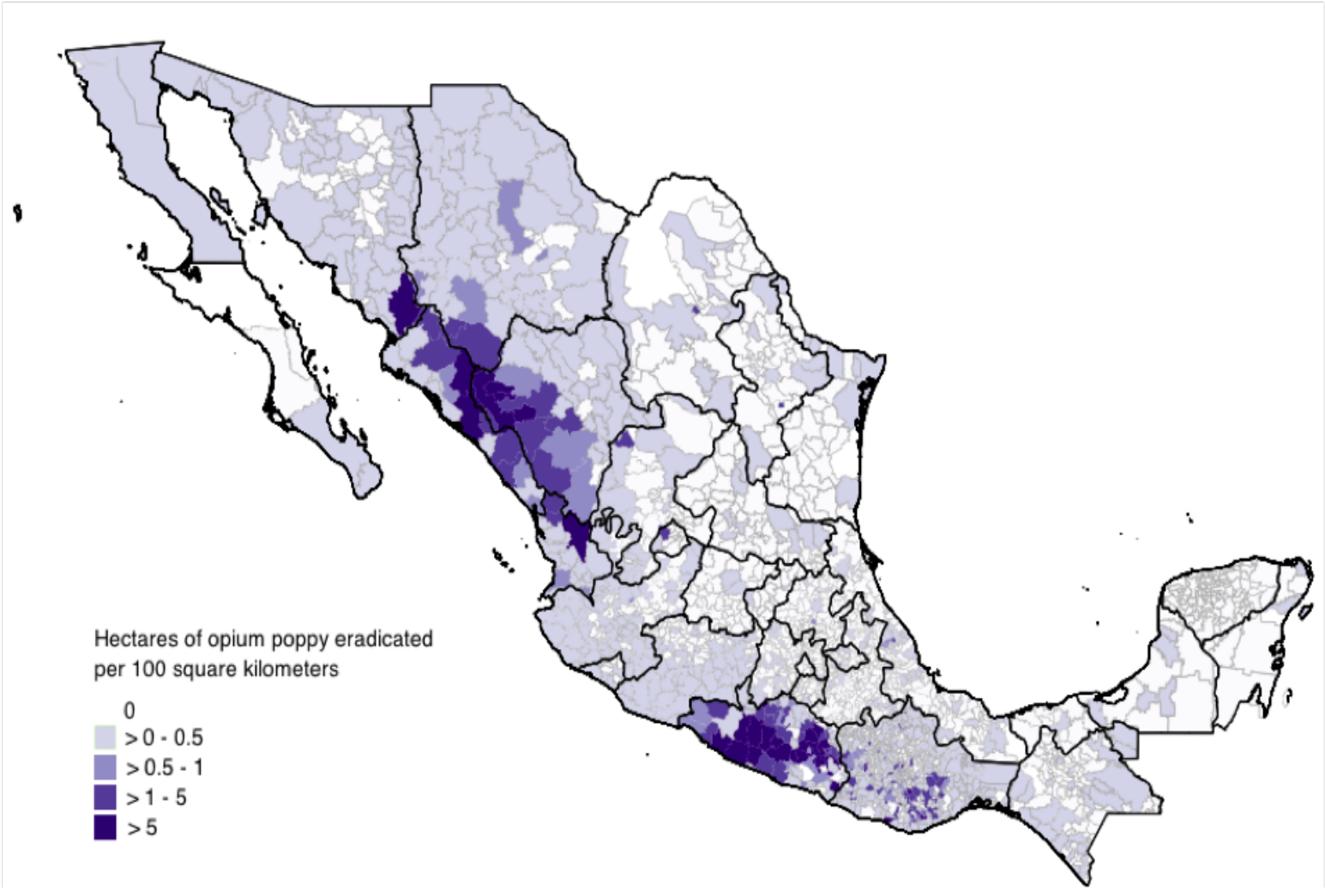
Marijuana Production

Panel A: ***Average Eradication of Marijuana in Mexican Municipios***



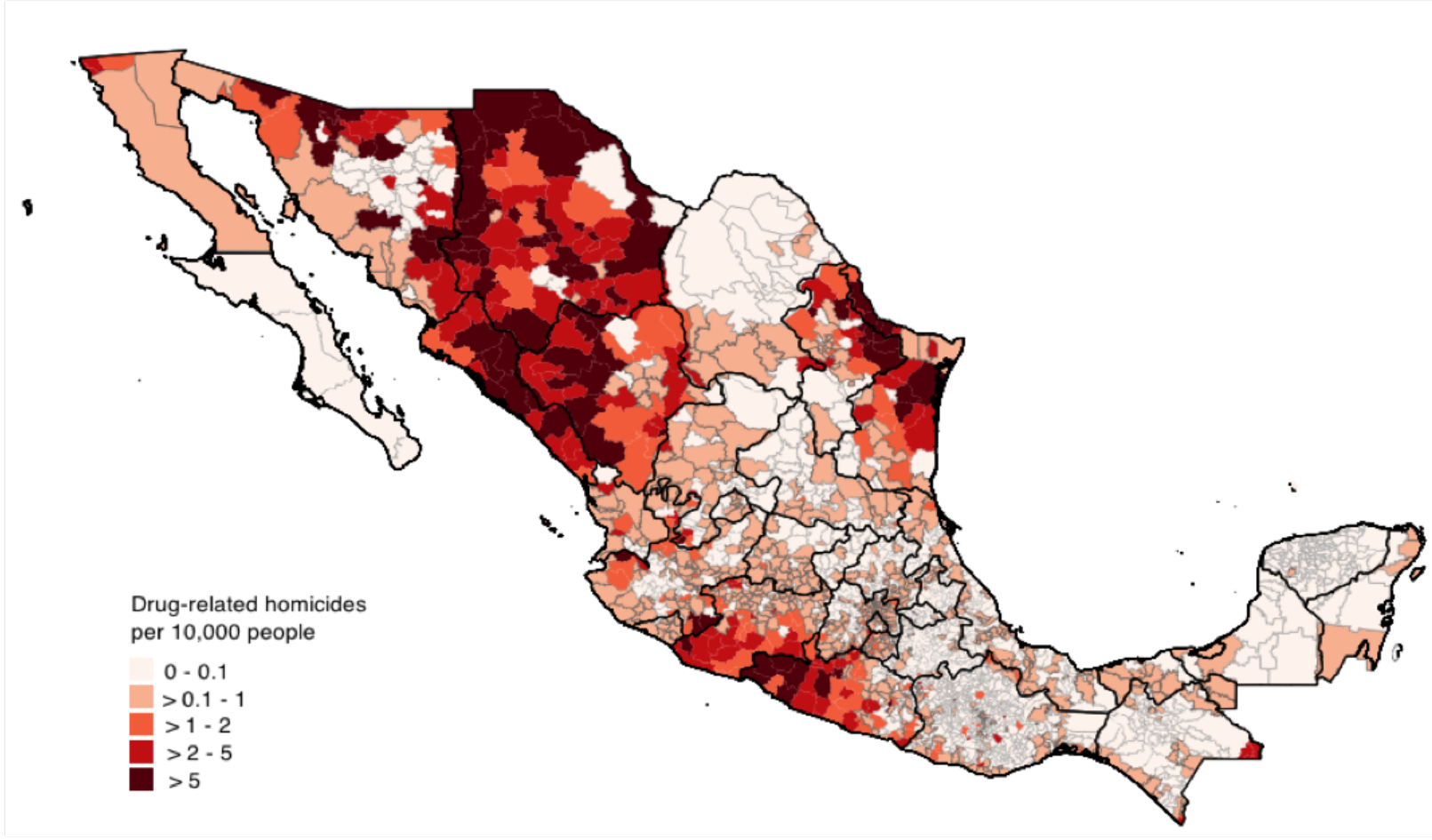
Poppy Production

Panel B: ***Average Eradication of Poppy in Mexican Municipios***



Drug Violence: Opportunity Costs, State as Prize, Feasibility

Figure 3: Drug-related Killings



Notes: This map shows the annual average of drug-related killings per 10,000 people in each Mexican municipios between 2007 and 2010. The data come from the Mexican National Security Council. Darker colors denote higher levels of drug-related killings.

Key Findings: Dube et al (2014)

59% drop in maize prices from 1990–2005 associated with...

- drop in rural wages
- increase in local poppy and marijuana eradication and seizures
- increase in local cartel presence and killings

with effects concentrated in areas suitable for growing maize

$\Longrightarrow$ support for opportunity costs (and state as prize)

... further work needed to quantify relative importance of NAFTA and fully disentangle mechanisms

Concluding Thoughts

- One-size-fits-all relationships remain elusive
  $\Longrightarrow$ general laws of price shocks and conflict unlikely

- Micro case studies help distinguish between competing mechanisms, and better data now allowing for cross-country approach to do same

- Future research should
  - continue to refine mechanisms with theory lens
  - explore policies for breaking link between commodities and conflict (e.g., redrawing administrative borders, Bazzi & Gudgeon, 2014)