

Trade Liberalization, Economic Activity, and Political Violence in the Global South: Evidence from PTAs

Francesco Amodio
McGill University

Leonardo Baccini
McGill University

Giorgio Chiovelli
Universidad de Montevideo

Michele Di Maio
Sapienza University of Rome

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Motivation

- Trade liberalization creates winners and losers (Autor et al., 2013; Atkin, 2016).
- In high-income countries: distributional tensions increase political polarization (Colantone and Stanig, 2017; Autor et al., 2020; Dippel et al. 2022).
- In low and middle-income countries: lack of evidence
 - Contrary to the prediction of standard trade models, globalization has not reduced inequality (Dix-Carneiro and Kovak, 2023)
 - Political institutions are typically fragile and the state is weak
 - The uneven gains from trade and the distributional conflict for their appropriation can trigger political violence

This paper

Research question:

- Impact of trade liberalization on Economic Activity and Political Violence in low and middle-income countries

Focus:

- All the 25 low and middle-income countries that signed a Preferential Trade Agreements (PTA) with a high-income country 1995-2013

How:

- *Localised measure of trade liberalization exposure* combining reduction in agricultural tariffs over time with cell-level crop suitability

Results:

- Economic Activity *and* Political Violence increase differentially more in areas more suitable to produce liberalized crops

Mechanisms:

- Political Violence increases in areas producing crops whose production process is less labor-intensive or that are (also) consumed locally.

Effects of international trade on internal conflict and political violence

- cross-country (Martin et al., 2008); Eastern Africa RTA (Mayer and Thoenig, 2016); West Bank (Amodio et al., 2021)

Economic conditions (prices) and conflict and political violence

- cross-country (Bruckner and Ciccone, 2010; Bazzi and Blattman, 2014)
- sub-national (Dube and Vargas, 2013; Berman et al., 2017)
 - differences across crops (McGuirk and Burke, 2020; Dincecco et al., 2022)

Our contributions:

- trade liberalization increases *both* economic activity and political violence
- sample of low and middle-income countries (external validity)
- political violence due to both producer- and consumer-side mechanisms
- focus on a policy tool on which governments have direct control

SAMPLE AND DATA

Sample and Data

Sample

- All 25 low and middle-income countries that signed a PTA with Australia, Canada, EU, Japan, South Korea, and USA (1995 to 2013)

[list countries](#)

[list PTAs](#)

Data

- Economic activity: Nightlights luminosity (DMSP-OLS dataset)
 - validation: nightlights as a proxy for (agricultural) economic activity [table](#)
- Political violence: (geo-localised) violent events (ICEWS dataset) [list](#) [des](#)
- Tariffs: crop-specific (*de jure*) preferential tariffs cut for each year of the implementation period (DESTA dataset)
- Crops:
 - suitability: 9 km × 9 km cell-level data for 42 crops (FAO-GAEZ dataset)
 - type: high vs low labor intensive (Talhelm and English, 2020); food vs cash crops (McGuirk and Burke, 2020)
- Area characteristics (urbanization, distance from border and coast, ruggedness, ethnic diversity, presence of diamonds and oil): various sources

EMPIRICAL STRATEGY

Empirical Strategy

We estimate the following:

$$Y_{it} = \gamma_i + \delta_t + \beta \text{Export Exposure}_{it} + u_{it}$$

- Y_{it} : outcome variable (Nightlights/No.Violent Events) for unit i at time t
- γ_i : fixed effects at the level of unit i (cell or county)
- δ_t : year fixed effect

Export Exposure _{it} for each area i at time t is: graph

$$\text{Export Exposure}_{it} = \sum_c \tau_{ct} S_{ic}$$

- τ_{ct} : proportional change in tariffs applied by the high-income country to the South country's imports of crop c between PTA signature year and year t .
- S_{ic} : suitability of area i to produce crop c (correlates w/ actual production table)

MAIN RESULTS

PTA, Economic Activity, and Political Violence: Cell-level Analysis

Trade liberalization increases Economic Activity

- Cell-level analysis (9 km x 9 km; 4,356,871 obs.) [specifications list](#) [table](#)
 - 1 SD increase in *EE* leads to 2 to 3% increase in *Nightlights*
 - Nightlights luminosity would have been around 2% lower in sample countries had the PTAs not been signed.

Trade liberalization increases Political Violence

- Cell-level analysis (9 km x 9 km; 4,356,871 obs.) [specifications list](#) [table](#)
 - 1 SD increase in *EE* leads to 0.1 to 0.3% increase in *Number violent events*
 - Number of violent events would have been around 7% lower in sample countries had the PTAs not been signed.

PTA, Economic Activity, and Political Violence: County-level Analysis

County-level (*level 2 sub-administrative units*) analysis:

- our cells are very small (9 km x 9 km): possible violation of SUTVA
- administrative units natural ones to study economic and political effects
- boundaries of administrative units not driven by data availability

Trade liberalization increases Economic Activity

- County-level analysis (GID 2; 197,676 obs.) [specifications list](#) [table](#)
 - 1 SD increase in *EE* leads to a 6 to 9% increase in *Nightlights*

Trade liberalization increases Political Violence

- County-level analysis (GID 2; 197,676 obs.) [specifications list](#) [table](#)
 - 1 SD increase in *EE* leads to a 4 to 5% increase in *Number of violent events*

Checks on the effect of *Export Exposure* on *Nightlights* and *Political Violence*

- Outcome variables as dummy
- Conley standard errors
- Lags and leads

- Alternative data sources and definitions of *Political Violence*
 - SCAD dataset (protests, riots, strikes, inter-communal conflict, government violence against civilians, other forms of social conflict) [table](#)
 - other definitions using ICEWS (hostile, high hostile, very high hostile) [table](#)

Heterogeneity

We consider various determinants of political violence as possible mediators of the impact of trade liberalization

- urbanization
- remoteness (distance from border and coast, ruggedness)
- presence of natural resources (oil and diamonds)
- ethnic diversity

The effect of trade liberalization on political violence: [table](#)

- larger in urban areas (and for areas close to the coast)
- non significant for all other determinants

MECHANISMS

Our main finding:

Trade liberalization increases Political Violence in areas more suitable to produce liberalized crops, and it does so differentially in more urbanized areas.

Two mechanisms (hinging on crop heterogeneity):

- Crop Labor Intensity
- Food vs Cash Crops

Mechanism: Crop Labor Intensity

The effect of trade liberalization on political violence depends on the importance of labor input in production (Dal Bo and Dal Bo, 2011).

We expect trade liberalization of less labor-intensive crops to increase political violence differentially more

Two measures of $Export\ Exposure_{it}$: 1) only including low-labor intensive crops; 2) only including high-labor intensive crops (PNAS, 2020)

Results:

- Political Violence increases only in areas suitable to produce low labor-intensive crops [table](#)
 - *Interpretation*: Effect is localized in areas in which the asymmetry in the gains from trade between workers vs. land and capital owners is larger
- Political Violence increases only in more urbanized counties [table](#)
 - *Interpretation*: Effect is localized in areas where the share of population benefiting from agricultural trade liberalization is smaller

Mechanism: Food vs Cash Crops

The effect of trade liberalization on political violence is different whether liberalized crops are consumed locally or not (McGuirk and Burke, 2020)

We expect the effect to be larger in counties producing crops consumed locally because trade-induced increase in their prices reduces real income

Two measures of *Export Exposure_{it}*: 1) only including Food Crops ; 2) only including Cash Crops (McGuirk and Burke, 2020)

Results:

- Political Violence increases (decreases) in areas producing crops mostly consumed locally (elsewhere) [table](#)
 - *Interpretation*: Opportunity cost mechanism: the reduction in real income due to the price increases more than offsets the gains from trade
- Political Violence increases only in more urbanized counties [table](#)
 - *Interpretation*: Effect is localized in areas where the share of population benefiting from trade is smaller

CONCLUSIONS

Conclusions

Agricultural trade liberalization is both a boon and a curse

It brings about economic growth but is also increase political violence

- *Nightlights Luminosity and Number of Conflict Events* would have been 2% and 7% lower in sample countries had the PTA non been signed

Mechanism: struggle for redistribution of the gains from trade between land and capital owners vs. agricultural workers and consumers of liberalized crops

Policy implications:

- complementing trade liberalization with policies that can address potentially destabilizing imbalances of its distributional effects
- policies should target areas in which agricultural production is less labor-intensive and the share of the urban population is large

TABLES

| | Economic Activity | | | | | | |
|-------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Export Exposure | 0.017*** (0.006) | 0.027*** (0.005) | 0.025*** (0.005) | 0.025*** (0.005) | 0.024*** (0.005) | 0.024*** (0.004) | 0.017*** (0.003) |
| Cell FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No | No | No |
| Country-specific trends | No | No | Yes | No | No | No | No |
| Country-specific flex. trends | No | No | No | Yes | No | No | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes | Yes | Yes |
| Spatial lags | No | No | No | No | No | Yes | Yes |
| Cell specific char. x linear trends | No | No | No | No | No | No | Yes |
| Observations | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,178,252 |
| R-squared | 0.895 | 0.898 | 0.896 | 0.897 | 0.897 | 0.897 | 0.898 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the FAO-GAEZ cell. Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of night-time luminosity. Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units. In column 6, we include spatial lags to account for spillover effects within larger 110km x 110km cells. In column 7, we include a rich set of (time-invariant) geographic and other controls that include elevation, ruggedness of terrain, share of area covered by water, precipitation, temperature, distance from the border and the coast, and the number of ethnic groups, and interact them with linear trends.

$Export\ Exposure_{it}$ is rescaled (its estimated value is divided by its SD)
 β captures the effect of a one SD increase.

Export Exposure and Political Violence at Cell Level back

| | Political Violence | | | | | | |
|-------------------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Export Exposure | 0.002** (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.003*** (0.001) | 0.002*** (0.001) | 0.003*** (0.001) | 0.001*** (0.001) |
| Cell FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No | No | No |
| Country-specific trends | No | No | Yes | No | No | No | No |
| Country-specific flex. trends | No | No | No | Yes | No | No | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes | Yes | Yes |
| Spatial lags | No | No | No | No | No | Yes | No |
| Cell specific char. x linear trends | No | No | No | No | No | No | Yes |
| Observations | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,356,871 | 4,178,252 |
| R-squared | 0.580 | 0.584 | 0.583 | 0.583 | 0.583 | 0.583 | 0.582 |

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The unit of observation is the FAO-GAEZ cell. Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of political violence (i.e., the number of hostile and violent events in ICEWS). Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units. In column 6, we include spatial lags to account for spillover effects within larger 110km x 110km cells. In column 7, we include a rich set of (time-invariant) geographic and other controls that include elevation, ruggedness of terrain, share of area covered by water, precipitation, temperature, distance from the border and the coast, and the number of ethnic groups, and interact them with linear trends.

| | Economic Activity | | | | |
|----------------------------------|---------------------|--------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Export Exposure | 0.070*** (0.025) | 0.067** (0.029) | 0.089*** (0.031) | 0.075*** (0.029) | 0.076*** (0.029) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.931 | 0.938 | 0.934 | 0.935 | 0.936 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of night-time luminosity. Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.

Export Exposure and Political Violence at County Level [back](#)

| | Political Violence | | | | |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Export Exposure | 0.133*** (0.033) | 0.041*** (0.014) | 0.054*** (0.016) | 0.047*** (0.016) | 0.037*** (0.014) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.663 | 0.716 | 0.701 | 0.703 | 0.704 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of political violence (i.e., the number of hostile and violent events in ICEWS). Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.

| | Political Violence | | | | |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| EE – Low Labour Intensity Crops | 0.287*** (0.046) | 0.089*** (0.027) | 0.121*** (0.028) | 0.092*** (0.026) | 0.081*** (0.025) |
| EE – High Labour Intensity Crops | -0.020 (0.015) | 0.014 (0.012) | 0.013 (0.012) | 0.009 (0.012) | 0.011 (0.012) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.669 | 0.716 | 0.702 | 0.703 | 0.705 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. This is calculated separately for low and high labour intensity crops (Talhelm and English 2020). The former include barley, buckwheat, foxtail millet, maize, oat, pearl millet, rye, sorghum, and wheat, while the latter includes (wetland and dryland) rice. The dependent variable is the log of political violence (i.e., the number of hostile and violent events in ICEWS). Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.

| | Political Violence | | | | |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| EE – Low Labour Intensity Crops | 0.268*** (0.032) | 0.012 (0.026) | 0.058*** (0.021) | 0.022 (0.025) | 0.005 (0.025) |
| EE – Low Labour Intensity Crops × Urban | 0.028 (0.071) | 0.108*** (0.034) | 0.090** (0.039) | 0.099*** (0.034) | 0.106*** (0.033) |
| EE – High Labour Intensity Crops | -0.017 (0.016) | 0.013 (0.013) | 0.011 (0.013) | 0.008 (0.013) | 0.010 (0.013) |
| EE – High Labour Intensity Crops × Urban | -0.015 (0.032) | 0.033* (0.020) | 0.029 (0.020) | 0.023 (0.020) | 0.025 (0.020) |
| County FE | | | | | |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.669 | 0.717 | 0.702 | 0.703 | 0.705 |

Notes>(* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain by combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. This is calculated separately for low and high labour intensity crops (Talhelm and English 2020). Urban is a dummy equal to one if the share of urban land in the county is above the median at the country level.

| | Political Violence | | | | |
|----------------------------------|----------------------|---------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) |
| EE – Food Crops | 0.275*** (0.086) | 0.103** (0.042) | 0.174*** (0.049) | 0.135*** (0.045) | 0.157*** (0.047) |
| EE – Cash Crops | -0.193*** (0.055) | -0.068** (0.030) | -0.136*** (0.032) | -0.106*** (0.032) | -0.133*** (0.034) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.663 | 0.716 | 0.701 | 0.703 | 0.705 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. This is calculated separately for food and cash crops (McGuirk and Burke 2020). The former include maize, oil palm, dryland rice and wetland rice, sorghum, soybean, sugar beet and sugar cane, wheat and buckwheat, while the latter includes cocoa, coffee, tea and tobacco. The dependent variable is the log of political violence (i.e., the number of hostile and violent events in ICEWS). Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.

| | Political Violence | | | | |
|----------------------------------|----------------------|---------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) |
| EE – Food Crops | 0.145*** (0.050) | 0.058* (0.035) | 0.092*** (0.035) | 0.070* (0.037) | 0.084** (0.038) |
| EE – Food Crops × Urban | 0.663*** (0.154) | 0.331*** (0.088) | 0.423*** (0.093) | 0.386*** (0.087) | 0.411*** (0.089) |
| EE – Cash Crops | -0.131*** (0.044) | -0.052* (0.031) | -0.087*** (0.031) | -0.068** (0.034) | -0.086** (0.036) |
| EE – Cash Crops × Urban | -0.276** (0.113) | -0.139** (0.066) | -0.207*** (0.068) | -0.190*** (0.065) | -0.219*** (0.068) |
| County FE | | | | | |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.664 | 0.716 | 0.702 | 0.703 | 0.705 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. This is calculated separately for food and cash crops (McGuirk and Burke 2020). Urban is a dummy equal to one if the share of urban land in the county is above the median at the country level.

EXTRA SLIDES

Countries and Preferential Trade Agreements (PTAs)

| No. | South Country | PTA | No. | South Country | PTA |
|-----|--------------------|------------------------------------|-----|---------------|------------------------------------|
| 1 | Algeria | Algeria-EU (2002) | 17 | Mexico | Mexico EU (2000) |
| 2 | Cambodia | ASEAN Japan (2008) | | | Mexico Japan (2004) |
| | | ASEAN Australia New Zealand (2009) | 18 | Morocco | Morocco EU (1996) |
| 3 | Colombia | Colombia USA (2006) | | | Morocco US (2004) |
| | | Colombia Canada (2008) | 19 | Myanmar | ASEAN Japan (2008) |
| 4 | Costa Rica | Costa Rica Canada (2001) | | | ASEAN Australia New Zealand (2009) |
| | | CAFTA DR USA (2004) | 20 | Panama | Panama US (2007) |
| 5 | Dominican Republic | CAFTA DR USA (2004) | | | Panama Canada (2010) |
| 6 | Egypt | Egypt-EU (2001) | 21 | Peru | Peru US (2006) |
| 7 | El Salvador | CAFTA DR USA (2004) | | | Peru Canada (2008) |
| 8 | Guatemala | CAFTA DR USA (2004) | | | Peru Japan (2011) |
| 9 | Honduras | CAFTA DR USA (2004) | 22 | Philippines | Philippines Japan (2006) |
| | | Honduras Canada (2013) | | | ASEAN Japan (2008) |
| 10 | Nicaragua | CAFTA DR USA (2004) | | | ASEAN Australia New Zealand (2009) |
| 11 | India | India Japan (2011) | 23 | South Africa | South Africa EU (1999) |
| 12 | Indonesia | Indonesia Japan (2007) | 24 | Thailand | Thailand Australia (2004) |
| | | ASEAN Japan (2008) | | | Thailand Japan (2007) |
| | | ASEAN Australia New Zealand (2009) | | | ASEAN Japan (2008) |
| 13 | Jordan | Jordan US (2000) | | | ASEAN Australia New Zealand (2009) |
| | | Jordan EU (1997) | 25 | Tunisia | Tunisia EU (1995) |
| | | Jordan Canada (2009) | 26 | Turkey | Turkey EU (1995) |
| 14 | Laos | ASEAN Japan (2008) | 27 | Vietnam | Vietnam US (2000) |
| | | ASEAN Australia New Zealand (2009) | | | Vietnam Japan (2008) |
| 15 | Lebanon | Lebanon EU (2002) | | | ASEAN Japan (2008) |
| 16 | Malaysia | Malaysia Japan (2005) | | | ASEAN Australia New Zealand (2009) |
| | | ASEAN Japan (2008) | | | |
| | | ASEAN Australia New Zealand (2009) | | | |
| | | Malaysia Australia (2012) | | | |

| Country |
|--------------------|
| Algeria |
| Cambodia |
| Colombia |
| Costa Rica |
| Dominican Republic |
| Egypt |
| El Salvador |
| Guatemala |
| Honduras |
| India |
| Indonesia |
| Jordan |
| Laos |
| Lebanon |
| Malaysia |
| Mexico |
| Morocco |
| Myanmar |
| Nicaragua |
| Panama |
| Peru |
| Philippines |
| South Africa |
| Thailand |
| Vietnam |

Notes. The table reports the countries included in the analysis.

Luminosity by Country

| Country | Mean | St. Dev. | Min | Max |
|--------------------|-------|----------|-----|-----|
| Algeria | 0.63 | 3.73 | 0 | 63 |
| Cambodia | 0.15 | 1.81 | 0 | 63 |
| Colombia | 0.99 | 4.60 | 0 | 63 |
| Costa Rica | 3.39 | 7.18 | 0 | 63 |
| Dominican Republic | 3.42 | 8.36 | 0 | 63 |
| Egypt | 2.13 | 8.64 | 0 | 63 |
| El Salvador | 4.63 | 7.86 | 0 | 63 |
| Guatemala | 1.85 | 5.63 | 0 | 63 |
| Honduras | 1.28 | 4.71 | 0 | 63 |
| India | 3.54 | 6.56 | 0 | 63 |
| Indonesia | 0.92 | 4.12 | 0 | 63 |
| Jordan | 2.63 | 8.41 | 0 | 63 |
| Laos | 0.12 | 1.68 | 0 | 63 |
| Lebanon | 17.42 | 16.24 | 0 | 63 |
| Malaysia | 2.86 | 8.69 | 0 | 63 |
| Mexico | 2.23 | 7.09 | 0 | 63 |
| Morocco | 1.23 | 5.11 | 0 | 63 |
| Myanmar | 0.21 | 1.96 | 0 | 63 |
| Nicaragua | 0.50 | 3.24 | 0 | 63 |
| Panama | 1.18 | 5.17 | 0 | 63 |
| Peru | 0.38 | 2.93 | 0 | 63 |
| Philippines | 1.21 | 4.92 | 0 | 63 |
| South Africa | 1.42 | 6.06 | 0 | 63 |
| Thailand | 3.16 | 8.09 | 0 | 63 |
| Vietnam | 2.05 | 6.03 | 0 | 63 |

Notes. The table reports summary statistics of the night-time luminosity variable by country and across FAO-GAEZ cells.

- Abduct, hijack, or take hostage
- Arrest, detain, or charge with legal action
- Assassinate
- Attempt to assassinate
- Carry out car bombing
- Carry out roadside bombing
- Carry out suicide bombing
- Coerce
- Conduct suicide, car, or other non-military bombing
- Demonstrate military or police power
- Destroy property
- Employ aerial weapons
- Engage in ethnic cleansing
- Engage in mass expulsion
- Engage in mass killings
- Engage in violent protest for leadership change
- Expel or deport individuals
- Expel or withdraw
- Expel or withdraw peacekeepers
- Fight with artillery and tanks
- Fight with small arms and light weapons
- Kill by physical assault
- Mobilize or increase armed forces
- Mobilize or increase police power
- Physically assault
- Protest violently, riot
- Seize or damage property
- Sexually assault
- Torture
- Use chemical, biological, or radiological weapons
- Use conventional military force
- Use tactics of violent repression
- Use unconventional violence

Descriptive Statistics of Violence by Country - ICEWS dataset [back](#)

| Country | Mean | St. Dev. | Min | Max |
|--------------------|------|----------|-----|-------|
| Algeria | 0.01 | 1.01 | 0 | 294 |
| Cambodia | 0.08 | 2.88 | 0 | 254 |
| Colombia | 0.07 | 4.98 | 0 | 987 |
| Costa Rica | 0.09 | 1.64 | 0 | 80 |
| Dominican Republic | 0.05 | 0.86 | 0 | 35 |
| Egypt | 0.07 | 10.14 | 0 | 3,502 |
| El Salvador | 0.15 | 2.50 | 0 | 99 |
| Guatemala | 0.07 | 2.11 | 0 | 126 |
| Honduras | 0.05 | 2.09 | 0 | 289 |
| India | 0.17 | 7.28 | 0 | 2,090 |
| Indonesia | 0.05 | 3.88 | 0 | 1,054 |
| Jordan | 0.10 | 3.27 | 0 | 213 |
| Laos | 0.00 | 0.29 | 0 | 44 |
| Lebanon | 4.65 | 52.90 | 0 | 2,262 |
| Malaysia | 0.09 | 3.46 | 0 | 395 |
| Mexico | 0.04 | 2.56 | 0 | 727 |
| Morocco | 0.02 | 0.75 | 0 | 111 |
| Myanmar | 0.02 | 1.12 | 0 | 194 |
| Nicaragua | 0.03 | 1.06 | 0 | 103 |
| Panama | 0.03 | 0.88 | 0 | 58 |
| Peru | 0.02 | 1.67 | 0 | 637 |
| Philippines | 0.29 | 7.96 | 0 | 816 |
| South Africa | 0.06 | 1.84 | 0 | 300 |
| Thailand | 0.16 | 11.68 | 0 | 2,947 |
| Vietnam | 0.03 | 1.39 | 0 | 142 |

Notes. The table reports summary statistics of the political violence variable (i.e., the number of hostile and violent events in ICEWS) by country and across FAO-GAEZ cells.

| | (Log) Night-time Luminosity | | | | All |
|------------------------|-----------------------------|---------------------|---------------------|---------------------|---------------------|
| | 2000 | | 2010 | | |
| | (1) | (2) | (3) | (4) | |
| (Log) Production Value | 0.101*** (0.000) | 0.109*** (0.001) | 0.124*** (0.001) | 0.131*** (0.001) | 0.094*** (0.002) |
| Country FE | No | Yes | No | Yes | n.a. |
| Cell FE | No | No | No | No | Yes |
| Observations | 229,309 | 229,309 | 229,309 | 229,309 | 458,618 |
| R-squared | 0.168 | 0.255 | 0.184 | 0.264 | 0.925 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the FAO-GAEZ cell. Standard errors in parenthesis, clustered at the same level. The dependent variable is the log of night-time luminosity. The main independent variable is the log of agricultural production value from FAO-GAEZ. Crop production value is expressed in Geary Kharmis dollars (GK), i.e. an international price weight (year 2000), used by UN, to compare different commodities in value terms.

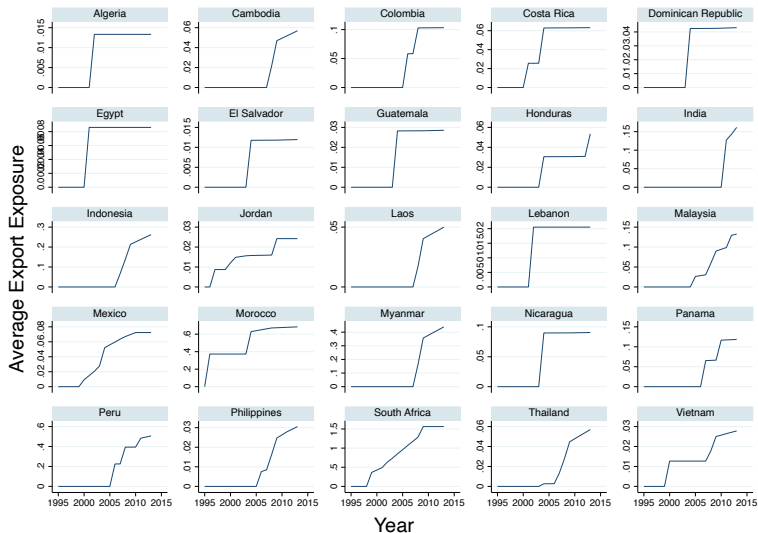
Suitability and Total Agricultural Production [back](#)

| | (Log) Total Production | | | | |
|-------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| | 2000 | | 2010 | | All |
| | (1) | (2) | (3) | (4) | (5) |
| (Log) Suitability | 0.144*** (0.000) | 0.130*** (0.000) | 0.153*** (0.000) | 0.135*** (0.000) | 0.141*** (0.000) |
| Crop FE | Yes | Yes | Yes | Yes | Yes |
| Country FE | No | Yes | No | Yes | n.a. |
| Cell FE | No | No | No | No | Yes |
| Observations | 4,127,562 | 4,127,562 | 4,127,562 | 4,127,562 | 8,255,124 |
| R-squared | 0.391 | 0.443 | 0.399 | 0.455 | 0.523 |

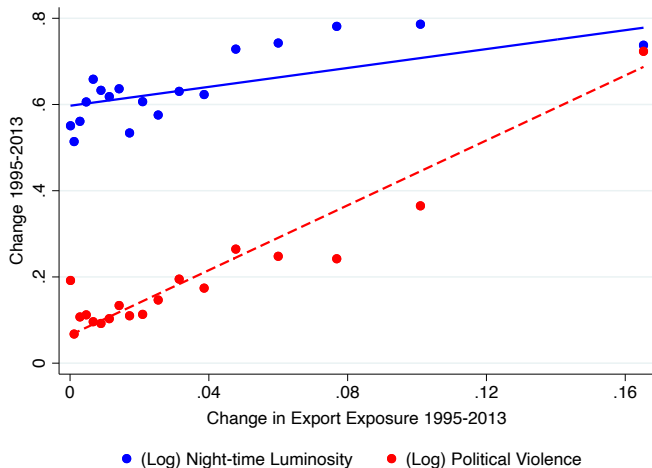
Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the FAO-GAEZ crop × cell. Standard errors in parenthesis, clustered at the cell level. The dependent variable is the log of produced yields (in tons) from FAO-GAEZ. The main independent variable is the log of suitability and thus potential yields estimated at the same level. Because we have multiple observations (one per crop) for each cell and year, in column 5 we can include both crop and cell fixed effects.

Export Exposure by Country Over Time

[back](#)



Notes. The figure shows the average value of Export Exposure across FAO-GAEZ cells within countries over time. Export Exposure begins to take positive values at the time of PTA signature, and only if and only if any agricultural crop experiences any tariff cut and any cell in the country is suitable to produce it.



Notes. Figure shows the relationship between the change in export exposure between the first and the last year in our sample (between 1995 and 2013), and the change in economic activity and political violence across all counties in our sample. It reports the average change in each of the two variables by bins (ventiles) of the change in export exposure, together with the linear fit.

Empirical Strategy: Alternative Specifications for the Cell-level Regression

back

1. BASELINE
2. Country-year fixed effects (fully flexible trends)
3. Country-specific linear trends
4. Country-specific flexible trends, i.e. every country has its own trend in the years prior to signature, a jump in year of signature, and another linear trend in the years after
5. Flexible trends which are different within country between treated ($Export\ Exposure_{it} > 0$ at any point) and non-treated cells
6. Include spatial lag: average exposure in all other cells within one degree latitude/one degree longitude from the given cell
7. Include interaction between cell-specific characteristics and linear trends

Empirical Strategy: Alternative Specifications for the County-level Regression

back

1. BASELINE
2. Country-year fixed effects (fully flexible trends)
3. Country-specific linear trends
4. Country-specific flexible trends, i.e. every country has its own trend in the years prior to signature, a jump in year of signature, and another linear trend in the years after
5. Flexible trends which are different within country between treated ($Export Exposure_{it} > 0$ at any point) and non-treated counties

| | Political Violence | | | | |
|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Export Exposure | -0.008 (0.016) | 0.060** (0.025) | 0.057** (0.024) | 0.047** (0.023) | 0.065** (0.025) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 84,664 | 84,664 | 84,664 | 84,664 | 84,664 |
| R-squared | 0.324 | 0.350 | 0.332 | 0.333 | 0.336 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of political violence, now measured as the number events in SCAD. Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.

Export Exposure and Political Violence: Alternative Measures using ICEWS data

[back](#)

| | (1) | (2) | (3) | (4) | (5) |
|----------------------------------|-------------------------------|--------------------|---------------------|---------------------|--------------------|
| | All Hostile Events | | | | |
| Export Exposure | 0.134*** (0.034) | 0.048** (0.020) | 0.057*** (0.021) | 0.056*** (0.021) | 0.046** (0.020) |
| | Events of High Hostility | | | | |
| Export Exposure | 0.128*** (0.035) | 0.038** (0.018) | 0.049*** (0.019) | 0.045** (0.019) | 0.035** (0.018) |
| | Events of Very High Hostility | | | | |
| Export Exposure | 0.046*** (0.016) | 0.016 (0.011) | 0.016 (0.011) | 0.016 (0.012) | 0.013 (0.011) |
| County FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |

Notes. (* p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t . The dependent variable is the log of political violence measured in different ways. In the top panel we consider all (violent and non-violent) events classified as hostile, meaning with intensity lower than or equal to -1. In the mid panel, we count only high hostility events, i.e. with intensity lower than or equal to -5. In the bottom panel, we consider only very high hostility events, meaning those with intensity equal to -10.

Export Exposure and Political Violence: Heterogeneity back

| | Political Violence | | | | |
|----------------------------------|----------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Export Exposure | 0.260* (0.146) | 0.119 (0.089) | 0.143 (0.097) | 0.134 (0.093) | 0.114 (0.086) |
| × Urban | 0.172*** (0.056) | 0.110*** (0.035) | 0.119*** (0.037) | 0.110*** (0.036) | 0.106*** (0.034) |
| × Far from Border | 0.017 (0.042) | 0.014 (0.026) | 0.020 (0.028) | 0.013 (0.027) | 0.012 (0.026) |
| × Far from Coast | -0.201* (0.110) | -0.135** (0.068) | -0.139* (0.074) | -0.141** (0.071) | -0.130* (0.066) |
| × Rugged | 0.062 (0.111) | -0.036 (0.062) | -0.018 (0.069) | -0.023 (0.067) | -0.035 (0.061) |
| × High in Diamonds | 0.129 (0.105) | -0.075 (0.064) | -0.077 (0.068) | -0.032 (0.071) | -0.082 (0.064) |
| × High in Petrol | -0.177*** (0.053) | -0.031 (0.037) | -0.058 (0.038) | -0.047 (0.037) | -0.033 (0.036) |
| × Ethnically Diverse | 0.086 (0.058) | 0.046 (0.032) | 0.047 (0.035) | 0.048 (0.034) | 0.045 (0.032) |
| Country FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | No | Yes | No | No | No |
| Country-specific trends | No | No | Yes | No | No |
| Country-specific flex. trends | No | No | No | Yes | No |
| Country-spec. trends (tr/non-tr) | No | No | No | No | Yes |
| Observations | 197,676 | 197,676 | 197,676 | 197,676 | 197,676 |
| R-squared | 0.665 | 0.716 | 0.702 | 0.703 | 0.705 |

Notes>(* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The unit of observation is the county (level 2 administrative unit). Standard errors in parenthesis, clustered at the same level. Export Exposure is the PTA-driven export exposure of spatial unit i in year t that we obtain combining time variation in tariffs with cross-sectional variation in crop suitability, as described in equation 1. The dependent variable is the log of political violence (i.e., the number of hostile and violent events in ICEWS). All interaction variables are dummies equal to one if the value for the county is above the median at the country level. Through country-specific flexible trends in column 4, we allow each country to have its own linear trend in the years prior to signature, a jump in the year of signature, and another linear trend in the years after. In column 5, we further allow these flexible trends to be different across ever-exposed (Export Exposure > 0 at any point) and never-exposed spatial units.