Aid and Aids
PEPFAR, trade, and contagious disease

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3. Department of Politics, University of Virginia

Objectives for talk
- Plausibility probe
- Grounding in literature

President's Emergency Plan for AIDS Relief

Motivation – conjectures of relationship between trade and disease
- Bad policy – trade shock related to covid lockdowns
- Bad science – very early in the pandemic the WHO suggested (incorrectly) that covid may have spread to initial outbreak location of Wuhan through seafood trade networks

Some trade mechanisms
- heterogenous populations with higher prevalence of HIV engaged in trade
  - (E.g. Emily Osters work on SSA truck drivers as a pathway for HIV when exports increase)
- Trade based connections establishing new migration routes
- Trade leads to economic development and therefore increases health capacity

- Do we observe evidence of international trade-based HIV diffusion?

PEPFAR reauthorization
- President's Emergency Plan for AIDS Relief
- Program successes, reauthorization controversy, pivot towards a "sustainability approach"

Data here
- IHME HIV incidence – Global Burden of Disease Study
- PEPFAR – USAID's Foreign Aid data
- Trade – (Imports + Exports) – CEPII Gravity Database

- Do we observe evidence of international trade-based HIV diffusion?

  - H1 – Global trade connectedness provides a diffusion pathway for HIV incidence.

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  - H1 – Global trade connectedness provides a diffusion pathway for HIV incidence.
  - H2 – Trade with PEPFAR recipients moderates the effect for PEPFAR aid.

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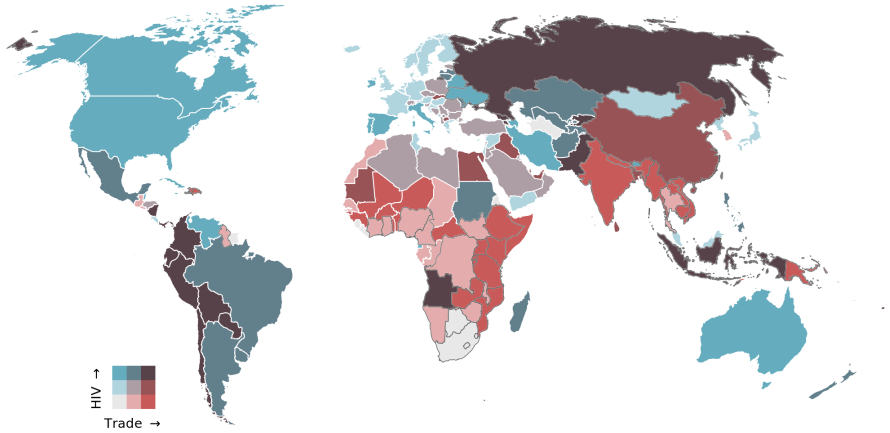
H1 - Global trade connectedness provides a diffusion pathway for HIV incidence



PANEL
2005 – 2018 (13 years) PEPFAR begins 2004

Colors represent percent change from year 1 to year 13 binned from low to high

H2 - Trade with PEPFAR recipients moderates the effect for PEPFAR aid

		Trade with PEPFAR Recipeints	
		Low	High
PEPFAR Recipient	No	-0.625 [-0.816, -0.434] Observations: 1971	-2.958 [-4.280, -1.637] Observations: 263
	Yes	-7.260 [-9.336, -5.183] Observations: 189	-26.163 [-29.672, -22.653] Observations: 211

Values – median HIV incidence change across countries who:

- received pepfar or not
- have high or low trade with other pepfar recipients.

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$$y = \sum_{i=1}^{p} \rho_i W_i y + \phi y_{t-1} + (\beta \text{Pepfar}_{USD} * \text{Pepfar}_{trade} * \text{Pepfar}_{trade}^2) + X\beta + \epsilon$$

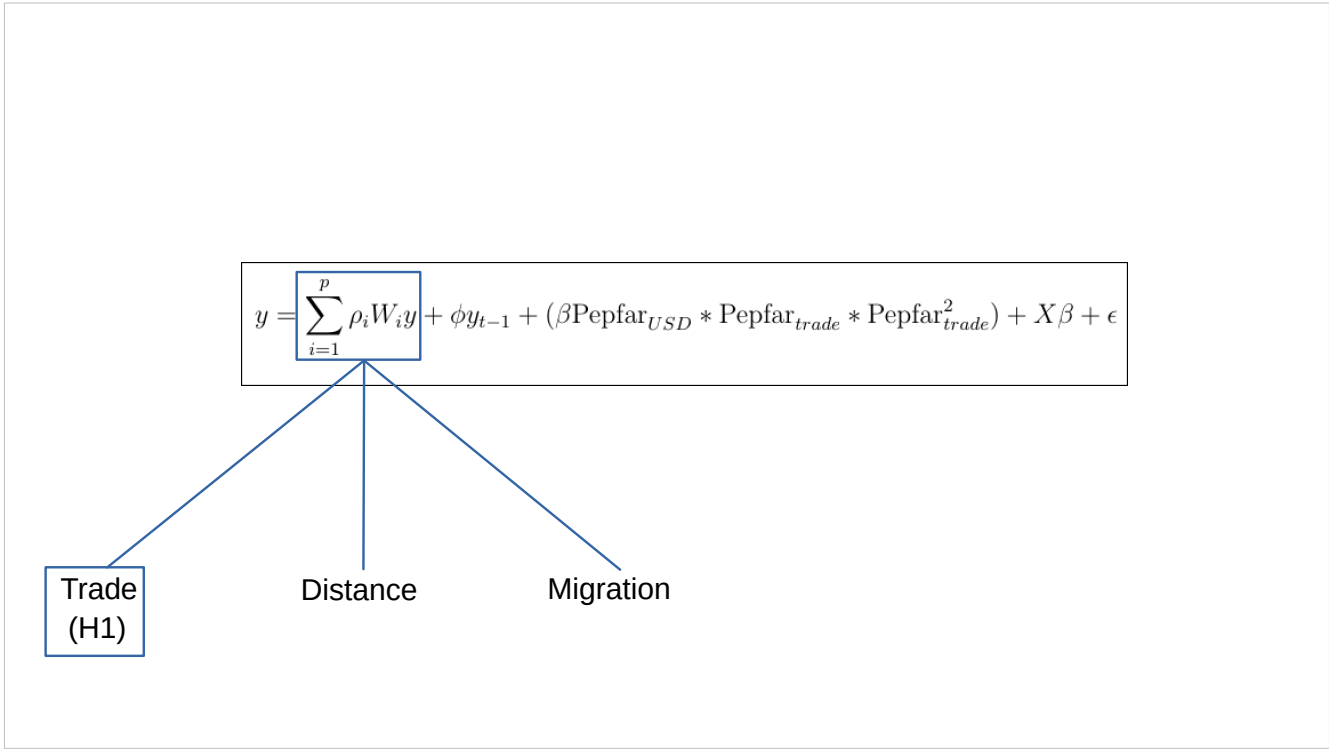
High-order spatiotemporal autoregressive model

Bayesian markov chain monte carlo

HIV – first difference + fd lag

Country and year fixed effect

All but (1) have controls
OECD health aid
Public health spending
GDP per capita
Population density
Internet acces (reporting)
Live expectancy
Infant mortality



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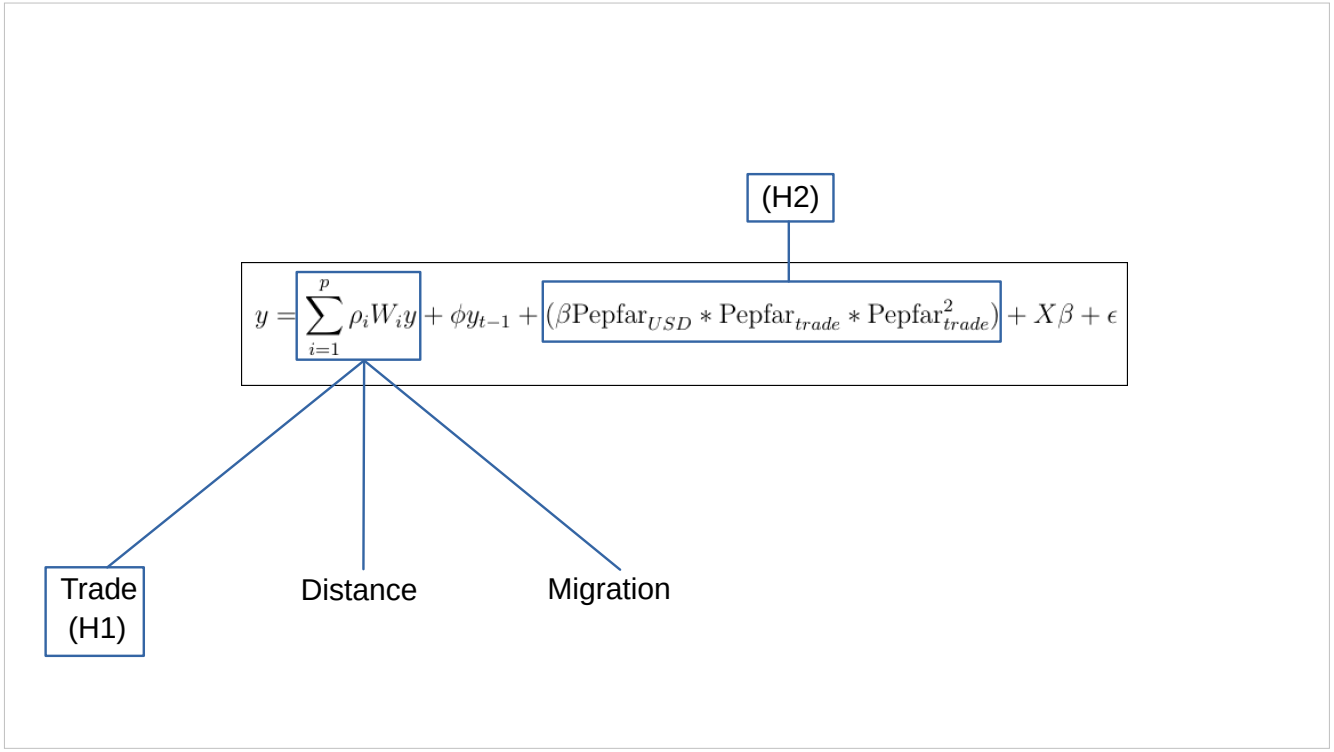

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	Non-spatial		Spatial		
	[1]	[2]	[3]	[4]	[5]
PEPFAR Aid	−0.468* [−0.724; −0.219]	−0.489* [−0.737; −0.246]	−0.486* [−0.740; −0.239]	−0.488* [−0.728; −0.247]	−0.490* [−0.744; −0.239]
PEPFAR Aid × PEPFAR Trade	3.962* [2.034; 5.842]	3.936* [2.028; 5.894]	3.961* [1.972; 5.962]	4.110* [2.086; 6.059]	4.115* [2.018; 6.138]
PEPFAR Aid × PEPFAR Trade^2	−8.524* [−12.647; −4.412]	−8.342* [−12.428; −4.309]	−8.572* [−12.873; −4.361]	−8.931* [−13.232; −4.594]	−8.930* [−13.222; −4.464]
PEPFAR Aid × PEPFAR Trade × PEPFAR Trade^2	5.559* [3.011; 8.118]	5.498* [2.932; 8.072]	5.722* [3.132; 8.337]	5.948* [3.222; 8.637]	5.945* [3.210; 8.656]
Spatial Lags					
Rho - Trade			0.117* [0.055; 0.176]	0.123* [0.064; 0.182]	0.123* [0.053; 0.189]
Rho - Distance				−0.108 [−0.279; 0.133]	−0.106 [−0.277; 0.139]
Rho - Migration					0.001 [−0.074; 0.071]
Temporal Lag					
HIV incidence rate (per 100k, lag)	0.622* [0.591; 0.653]	0.613* [0.581; 0.645]	0.612* [0.581; 0.644]	0.614* [0.582; 0.646]	0.614* [0.582; 0.645]
Controls	No	Yes	Yes	Yes	Yes
FE - Country	Yes	Yes	Yes	Yes	Yes
FE - Year	Yes	Yes	Yes	Yes	Yes
Log lik.	−6847.650	−6807.840	−6809.419	−6806.033	−6813.627
WAIC	14051.815	13986.454	13992.430	14007.591	14209.719
N	2634	2634	2634	2634	2634

* Null hypothesis value outside the confidence interval.

ALL MODELS HAVE:

- Country and year fixed effects

- All but (1) have controls
  - OECD health aid
  - Public health spending
  - GDP per capita
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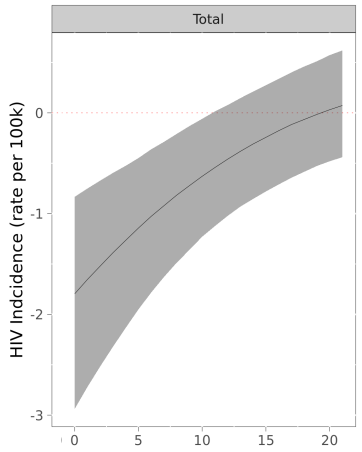
LRSS conditional effects of PEPFAR aid on HIV incidence as trade with other PEPFAR recipients increases



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Indirect effect (trade-based diffusion) accounts for between 14 – 45% of the total response

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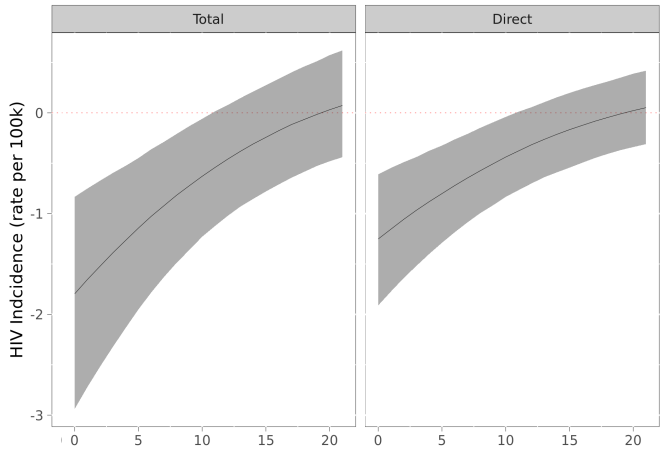

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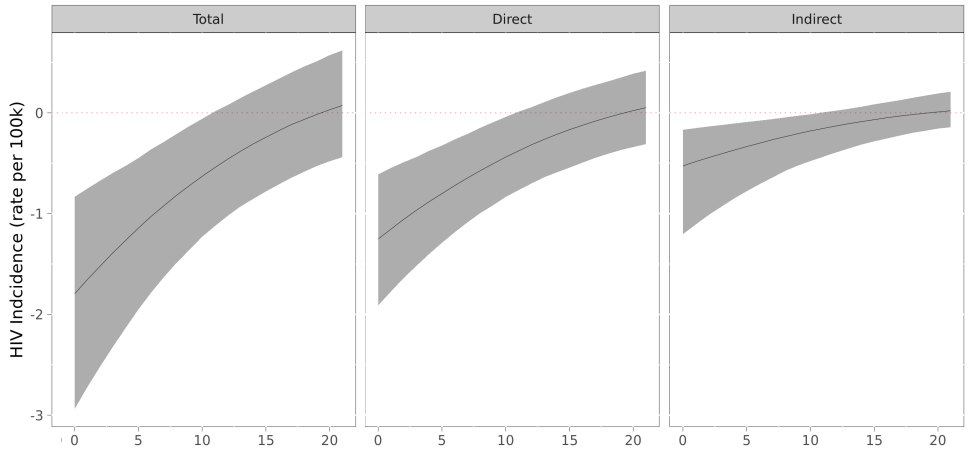

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PEPFAR aid allocation counterfactual

	Direct	Indirect
Guinea Bissau	-54.3^*	-2175.3^*
	$[-84.9; -24.9]$	$[-4985.9; -662.9]$
Gabon	-35.7^*	-2140.5^*
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Equatorial Guinea	-18.0^*	-1881.6^*
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Djibouti	-10.7	-1178.4
	$[-22.4; 0.8]$	$[-3405.8; 83.1]$

* Null hypothesis value outside the confidence interval.

Cases
Have never received PEPFAR
Have median annual trade with PEPFAR recipients of less than 12%
Hav an HIV incidence rate 2 deviations above median

cname	ihme_hiv	ihme_hiv100k
1 Guinea-Bissau	1650	87.8
2 Gabon	2631	123.
3 Equatorial Guinea	7449	513.
4 Djibouti	903	86.8

Trade shock = median among PEPFAR recipients (~$2.9 per capita) – for these countries that would equate to 3-6 million USD which is slightly below the 3rd quartile of PEPFAR aid allocations.

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Indirect effects:
Top-3 reductions

Guinea Bissau
- China
- Pakistan
- Portugal

Gabon
- China
- India
- France

Equatorial Guinea
- China
- United States
- India

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Conclusion

- Trade connections serve as a pathway for disease diffusion, amplifying impulses that increase or decrease disease incidence.
- PEPFAR matters most when distributed to countries with fewer trade opportunities with other PEPFAR recipients.
- PEPFAR authorization ends this month. The program has pivoted towars a “sustainability approach” to aid delivery.

Limitations : use total trade values rather than export volume which may be a better measure.