

Exchanging Fire: Trade, Conflict, and the Strategic Incentives of Indirect Economic Interdependence

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International Political Economy Society, 2012

Questions

Economics and conflict:

- How do economic relationships connecting states affect their tendency to come into conflict?

Dyadic rivalries:

- What explains varying conflict patterns within dyadic rivalries?

Third-party effects:

- How are dyadic relationships affected by extra-dyadic factors?

Indirect Ties and Indirect Economic Interdependence

Indirect ties linking two states to the same economic networks create (latent, potential) mutual economic interests.

- pressure from dominant third-party hegemonic states
- links through common global production chains

This type of relationship will dampen conflict incentives, even in the absence of any active, direct ties between the states.

Economic complementarity - indirect economic interdependence.

Model and Equilibrium Results

Optimization problem:

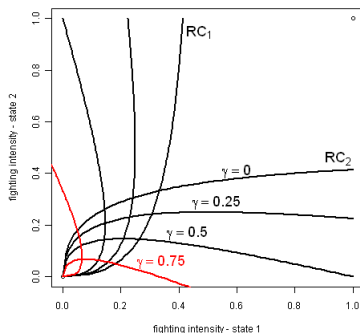
- $\max_{e_i, f_i} (e_i p_i R + \gamma_i e_{-i} p_{-i} R)^h$

Reaction curves (directed, $M=1$, symmetric π):

- $f_i = -f_{-i} + \sqrt{(1 - \gamma_i)(f_{-i}^2 + f_{-i})}$

Equilibrium fighting (symmetric γ , π):

- $f_i = \frac{M(1 - \gamma)}{b[M(1 - \gamma) + 2]}$



Hypotheses - Militarized Interstate Disputes

H_{1A} : Existence of MIDs

High average levels of indirect economic interdependence within a dyad will decrease the likelihood of a militarized interstate dispute occurring between those states.

H_{1B} : Initiation of MIDs

States with high levels of indirect economic interdependence toward another state will be less likely to initiate militarized interstate disputes with that other state.

Hypotheses - General Conflict and Cooperation

H_{2A} : Average Conflict-Cooperation Patterns

High average levels of indirect economic interdependence within a dyad will increase average scores on generalized measures of conflict-cooperation.

H_{2B} : Directed Conflict-Cooperation Patterns

States with high levels of indirect economic interdependence toward another state will engage in more positive interactions toward that other state on generalized measures of conflict-cooperation.

Dyadic Rivalries

The effects of indirect economic interdependence will be particularly strong, and particularly important, in hostile dyads such as rivalries.

- frequent conflict, but also great prospects for cooperation through contiguity or historical interaction
- conflict histories often inhibit direct economic ties, but opposing states may be (or may not be) linked to common outside powers

Empirical Approach

Panel data, 1948-2000.

Three dimensions of empirical specifications:

- dichotomous DV vs. continuous DV
 - logistic regression/linear regression
- undirected vs. directed
 - dyad-year/directed-dyad year, undirected/directed variables
- full sample vs. rivalry sample

Fixed effects by dyad and year.

Dependent Variable 1 - Militarized Interstate Disputes

Did the two states in the dyad engage in a militarized interstate dispute in a given year?

Dichotomous measure of conflict.

- 1 - dispute; 0 - no dispute

Common measure of conflict in international security.

Dependent Variable 2 - Dyadic Conflict-Cooperation Scale

Based on events data coded from news reports.

“State A took action X toward state B.”

- action X assigned a numerical score
 - positive - friendly; negative - hostile
 - magnitude based on severity of the action
- yearly average

Nuanced measure of dyadic relations that captures positive and negative relations.

IV - Maximum Trade-Share Product

Measuring indirect economic independence as the degree to which states are integrated into the same global trade networks.

Mutual high reliance on a common outside economic partner.

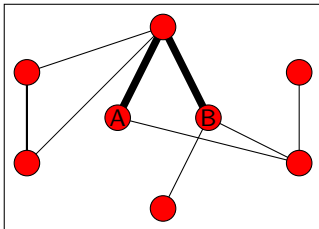
- United States, European Union, Japan, Brazil, Russia, India, China

Maximum trade-share product.

- $$mtsp = \max_O \left(\frac{T_{AO}}{T_A} * \frac{T_{BO}}{T_B} \right)$$

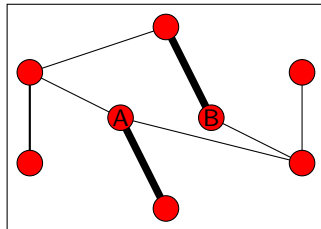
IV - Maximum Trade-Share Product

Common Outside Partner



(high mtsp)

Different Networks



(low mtsp)

CVs - Dyadic, Monadic, Temporal Dependence

Dyadic:

- contiguity, alliance, rivalry, dyadic trade

Monadic:

- polity, major power, GDP, total trade, trade/GDP

Temporal dependence:

- peace years^(2,3), lagged DV

Full Sample, Militarized Interstate Disputes

Variable	Undirected		Directed	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
EC UNDIRECTED	-1.843**	(0.493)		
EC DIRECTED			-0.565 [†]	(0.298)
CONTIGUITY	1.050**	(0.202)	2.208**	(0.294)
ALLY	-0.017	(0.147)	0.006	(0.165)
RIVALRY	2.046**	(0.184)	1.988**	(0.208)
DYADIC TRADE	-0.000	(0.000)	0.000	(0.000)
POLITY 1	0.004	(0.008)	-0.009	(0.009)
POLITY 2			0.012	(0.009)
GDP 1	-0.000**	(0.000)	-0.000	(0.000)
GDP 2			0.000	(0.000)
TOTAL TRADE 1	0.000**	(0.000)	0.000	(0.000)
TOTAL TRADE 2			-0.000	(0.000)
TRADE PCT GDP 1	0.417**	(0.108)	0.653**	(0.119)
TRADE PCT GDP 2			0.396**	(0.117)
MAJOR 1	0.813	(0.495)	14.829	(564.589)
MAJOR 2			0.529	(0.481)
PEACE YEARS	-0.166**	(0.008)	-0.048**	(0.008)
PEACE YEARS ²	0.004**	(0.000)	0.001**	(0.000)
PEACE YEARS ³	-0.000**	(0.000)	-0.000**	(0.000)
N		17461		19876
FE		directed-dyad and year		directed-dyad and year

Significance levels : † : 10% * : 5% ** : 1%

Rivalry Sample, Militarized Interstate Disputes

Variable	Undirected		Directed	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
EC UNDIRECTED	-7.275**	(1.259)		
EC DIRECTED			-2.488**	(0.617)
CONTIGUITY	1.540	(1.173)	14.801	(332.073)
ALLY	0.819*	(0.330)	0.415	(0.285)
DYADIC TRADE	-0.000	(0.000)	-0.000	(0.000)
POLITY 1	0.010	(0.019)	0.023	(0.017)
POLITY 2			-0.007	(0.016)
GDP 1	-0.000	(0.000)	0.000	(0.000)
GDP 2			-0.000**	(0.000)
TOTAL TRADE 1	0.000	(0.000)	-0.000	(0.000)
TOTAL TRADE 2			0.000†	(0.000)
TRADE PCT GDP 1	0.057	(0.301)	0.078	(0.216)
TRADE PCT GDP 2			0.148	(0.231)
MAJOR 1	[omit]		[omit]	
MAJOR 2			[omit]	
PEACE YEARS	-0.146**	(0.025)	-0.023	(0.023)
PEACE YEARS ²	0.004**	(0.001)	-0.000	(0.001)
PEACE YEARS ³	-0.000*	(0.000)	0.000	(0.000)
N	309577		564707	
FE	directed-dyad and year		directed-dyad and year	

Significance levels : † : 10% * : 5% ** : 1%

Results: Militarized Interstate Disputes

Full sample:

Variable	Undirected		Directed	
	Coeff.	(Std. Err.)	Coeff.	(Std. Err.)
MTSP UNDIRECTED	-1.843**	(0.493)		
MTSP DIRECTED			-0.565 [†]	(0.298)
Significance levels : † : 10% * : 5% ** : 1%				

Rivalry sample:

Variable	Undirected		Directed	
	Coeff.	(Std. Err.)	Coeff.	(Std. Err.)
MTSP UNDIRECTED	-7.275**	(1.259)		
MTSP DIRECTED			-2.488**	(0.617)
Significance levels : † : 10% * : 5% ** : 1%				

Full Sample, Conflict-Cooperation Scale

Variable	Undirected		Directed	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
EC UNDIRECTED	0.023**	(0.007)		
EC DIRECTED			0.008**	(0.002)
CONTIGUITY	-0.017*	(0.008)	0.005	(0.006)
ALLY	0.026**	(0.004)	0.029**	(0.003)
RIVALRY	-0.226**	(0.011)	-0.243**	(0.009)
DYADIC TRADE	0.000**	(0.000)	0.000**	(0.000)
POLITY 1	0.000*	(0.000)	0.000	(0.000)
POLITY 2			0.000*	(0.000)
GDP 1	-0.000**	(0.000)	-0.000**	(0.000)
GDP 2			-0.000**	(0.000)
TOTAL TRADE 1	-0.000	(0.000)	-0.000**	(0.000)
TOTAL TRADE 2			0.000*	(0.000)
TRADE PCT GDP 1	-0.003†	(0.002)	-0.001	(0.002)
TRADE PCT GDP 2			-0.004*	(0.002)
MAJOR 1	0.394**	(0.047)	0.072†	(0.043)
MAJOR 2			1.067**	(0.046)
LAGGED DV	0.327**	(0.002)	0.265**	(0.001)
INTERCEPT	0.445	(0.019)	-0.029	(170.201)
N	309577		564707	
FE	directed-dyad and year		directed-dyad and year	

Significance levels : † : 10% * : 5% ** : 1%

Rivalry Sample, Conflict-Cooperation Scale

Variable	Undirected		Directed	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
EC UNDIRECTED	1.664**	(0.486)		
EC DIRECTED			0.856**	(0.203)
CONTIGUITY	-0.096	(0.481)	-0.057	(0.370)
ALLY	0.093	(0.134)	0.044	(0.099)
DYADIC TRADE	0.000	(0.000)	0.000 [†]	(0.000)
POLITY 1	0.007	(0.008)	0.000	(0.006)
POLITY 2			0.003	(0.006)
GDP 1	-0.000*	(0.000)	-0.000	(0.000)
GDP 2			0.000	(0.000)
TOTAL TRADE 1	0.000*	(0.000)	0.000	(0.000)
TOTAL TRADE 2			0.000	(0.000)
TRADE PCT GDP 1	-0.225 [†]	(0.133)	-0.074	(0.089)
TRADE PCT GDP 2			-0.159 [†]	(0.089)
MAJOR 1	[omit]		[omit]	
MAJOR 2			[omit]	
LAGGED DV	0.526**	(0.024)	0.463**	(0.017)
INTERCEPT	1.584	(0.507)	0.433	(0.406)
N		1788		3395
FE		directed-dyad and year		directed-dyad and year

Significance levels : † : 10% * : 5% ** : 1%

Results: Conflict-Cooperation Scale

Full sample:

Variable	Undirected		Directed	
	Coeff.	(Std. Err.)	Coeff.	(Std. Err.)
MTSP UNDIRECTED	0.023**	(0.007)		
MTSP DIRECTED			0.008**	(0.002)
Significance levels : † : 10% * : 5% ** : 1%				

Rivalry sample:

Variable	Undirected		Directed	
	Coeff.	(Std. Err.)	Coeff.	(Std. Err.)
MTSP UNDIRECTED	1.664**	(0.486)		
MTSP DIRECTED			0.856**	(0.203)
Significance levels : † : 10% * : 5% ** : 1%				

Implications - Economics and Conflict

High levels of indirect economic interdependence affect conflict outcomes.

- decrease the probability of a militarized interstate dispute
- increase positive scores on conflict-cooperation scales

The links between economics and security in international politics are not confined to direct effects of relationships within the dyad.

Implications - Dyadic Rivalries

Patterns of conflict in dyadic rivalries are powerfully influenced by evolving ties to common global economic networks.

States' interests and incentives are driven by extra-dyadic factors as well as intra-dyadic factors.

Implications - Third-Party Involvement

Major powers can play a major role in dampening conflict incentives through economic engagement with both sides of a rivalry.

Next Steps

Network measure of indirect economic integration.

- more accurately capture full extent of networked ties

Explore interaction effects between rivalry and maximum trade-share product.

- theory suggests a stronger, but not necessarily exclusive, effect in rivalries

Explicit two-stage selection models.

- model propensity for non-zero interaction

Model (adaptation of Hirshleifer 1995)

Actors

- two states
- $i \in \{1, 2\}$

Choice variables

- effort intensities devoted to productive vs. fighting effort
- e_i, f_i such that $a_i e_i + b_i f_i = 1$

Contest success function

- probability of victory (share of resources) a function of relative fighting effort
 - *...adjusted according to the state's relative power*

- $R_i = p_i = \frac{\pi_i f_i^M}{\pi_i f_i^M + \pi_{-i} f_{-i}^M}$

Utility

- productive effort multiplied by the share of resources controlled...
 - *...plus a (variable) proportion of the partner's production*
- $(e_i p_i R + \gamma_i e_{-i} p_{-i} R)^h$

Equilibrium Results

Optimization problem:

$$\max_{e_i, f_i} (e_i p_i R + \gamma_i e_{-i} p_{-i} R)^h$$

Reaction curves (ratio):

$$\frac{f_i^M}{f_{-i}^M} = \left[\frac{M(1 - \gamma_i)}{f_i b} + \frac{M\gamma_i f_{-i}}{f_i} - (M + 1) \right] \left(\frac{\pi_{-i}}{\pi_i} \right)$$

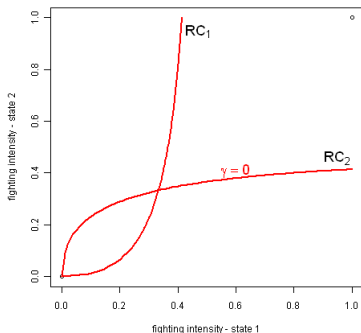
Reaction curves (directed, $M=1$, symmetric π):

$$f_i = -f_{-i} + \sqrt{(1 - \gamma_i)(f_{-i}^2 + f_{-i})}$$

Equilibrium fighting (symmetric γ , π):

$$f_i = \frac{M(1 - \gamma)}{b[M(1 - \gamma) + 2]}$$

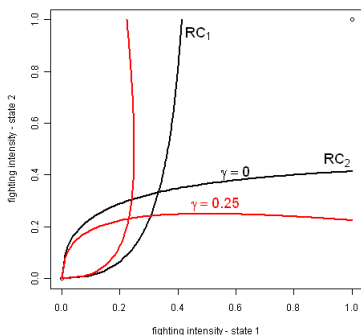
Characterizing Equilibria - Symmetric γ, π



- At $\gamma = 0$, moderate to high fighting.

- $$\frac{M(1-\gamma)}{b[M(1-\gamma)+2]}$$

Characterizing Equilibria - Symmetric γ, π



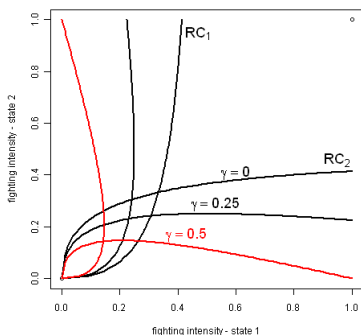
- At $\gamma = 0$, moderate to high fighting.

- $\frac{M(1-\gamma)}{b[M(1-\gamma)+2]}$

- As γ increases, fighting effort decreases.

- $\frac{d(\cdot)}{d\gamma} = \frac{-M(b[M(1-\gamma)+2])+M^2b(1-\gamma)}{(b[M(1-\gamma)+2])^2}$

Characterizing Equilibria - Symmetric γ, π



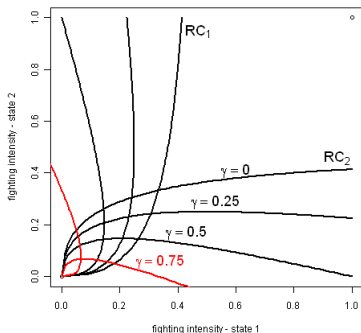
- At $\gamma = 0$, moderate to high fighting.

- $\frac{M(1-\gamma)}{b[M(1-\gamma)+2]}$

- As γ increases, fighting effort decreases.

- $\frac{d(\cdot)}{d\gamma} = \frac{-M(b[M(1-\gamma)+2])+M^2b(1-\gamma)}{(b[M(1-\gamma)+2])^2}$

Characterizing Equilibria - Symmetric γ, π



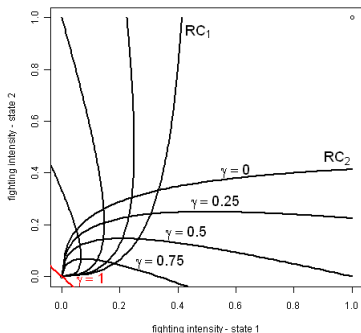
- At $\gamma = 0$, moderate to high fighting.

- $\frac{M(1-\gamma)}{b[M(1-\gamma)+2]}$

- As γ increases, fighting effort decreases.

- $\frac{d(\cdot)}{d\gamma} = \frac{-M(b[M(1-\gamma)+2])+M^2b(1-\gamma)}{(b[M(1-\gamma)+2])^2}$

Characterizing Equilibria - Symmetric γ, π

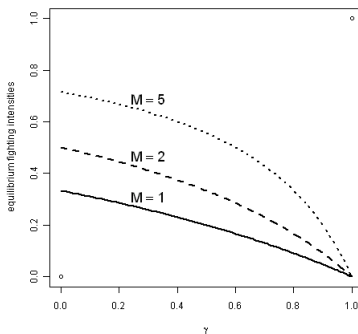


- At $\gamma = 0$, moderate to high fighting.
 - $\frac{M(1-\gamma)}{b[M(1-\gamma)+2]}$
- As γ increases, fighting effort decreases.
 - $\frac{d(\cdot)}{d\gamma} = \frac{-M(b[M(1-\gamma)+2])+M^2b(1-\gamma)}{(b[M(1-\gamma)+2])^2}$
- At $\gamma = 1$, neither state invests any effort in fighting.

Characterizing Equilibria - Symmetric γ , π

Strictly monotone decreasing fighting effort on γ :

$$\frac{d(\cdot)}{d\gamma} = \frac{-M(b[M(1-\gamma) + 2]) + M^2b(1-\gamma)}{(b[M(1-\gamma) + 2])^2} < 0$$



Data and Variables

Dependent Variables:

- Militarized Interstate Disputes
- dyadic conflict-cooperation scale using events data

Key Explanatory Variable:

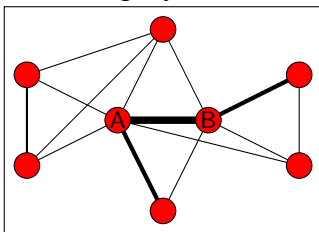
- indirect economic interdependence
- mutual high reliance on a common outside trading partner
 - maximum trade-share product
 - $mtsp = \max_O \left(\frac{T_{AO}}{T_A} * \frac{T_{BO}}{T_B} \right)$

Control Variables:

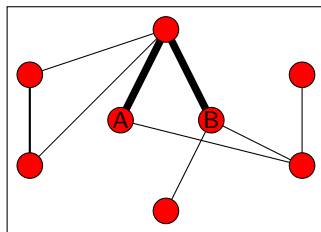
- dyad-level: contiguity, alliance, rivalry, dyadic trade
- state-level: polity, major power, GDP, total trade, trade/GDP
- temporal dependence: peace years^(2,3), lagged DV

Direct and Semi-Direct Ties

Strong Dyadic Tie

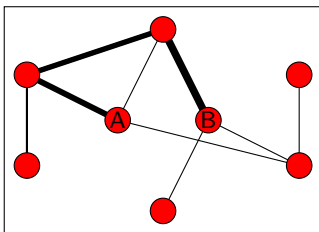


Common Outside Partner

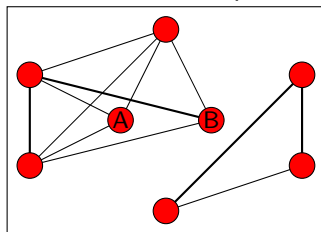


Other Network Ties

Partners Tied

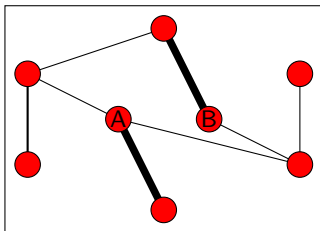


Shared Group



Disconnected Dyads

Different Partners



Different Groups

