Supplementary appendix for "Does Punishing Sanctions Busters Work? Sanctions Enforcement and U.S. Trade with Sanctioned States"

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Contents

1 Introduction

This appendix include supplemental information about the specification and results of our auto-distributed lag (ADL) models, as well as additional models to demonstrate the robustness of our results, and summary statistics.

2 Selecting the optimal lag length

We specify auto-distributed lag (ADL) models of the following form:

$$y_{i,t} = \theta + \alpha_1 y_{i,t-1} + ... + \alpha_p y_{i,t-p} + \beta_1 x_{i,t} + ... + \beta_{1-q} x_{i,t-q} + \gamma_k z_{i,t} + \epsilon_{i,t}$$

Where $y_{i,t}$ is our dependent variable, θ is the constant term, γ_k is the coefficient for each control variable z, and $\epsilon_{i,t}$ is the residual. We include p lags of our dependent variable (with associated α coefficients) and q lags as well as the contemporaneous value of a given explanatory variable (with associated β coefficients).

For each of the ADL models presented in the main paper and this appendix, we selected the optimal lag length by comparing AIC (as well as BIC) across every combination of lags (up to four) that produce white noise residuals—specifically where we fail to reject the null hypothesis of Breusch–Godfrey tests for serial correlation of orders 1 through 4. We used "for" loops in R to automate this process. Given that we had lags up to four across the DV and five time-varying IVS (dyadic penalties, US-third penalties, Foreign-C2 penalties, US GDP, and C2 GDP), each of these loops iterated 12,500 times ($4 * 5^5$). To illustrate the behavior of serial correlation and model fit as we vary the lag structure, we present Table A.1, with nine different model candidates for Model 1 from our main paper. These models show that serial correlation is a major problem until we add several lags of the DV and some of the IVs.[1] The sixth column of coefficients and heteroskedasticity-consistent standard errors presents Model 1 from the main paper, which has a lower AIC and BIC than alternates that add or remove lags, and for which we fail to reject all BG tests of serial correlation.

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[1]Note: the fifth column model is specified with 4 lags of the DV and each time-varying IV. However, the variables for US GDP for $t-3$ and $t-4$ drop from this model.

Table A.1: Lag selection for imports model, 500k+ penalties; coefficients and heteroskedasticity-consistent standard errors.

					DV = log US imports				
	No lags	1 lag	2 lags	3 lags	4 lags^	best model	alt1	alt2	alt3
LDV_{t-1}		0.71***	0.63***	0.57***	0.69***	0.69***	0.71***	0.63***	0.64***
		(0.08)	(0.10)	(0.13)	(0.13)	(0.13)	(0.13)	(0.16)	(0.15)
LDV_{t-2}			0.23**	0.20	−0.07	−0.07	−0.08	−0.02	−0.04
			(0.10)	(0.18)	(0.26)	(0.27)	(0.27)	(0.30)	(0.29)
LDV_{t-3}				0.14	0.31**	0.32**	0.32**	0.31**	0.32**
				(0.09)	(0.13)	(0.13)	(0.12)	(0.13)	(0.13)
LDV_{t-4}					0.01				
					(0.03)				
Dyadic penalty$_t$	−2.97***	−1.26	−1.37**	−1.70***	−0.69	−1.38***	−1.40***	−1.38***	−1.41***
	(1.03)	(0.97)	(0.59)	(0.48)	(0.52)	(0.39)	(0.42)	(0.36)	(0.37)
Dyadic penalty$_{t-1}$		−0.80	−1.51*	−0.49	1.22**	0.58	0.46	0.35	0.42
		(0.66)	(0.90)	(0.62)	(0.62)	(0.72)	(0.71)	(0.76)	(0.74)
Dyadic penalty$_{t-2}$			1.34	1.58	−0.32	0.48	0.47	0.44	0.89
			(1.11)	(1.19)	(1.36)	(1.45)	(1.44)	(1.56)	(1.41)
Dyadic penalty$_{t-3}$				−2.42**	−3.82***	−3.10***	−2.99***	−3.52***	−2.45**
				(0.95)	(1.16)	(1.13)	(1.12)	(1.28)	(0.98)
Dyadic penalty$_{t-4}$					0.77	1.41***	1.62***	1.73***	
					(0.59)	(0.51)	(0.52)	(0.53)	
US-third penalty$_t$	−0.05*	0.00	−0.01	−0.21***	0.69***	0.02	0.02	0.01	0.01
	(0.03)	(0.01)	(0.04)	(0.06)	(0.24)	(0.02)	(0.02)	(0.02)	(0.02)
US-third penalty$_{t-1}$		−0.01	0.01	0.04	0.67***				
		(0.02)	(0.01)	(0.02)	(0.24)				
US-third penalty$_{t-2}$			0.03	0.16***	−0.79***				
			(0.07)	(0.05)	(0.29)				
US-third penalty$_{t-3}$				−0.17**	−0.69***				
				(0.07)	(0.27)				
US-third penalty$_{t-4}$					−0.68***				
					(0.24)				
Foreign-C2 penalty$_t$	−2.71***	−0.66***	−0.59***	−0.52***	−0.31	−0.33	−0.22	−0.65***	−0.44
	(0.37)	(0.20)	(0.20)	(0.19)	(0.41)	(0.37)	(0.39)	(0.23)	(0.31)
Foreign-C2 penalty$_{t-1}$		0.13	−0.19	0.10	0.89	0.89	0.81	0.35	0.93
		(0.49)	(0.93)	(0.76)	(0.69)	(0.70)	(0.72)	(0.69)	(0.74)
Foreign-C2 penalty$_{t-2}$			0.77*	1.00**	0.32	0.33	0.41	0.69	0.46
			(0.46)	(0.49)	(0.36)	(0.36)	(0.37)	(0.43)	(0.47)
Foreign-C2 penalty$_{t-3}$				0.54**	0.21	0.21	0.08	0.38	0.53***
				(0.24)	(0.36)	(0.35)	(0.38)	(0.32)	(0.19)
Foreign-C2 penalty$_{t-4}$					−2.02***	−2.03***	−1.92***		−2.26***
					(0.45)	(0.47)	(0.49)		(0.52)
US GDP$_t$	−3.21*	1.28	0.55	−14.97**	169.38***	6.17***	6.02***	5.59**	6.56***
	(1.71)	(1.63)	(8.83)	(7.07)	(59.33)	(2.12)	(2.11)	(2.31)	(2.16)
US GDP$_{t-1}$		−3.00	−2.98	50.15***	−127.17***	−9.38**	−9.44**	−8.60**	−9.76***
		(2.80)	(12.51)	(17.04)	(41.87)	(3.72)	(3.75)	(4.17)	(3.63)
US GDP$_{t-2}$			−0.67	−66.69***	27.02***				
			(5.86)	(18.73)	(9.48)				
US GDP$_{t-3}$				31.71***					
				(8.11)					
C2 GDP$_t$	1.30***	0.58	0.40	0.36	0.19	0.25	0.38	0.33	0.24
	(0.13)	(0.46)	(0.49)	(0.49)	(0.47)	(0.44)	(0.41)	(0.46)	(0.45)
C2 GDP$_{t-1}$		−0.21	0.49	0.74	0.55	0.31	0.20	0.18	0.51
		(0.49)	(0.85)	(0.74)	(0.60)	(0.56)	(0.56)	(0.68)	(0.56)
C2 GDP$_{t-2}$			−0.71	−0.89	−0.84	−0.74	−0.80	−0.24	−0.98*
			(0.57)	(0.61)	(0.58)	(0.52)	(0.52)	(0.61)	(0.57)
C2 GDP$_{t-3}$				−0.06	0.62	0.66*	0.31	0.20	0.63*
				(0.61)	(0.40)	(0.35)	(0.45)	(0.40)	(0.35)
C2 GDP$_{t-4}$					−0.43	−0.39		−0.36	−0.29
					(0.46)	(0.46)		(0.48)	(0.43)
Constant	72.58*	39.05	71.11	−4.84	−1,618.42***	72.09*	77.12*	67.82	72.10*
	(38.22)	(32.64)	(52.85)	(32.40)	(595.35)	(40.25)	(42.28)	(46.42)	(39.02)
Observations	977	878	779	689	606	604	606	604	604
Adjusted R^2	0.609	0.852	0.91	0.923	0.933	0.933	0.932	0.928	0.93
AIC	4414.5	3091.3	2347.8	1985.2	1689	1683.6	1697.4	1725.9	1704
BIC	4482.9	3186.8	2468.9	2130.3	1847.6	1815.8	1825.2	1853.6	1831.7
Breusch–Godfrey: order 1	388.11 (p = 0)	6.59 (p = 0.01)	5.21 (p = 0.02)	3.63 (p = 0.06)	0.64 (p = 0.42)	1.07 (p = 0.3)	0.93 (p = 0.33)	1.15 (p = 0.28)	0.21 (p = 0.65)
Breusch–Godfrey: order 2	420.36 (p = 0)	9.68 (p = 0.01)	31.68 (p = 0)	6.54 (p = 0.04)	0.67 (p = 0.72)	1.1 (p = 0.58)	0.94 (p = 0.63)	1.5 (p = 0.47)	1.35 (p = 0.51)
Breusch–Godfrey: order 3	425.93 (p = 0)	53.64 (p = 0)	38.48 (p = 0)	17.9 (p = 0)	4.9 (p = 0.18)	5.54 (p = 0.14)	10.28 (p = 0.02)	8.79 (p = 0.03)	5.07 (p = 0.17)
Breusch–Godfrey: order 4	426.06 (p = 0)	91.47 (p = 0)	38.7 (p = 0)	19.01 (p = 0)	5.77 (p = 0.22)	6.15 (p = 0.19)	10.8 (p = 0.03)	10.45 (p = 0.03)	5.43 (p = 0.25)

* p less than 0.1, ** p less than 0.05, *** p less than 0.01
^ Note: two lags drop from this specification

3 Long-run multipliers

There are a few reasons why we do not present long-run multipliers in the main text. First, we do not have a strong theoretical reason to expect a long-run equilibrium relationship between penalties—which are not necessarily imposed regularly—and trade flows. Second, practical data limitations prevent some of the tests we would need to justify LRMs. Notably, the unbalanced and occasionally broken time series we have lead the plm package's panel data unit root tests to fail with errors.[2] Further, the coefficients for our multiple lags at times switch signs contrary to typical patterns when a long-run equilibrium exists.

However, we did calculate LRMs for our main explanatory variables. These are presented in Tables A.2 and A.3. The calculation of the LRM itself is straightforward: for an ADL model with p lags of the dependent variable (with coefficients α_{t-1} through α_{t-p}) and q lags of some given explanatory variable (with coefficients $\beta_{t-0} \, [= \beta_t]$ through β_{t-q}), the LRM is calculated as:

$$\frac{\sum\limits_{i=0}^{q} \beta_{t-i}}{1 - \sum\limits_{j=1}^{p} \alpha_{t-j}}$$

The variance of the long-run multiplier is more difficult to calculate given this combination of variables. We therefore present the median LRM along with its 95% credible interval taken from 1,000 iterations of the main model when using a randomly-drawn sub-sample of panels in our data. Results show inconsistent support for the existence of a long-run equilibrium state, with the strongest significance existing for dyadic penalties, where four of six 95% credible intervals do not cross zero.

Table A.2: Long-run multipliers from Table 1

| | DV = log US imports | | |
	Model 1: 500k threshold	Model 2: 1m threshold	Model 3: 25m threshold
LDV_{t-1}	0.69*** (0.44, 0.95)	0.63*** (0.25, 1.00)	0.54* (−0.03, 1.11)
LDV_{t-2}	−0.07 (−0.61, 0.46)	−0.11 (−0.61, 0.39)	0.02 (−0.64, 0.69)
LDV_{t-3}	0.32** (0.07, 0.57)	0.39*** (0.20, 0.59)	0.32*** (0.13, 0.51)
Dyadic penalty$_t$	−1.38*** (−2.15, −0.61)	−1.33** (−2.46, −0.19)	−4.51*** (−7.75, −1.27)
Dyadic penalty$_{t-1}$	0.58 (−0.83, 1.99)	1.30 (−0.56, 3.16)	−2.92 (−8.30, 2.46)
Dyadic penalty$_{t-2}$	0.48 (−2.36, 3.32)	−2.56* (−5.20, 0.08)	
Dyadic penalty$_{t-3}$	−3.10*** (−5.30, −0.89)	−2.10*** (−3.52, −0.68)	
Dyadic penalty$_{t-4}$	1.41*** (0.40, 2.42)	2.20* (−0.03, 4.42)	
US-third penalty$_t$	0.02 (−0.02, 0.05)	0.01 (−0.08, 0.09)	0.01 (−0.03, 0.05)
US-third penalty$_{t-1}$		0.05 (−0.02, 0.11)	
Foreign-C2 penalty$_t$	−0.33 (−1.05, 0.39)	−1.16*** (−1.99, −0.33)	−0.95* (−1.97, 0.07)
Foreign-C2 penalty$_{t-1}$	0.89 (−0.49, 2.27)	1.28** (0.13, 2.43)	
Foreign-C2 penalty$_{t-2}$	0.33 (−0.38, 1.04)	0.01 (−0.49, 0.52)	
Foreign-C2 penalty$_{t-3}$	0.21 (−0.48, 0.89)	1.08** (0.07, 2.08)	
Foreign-C2 penalty$_{t-4}$	−2.03*** (−2.95, −1.11)	−2.10** (−3.77, −0.42)	
Long-run multiplier from bootstrapping: median and [2.5th, 97.5th] percentiles			
Dyadic penalty	-30.51 [-192.45, 129.81]	-74.13 [-163.21, -32.48]	-61.89 [-429.85, -40.47]
US-third penalty	0.27 [-0.32, 0.85]	0.64 [-0.27, 0.95]	0.08 [-0.015, 0.49]
Foreign-C2 penalty	-13.94 [-922.64, 218.07]	-9.36 [-68.52, -3.25]	11.39 [-0.83, 20.51]

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

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[2]In particular, "cipstest" and "purtest" do not work on our data in plm version 2.2-4. In part, this failure is due to the fact that our observations consist only of US dyad-years in which state 2 is subject to at least some US sanctions.

Table A.3: Long-run multipliers from Table 2

	DV = log US exports		
	Model 4: 500k threshold	Model 5: 1m threshold	Model 6: 25m threshold
LDV_{t-1}	0.80*** (0.68, 0.93)	0.82*** (0.70, 0.94)	0.82*** (0.70, 0.93)
LDV_{t-2}	0.12** (0.01, 0.24)	0.10 (−0.03, 0.22)	0.10 (−0.02, 0.22)
LDV_{t-3}	−0.04 (−0.18, 0.10)	−0.03 (−0.17, 0.11)	−0.04 (−0.18, 0.10)
LDV_{t-4}	0.09* (−0.01, 0.19)	0.09* (−0.01, 0.18)	0.09* (−0.01, 0.19)
Dyadic penalty$_t$	−0.07 (−0.19, 0.05)	−0.65*** (−0.84, −0.45)	−0.25*** (−0.38, −0.12)
Dyadic penalty$_{t-1}$	−0.01 (−0.12, 0.09)	−0.33*** (−0.52, −0.14)	
Dyadic penalty$_{t-2}$	−0.09 (−0.28, 0.09)		
Dyadic penalty$_{t-3}$	−0.28*** (−0.47, −0.08)		
US-third penalty$_t$	−0.15*** (−0.25, −0.06)	−0.40*** (−0.59, −0.22)	−0.14*** (−0.19, −0.09)
US-third penalty$_{t-1}$	0.01 (−0.01, 0.03)	−0.28*** (−0.41, −0.15)	0.09** (0.01, 0.17)
US-third penalty$_{t-2}$	0.14*** (0.05, 0.24)	0.12*** (0.06, 0.18)	0.27*** (0.07, 0.47)
US-third penalty$_{t-3}$	−0.12*** (−0.18, −0.06)		0.16 (−0.06, 0.38)
US-third penalty$_{t-4}$			0.30* (−0.03, 0.62)
Foreign-C2 penalty$_t$	0.00 (−0.05, 0.06)	−0.01 (−0.13, 0.10)	−0.05 (−0.19, 0.09)
Foreign-C2 penalty$_{t-1}$	0.10* (−0.00, 0.20)	0.10 (−0.02, 0.22)	0.17*** (0.07, 0.26)
Foreign-C2 penalty$_{t-2}$	0.04 (−0.13, 0.21)	0.00 (−0.12, 0.13)	0.01 (−0.12, 0.13)
Foreign-C2 penalty$_{t-3}$	0.18*** (0.09, 0.27)	0.19*** (0.09, 0.28)	0.18*** (0.05, 0.32)
Long-run multiplier from bootstrapping: median and [2.5^{th}, 97.5^{th}] percentiles			
Dyadic penalty	-16.06 [-28.66, -10.728]	-29.05 [-42.65, -21.80]	-8.95 [-15.59, -5.98]
US-third penalty	-4.15 [-8.13, -2.69]	-16.79 [-23.97, -12.22]	23.93 [6.87, 52.65]
Foreign-C2 penalty	11.11 [5.45, 20.59]	8.04 [3.96, 14.16]	11.39 [-0.83, 20.51]

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

4 Accounting for time effects

In recent work, Early and Preble (2020) show that OFAC enforcement can be split into "fishing" (until 2008) and "whale-hunting" (2009+) periods. More broadly, there could be year-specific effects that lags of our DV and IV do not capture. Accordingly, we re-ran all of our models including year fixed effects. Doing so required re-calculating the ideal lag structure as simply adding year dummies to our main models re-introduced serial correlation.

A few notable differences emerge, the most important of which is that the variable capturing penalties paid by US firms for violations of sanctions against (non state-2) third-parties drops from each model. While this variable does technically vary at the dyad-year level, the vast majority of US-dyads (all except those where dyadic penalties are relevant) are coded the same in any given year, such that the variable is close to time-specific. US GDP also drops from these models as it is time-specific. Ultimately, the lack of between-dyad variation leads us to prefer the models presented in the paper text.

Keeping in mind the limitations discussed above, results from time-FE models (Tables A.4 and A.5) are generally similar to those main results. Dyadic penalties tend to have negative and significant coefficients for the immediate (t = 0) period. Foreign penalties paid for violation of sanctions against state 2 are negatively associated with US imports from that state (for penalty size of 1m or greater), but as in our main models, appear not to be associated with US exports to state 2.

5 Combined penalties

We disaggregate OFAC penalties according to who pays them (the US or a foreign state) as well as whether these penalties applied to violation of sanctions against state 2 within the dyad, or against

Table A.4: Coefficients and 95 percent confidence intervals for ADL models, including time fixed effects and heteroskedasticity-consistent standard errors.

| | DV = log US imports | | |
	Model 1: 500k threshold	Model 2: 1m threshold	Model 3: 25m threshold
LDV_{t-1}	0.70*** (0.45, 0.94)	0.63*** (0.27, 1.00)	0.56** (0.01, 1.11)
LDV_{t-2}	−0.07 (−0.59, 0.45)	−0.12 (−0.61, 0.37)	0.02 (−0.62, 0.67)
LDV_{t-3}	0.31** (0.07, 0.56)	0.39*** (0.20, 0.58)	0.34*** (0.16, 0.52)
LDV_{t-4}			−0.04** (−0.08, −0.01)
Dyadic penalty$_t$	−1.39*** (−2.14, −0.64)	−1.32** (−2.51, −0.14)	−3.68** (−6.68, −0.67)
Dyadic penalty$_{t-1}$	0.56 (−0.82, 1.94)	1.24 (−0.58, 3.06)	−2.07 (−6.75, 2.61)
Dyadic penalty$_{t-2}$	0.48 (−2.34, 3.30)	−2.56* (−5.19, 0.08)	
Dyadic penalty$_{t-3}$	−3.12*** (−5.33, −0.91)	−2.06*** (−3.46, −0.67)	
Dyadic penalty$_{t-4}$	1.46*** (0.42, 2.49)	2.20* (−0.02, 4.43)	
Foreign-C2 penalty$_t$	−0.32 (−1.06, 0.42)	−1.13*** (−1.95, −0.32)	−0.90** (−1.72, −0.09)
Foreign-C2 penalty$_{t-1}$	0.89 (−0.49, 2.26)	1.28** (0.12, 2.44)	
Foreign-C2 penalty$_{t-2}$	0.31 (−0.39, 1.02)	0.00 (−0.50, 0.51)	
Foreign-C2 penalty$_{t-3}$	0.21 (−0.47, 0.90)	1.07** (0.08, 2.05)	
Foreign-C2 penalty$_{t-4}$	−2.01*** (−2.87, −1.14)	−2.18** (−3.91, −0.45)	
C2 GDP$_t$	0.18 (−0.73, 1.10)	−0.19 (−1.12, 0.74)	0.22 (−0.61, 1.05)
C2 GDP$_{t-1}$	0.55 (−0.63, 1.74)	1.23 (−0.45, 2.91)	0.37 (−1.43, 2.17)
C2 GDP$_{t-2}$	−0.84 (−1.97, 0.29)	−1.02 (−2.46, 0.43)	−0.45 (−1.54, 0.64)
C2 GDP$_{t-3}$	0.60 (−0.16, 1.37)	0.43 (−0.65, 1.52)	
C2 GDP$_{t-4}$	−0.41 (−1.32, 0.50)	−0.35 (−1.39, 0.70)	
US ally	0.10 (−0.08, 0.29)	0.11 (−0.10, 0.32)	0.10 (−0.08, 0.29)
US rival	−0.01 (−0.23, 0.21)	0.03 (−0.22, 0.28)	−0.19 (−0.54, 0.15)
C2 democracy	0.11 (−0.05, 0.27)	0.10 (−0.06, 0.26)	0.06 (−0.10, 0.22)
log Distance	0.23 (−0.11, 0.57)	0.16 (−0.13, 0.45)	0.22 (−0.13, 0.57)
Contiguity	0.39* (−0.04, 0.81)	0.35* (−0.06, 0.75)	0.47* (−0.00, 0.94)
C2 EU	0.04 (−0.07, 0.15)	0.02 (−0.10, 0.14)	−0.01 (−0.17, 0.15)
C2 GATT/WTO	0.01 (−0.13, 0.16)	0.08 (−0.04, 0.21)	0.09 (−0.11, 0.29)
Common language	−0.01 (−0.12, 0.09)	−0.00 (−0.13, 0.13)	−0.00 (−0.15, 0.14)
Observations	600	600	601
Adjusted R^2	0.933	0.932	0.905
AIC	1671.2	1677.5	1886.5
BIC	1790.1	1796.4	1970.3

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

Table A.5: Coefficients and 95 percent confidence intervals for ADL models, including time fixed effects and heteroskedasticity-consistent standard errors.

| | DV = log US exports | | |
	Model 4: 500k threshold	Model 5: 1m threshold	Model 6: 25m threshold
LDV_{t-1}	0.80*** (0.68, 0.93)	0.83*** (0.72, 0.94)	0.82*** (0.71, 0.94)
LDV_{t-2}	0.12** (0.01, 0.24)	0.10 (−0.03, 0.22)	0.10 (−0.02, 0.22)
LDV_{t-3}	−0.04 (−0.18, 0.10)	−0.04 (−0.18, 0.10)	−0.04 (−0.18, 0.10)
LDV_{t-4}	0.09* (−0.01, 0.19)	0.08* (−0.01, 0.17)	0.09* (−0.01, 0.19)
Dyadic penalty$_t$	0.08 (−0.02, 0.19)	−0.31*** (−0.47, −0.15)	−0.04 (−0.23, 0.14)
Dyadic penalty$_{t-1}$	−0.02 (−0.13, 0.08)		−0.19* (−0.41, 0.03)
Dyadic penalty$_{t-2}$	−0.24*** (−0.38, −0.10)		−0.38 (−0.94, 0.17)
Dyadic penalty$_{t-3}$	−0.16* (−0.32, 0.01)		
Foreign-C2 penalty$_t$	0.00 (−0.05, 0.06)	−0.03 (−0.13, 0.07)	−0.06 (−0.18, 0.07)
Foreign-C2 penalty$_{t-1}$	0.10* (−0.00, 0.20)	0.08 (−0.06, 0.21)	0.14*** (0.04, 0.24)
Foreign-C2 penalty$_{t-2}$	0.04 (−0.13, 0.21)	−0.01 (−0.13, 0.11)	−0.00 (−0.17, 0.17)
Foreign-C2 penalty$_{t-3}$	0.18*** (0.09, 0.27)	0.18*** (0.07, 0.28)	0.18** (0.03, 0.34)
C2 GDP$_t$	0.50*** (0.25, 0.74)	0.48*** (0.24, 0.73)	0.47*** (0.23, 0.71)
C2 GDP$_{t-1}$	−0.33** (−0.59, −0.06)	−0.34** (−0.59, −0.08)	−0.34** (−0.62, −0.07)
C2 GDP$_{t-2}$	−0.13 (−0.41, 0.15)	−0.08 (−0.36, 0.19)	−0.08 (−0.35, 0.18)
C2 GDP$_{t-3}$	0.27** (0.00, 0.54)	0.21 (−0.06, 0.47)	0.26* (−0.01, 0.54)
C2 GDP$_{t-4}$	−0.27** (−0.53, −0.01)	−0.23* (−0.49, 0.03)	−0.27* (−0.55, 0.00)
US ally	−0.01 (−0.06, 0.04)	−0.01 (−0.06, 0.05)	−0.01 (−0.06, 0.04)
US rival	−0.03 (−0.10, 0.05)	−0.00 (−0.10, 0.09)	−0.04 (−0.11, 0.04)
C2 democracy	0.02 (−0.03, 0.08)	0.02 (−0.03, 0.07)	0.02 (−0.03, 0.07)
log Distance	−0.02 (−0.07, 0.04)	−0.03 (−0.09, 0.02)	−0.02 (−0.07, 0.04)
Contiguity	0.06 (−0.03, 0.14)	0.04 (−0.04, 0.13)	0.06 (−0.03, 0.14)
C2 EU	−0.02 (−0.08, 0.04)	−0.02 (−0.09, 0.04)	−0.02 (−0.08, 0.04)
C2 GATT/WTO	−0.03 (−0.08, 0.02)	−0.02 (−0.07, 0.03)	−0.02 (−0.07, 0.03)
Common language	0.04 (−0.02, 0.10)	0.04 (−0.02, 0.10)	0.04 (−0.02, 0.10)
Observations	599	596	598
Adjusted R^2	0.986	0.986	0.985
AIC	213.6	211.9	225.8
BIC	213.6	313.1	335.9

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

some other third party. As the main text shows, there are considerable differences in how these different penalty targets influence US imports and exports. Below, we present models where we aggregate these penalty types into a single yearly count (notably losing any between-dyad variation).

Tables A.6 and A.7 present the results, which are generally in line with those presented in the main text, though somewhat weaker. In particular, we find a significant coefficient for the immediate impact of penalties in two out of three import models, and only one out of three export models. These findings could make more sense when considered in light of the results from our main text—where US-third party penalties consistently show no association with US imports, while foreign-state 2 penalties show no association with US exports.

Table A.6: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors—combined penalty counts.

| | DV = log US imports | | |
	500k threshold	1m threshold	25m threshold
LDV_{t-1}	0.59*** (0.23, 0.94)	0.60*** (0.17, 1.03)	0.58** (0.11, 1.05)
LDV_{t-2}	0.20 (−0.18, 0.58)	0.00 (−0.51, 0.52)	0.05 (−0.54, 0.64)
LDV_{t-3}	0.16** (0.01, 0.31)	0.36*** (0.18, 0.54)	0.33*** (0.15, 0.51)
$Penalty_t$	−0.24** (−0.46, −0.02)	0.27 (−0.14, 0.69)	−0.39* (−0.82, 0.04)
$Penalty_{t-1}$	−0.07 (−0.17, 0.03)	0.01 (−0.11, 0.13)	−0.06 (−0.25, 0.13)
$Penalty_{t-2}$	0.23* (−0.03, 0.50)	−0.02 (−0.11, 0.07)	0.27 (−0.10, 0.64)
$Penalty_{t-3}$		0.18 (−0.15, 0.50)	
$Penalty_{t-4}$		−1.03 (−2.53, 0.47)	
US GDP_t	−25.79* (−54.81, 3.23)	29.81 (−6.81, 66.43)	−5.85 (−16.54, 4.84)
US GDP_{t-1}	42.16* (−0.24, 84.56)	21.14 (−19.77, 62.04)	14.39 (−3.97, 32.74)
US GDP_{t-2}	−39.12** (−71.62, −6.62)		−36.05* (−72.14, 0.03)
US GDP_{t-3}	19.71** (2.59, 36.84)		3.46 (−23.95, 30.87)
US GDP_{t-4}			14.16 (−4.41, 32.72)
C2 GDP_t	0.35 (−0.45, 1.15)	−0.15 (−1.31, 1.01)	0.22 (−0.67, 1.11)
C2 GDP_{t-1}	1.18 (−1.31, 3.67)	1.10 (−1.22, 3.41)	1.10 (−1.48, 3.68)
C2 GDP_{t-2}	−1.59 (−3.92, 0.73)	−0.89 (−2.25, 0.48)	−1.38 (−3.82, 1.07)
C2 GDP_{t-3}	0.15 (−0.85, 1.14)		0.12 (−0.75, 0.99)
US ally	0.05 (−0.13, 0.23)	0.05 (−0.13, 0.23)	0.08 (−0.12, 0.28)
US rival	−0.46* (−1.00, 0.07)	−0.57 (−1.26, 0.12)	−0.49 (−1.11, 0.13)
C2 democracy	0.10 (−0.06, 0.25)	0.11 (−0.07, 0.29)	0.13 (−0.04, 0.31)
log Distance	0.20 (−0.15, 0.55)	0.36 (−0.13, 0.85)	0.32 (−0.12, 0.77)
Contiguity	0.34 (−0.08, 0.76)	0.51* (−0.06, 1.09)	0.49* (−0.07, 1.06)
C2 EU	0.05 (−0.07, 0.17)	0.05 (−0.10, 0.20)	0.06 (−0.07, 0.20)
C2 GATT/WTO	0.05 (−0.10, 0.20)	0.04 (−0.21, 0.30)	0.10 (−0.13, 0.33)
Common language	−0.00 (−0.10, 0.10)	−0.02 (−0.15, 0.12)	−0.04 (−0.18, 0.09)
Constant	69.01 (−25.10, 163.13)	−1,192.56 (−2,955.14, 570.03)	228.00 (−133.77, 589.77)
Observations	689	608	606
Adjusted R^2	0.895	0.894	0.891

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

6   50m+ threshold models

Table A.8 presents models using a penalty threshold of 50 million US dollars. These results—in terms of coefficient signs and significance—are exactly in line with the models presented in the main paper.

Table A.7: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors—combined penalty counts.

	DV = log US exports		
	500k threshold	1m threshold	25m threshold
LDV_{t-1}	0.80*** (0.69, 0.92)	0.82*** (0.71, 0.93)	0.82*** (0.71, 0.93)
LDV_{t-2}	0.15** (0.03, 0.28)	0.12** (0.00, 0.25)	0.12** (0.00, 0.25)
LDV_{t-3}	−0.07 (−0.21, 0.06)	−0.07 (−0.21, 0.08)	−0.06 (−0.21, 0.09)
LDV_{t-4}	0.08* (−0.01, 0.18)	0.09* (−0.01, 0.18)	0.08 (−0.02, 0.18)
$Penalty_t$	0.00 (−0.01, 0.02)	−0.00 (−0.11, 0.11)	−0.09*** (−0.15, −0.02)
$Penalty_{t-1}$	−0.01 (−0.02, 0.00)	0.04 (−0.07, 0.14)	0.04 (−0.01, 0.08)
$Penalty_{t-2}$		0.03 (−0.01, 0.08)	0.11** (0.00, 0.22)
$Penalty_{t-3}$		0.01 (−0.02, 0.03)	0.03 (−0.09, 0.15)
$Penalty_{t-4}$		−0.18** (−0.33, −0.03)	0.10 (−0.09, 0.28)
US GDP_t	−0.46 (−1.85, 0.93)	2.60* (−0.04, 5.24)	−7.79** (−14.58, −1.01)
US GDP_{t-1}	3.32** (0.72, 5.93)	10.86*** (2.72, 18.99)	12.97*** (5.43, 20.51)
US GDP_{t-2}	−6.38*** (−8.73, −4.04)	−11.91*** (−18.63, −5.18)	−22.90*** (−34.18, −11.62)
US GDP_{t-3}		10.43** (1.51, 19.34)	6.73*** (1.68, 11.77)
US GDP_{t-4}		−5.15 (−12.94, 2.64)	
C2 GDP_t	0.60*** (0.35, 0.85)	0.52*** (0.25, 0.80)	0.56*** (0.30, 0.81)
C2 GDP_{t-1}	−0.50*** (−0.75, −0.24)	−0.38*** (−0.65, −0.11)	−0.46*** (−0.70, −0.22)
C2 GDP_{t-2}	−0.05 (−0.33, 0.22)	−0.14 (−0.43, 0.15)	−0.03 (−0.30, 0.23)
C2 GDP_{t-3}	0.20 (−0.06, 0.46)	0.28** (0.00, 0.57)	0.23* (−0.02, 0.49)
C2 GDP_{t-4}	−0.20* (−0.43, 0.03)	−0.24* (−0.51, 0.03)	−0.25* (−0.52, 0.02)
US ally	−0.01 (−0.06, 0.04)	−0.01 (−0.06, 0.04)	−0.01 (−0.06, 0.04)
US rival	−0.04 (−0.12, 0.03)	−0.05 (−0.13, 0.04)	−0.06 (−0.15, 0.03)
C2 democracy	0.02 (−0.03, 0.07)	0.02 (−0.03, 0.07)	0.02 (−0.03, 0.07)
log Distance	−0.01 (−0.08, 0.05)	−0.01 (−0.07, 0.05)	−0.01 (−0.07, 0.05)
Contiguity	0.07 (−0.03, 0.17)	0.07 (−0.03, 0.16)	0.07 (−0.03, 0.16)
C2 EU	−0.02 (−0.08, 0.04)	−0.02 (−0.08, 0.04)	−0.02 (−0.08, 0.04)
C2 GATT/WTO	−0.02 (−0.08, 0.04)	−0.02 (−0.07, 0.03)	−0.02 (−0.07, 0.04)
Common language	0.03 (−0.02, 0.09)	0.03 (−0.02, 0.09)	0.03 (−0.02, 0.09)
Constant	82.11*** (51.21, 113.02)	−159.31* (−342.45, 23.84)	256.53* (−34.55, 547.60)
Observations	604	604	604
Adjusted R^2	0.985	0.985	0.985

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

Table A.8: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors: 50m+ threshold.

	50m+ threshold, DV = imports	50m+ threshold, DV = exports
LDV_{t-1}	0.55* (−0.01, 1.11)	0.83*** (0.71, 0.94)
LDV_{t-2}	0.03 (−0.63, 0.68)	0.10 (−0.02, 0.23)
LDV_{t-3}	0.31*** (0.13, 0.50)	−0.03 (−0.17, 0.11)
LDV_{t-4}		0.07 (−0.03, 0.18)
Dyadic penalty$_t$	−3.79** (−6.91, −0.66)	−0.24** (−0.44, −0.04)
Dyadic penalty$_{t-1}$	−2.36 (−6.98, 2.27)	
US-third penalty$_t$	−0.02 (−0.07, 0.03)	−0.14*** (−0.19, −0.09)
US-third penalty$_{t-1}$		0.09** (0.01, 0.17)
US-third penalty$_{t-2}$		0.26*** (0.07, 0.45)
US-third penalty$_{t-3}$		0.15 (−0.06, 0.36)
US-third penalty$_{t-4}$		0.28* (−0.03, 0.59)
Foreign-C2 penalty$_t$	−0.74* (−1.56, 0.08)	−0.04 (−0.20, 0.13)
Foreign-C2 penalty$_{t-1}$		0.15** (0.02, 0.28)
Foreign-C2 penalty$_{t-2}$		−0.04 (−0.22, 0.14)
Foreign-C2 penalty$_{t-3}$		0.19*** (0.05, 0.33)
US GDP$_t$	5.18 (−2.27, 12.62)	−16.78*** (−28.34, −5.21)
US GDP$_{t-1}$	−7.30 (−21.92, 7.32)	17.73*** (11.58, 23.88)
US GDP$_{t-2}$	−1.54 (−15.03, 11.95)	−35.56*** (−49.14, −21.99)
US GDP$_{t-3}$	−2.06 (−15.99, 11.87)	9.82*** (5.89, 13.74)
US GDP$_{t-4}$	4.65 (−1.36, 10.65)	
C2 GDP$_t$	0.26 (−0.60, 1.12)	0.47*** (0.24, 0.70)
C2 GDP$_{t-1}$	0.41 (−1.45, 2.26)	−0.34** (−0.62, −0.06)
C2 GDP$_{t-2}$	−0.54 (−1.68, 0.60)	−0.09 (−0.38, 0.20)
C2 GDP$_{t-3}$		0.24* (−0.03, 0.51)
C2 GDP$_{t-4}$		−0.25* (−0.51, 0.01)
US ally	0.10 (−0.09, 0.29)	−0.01 (−0.06, 0.04)
US rival	−0.17 (−0.53, 0.18)	−0.03 (−0.10, 0.05)
C2 democracy	0.07 (−0.10, 0.24)	0.02 (−0.03, 0.07)
log Distance	0.22 (−0.12, 0.57)	−0.02 (−0.07, 0.04)
Contiguity	0.47** (0.01, 0.92)	0.06 (−0.03, 0.14)
C2 EU	0.00 (−0.16, 0.17)	−0.02 (−0.08, 0.05)
C2 GATT/WTO	0.07 (−0.13, 0.28)	−0.02 (−0.07, 0.03)
Common language	−0.00 (−0.15, 0.15)	0.04 (−0.01, 0.10)
Constant	22.99 (−115.77, 161.75)	578.33** (74.22, 1,082.44)
Observations	608	604
Adjusted R^2	0.905	0.985
AIC	1904.5	237.2
BIC	2010.3	378.2

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

7 No threshold models

Table A.9 presents models counting every OFAC penalty, regardless of size. As expected, results are somewhat weaker in these models, given that very small penalties might not serve as effective signals to firms considering business with US-sanctioned states. This fact further justifies our decision to use thresholds rather than assume (most likely in error) that there is a linear association between penalty size and subsequent trade with US targets.

Table A.9: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors: no penalty threshold.

	no threshold, DV = imports	no threshold, DV = exports
LDV_{t-1}	0.53*** (0.13, 0.92)	0.81*** (0.69, 0.92)
LDV_{t-2}	0.23 (−0.22, 0.68)	0.13** (0.01, 0.25)
LDV_{t-3}	0.17** (0.02, 0.32)	−0.08 (−0.22, 0.07)
LDV_{t-4}		0.10* (0.00, 0.20)
Dyadic penalty$_t$	−0.89 (−2.12, 0.35)	−0.02 (−0.11, 0.06)
Dyadic penalty$_{t-1}$	−0.10 (−1.90, 1.69)	−0.06* (−0.11, 0.00)
Dyadic penalty$_{t-2}$	0.42* (−0.04, 0.88)	−0.07* (−0.14, 0.01)
Dyadic penalty$_{t-3}$		0.04 (−0.01, 0.09)
Dyadic penalty$_{t-4}$		0.06 (−0.02, 0.14)
US-third penalty$_t$	−0.00 (−0.01, 0.01)	0.02*** (0.00, 0.03)
US-third penalty$_{t-1}$		−0.01 (−0.03, 0.01)
US-third penalty$_{t-2}$		−0.03** (−0.05, −0.00)
US-third penalty$_{t-3}$		0.00 (−0.00, 0.01)
US-third penalty$_{t-4}$		0.01*** (0.00, 0.01)
Foreign-C2 penalty$_t$	−1.03** (−1.83, −0.23)	−0.02 (−0.11, 0.08)
Foreign-C2 penalty$_{t-1}$	0.12 (−0.71, 0.95)	0.05 (−0.07, 0.18)
Foreign-C2 penalty$_{t-2}$	0.37* (−0.07, 0.81)	−0.03 (−0.14, 0.07)
Foreign-C2 penalty$_{t-3}$	0.91*** (0.55, 1.27)	0.03 (−0.08, 0.15)
US GDP$_t$	5.08*** (1.63, 8.53)	0.43 (−0.84, 1.71)
US GDP$_{t-1}$	−7.30*** (−12.73, −1.87)	
C2 GDP$_t$	0.21 (−0.57, 1.00)	0.59*** (0.35, 0.84)
C2 GDP$_{t-1}$	0.69 (−0.81, 2.19)	−0.53*** (−0.80, −0.26)
C2 GDP$_{t-2}$	−0.76 (−2.37, 0.85)	0.03 (−0.28, 0.33)
C2 GDP$_{t-3}$	−0.03 (−1.33, 1.27)	0.15 (−0.08, 0.38)
C2 GDP$_{t-4}$		−0.19* (−0.42, 0.03)
US ally	0.10 (−0.09, 0.29)	−0.01 (−0.06, 0.05)
US rival	−0.24 (−0.59, 0.11)	−0.05 (−0.13, 0.03)
C2 democracy	0.12 (−0.06, 0.29)	0.02 (−0.03, 0.08)
log Distance	0.32 (−0.13, 0.78)	−0.00 (−0.07, 0.06)
Contiguity	0.50* (−0.07, 1.07)	0.08 (−0.02, 0.18)
C2 EU	0.00 (−0.13, 0.13)	−0.02 (−0.09, 0.04)
C2 GATT/WTO	−0.01 (−0.14, 0.12)	−0.02 (−0.07, 0.03)
Common language	−0.02 (−0.13, 0.09)	0.04 (−0.02, 0.10)
Constant	48.13* (−7.11, 103.36)	−10.16 (−39.53, 19.21)
Observations	689	604
Adjusted R^2	0.917	0.985

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

8 ICEWS coding

To code the existence of a sanction, we first create running counts of impositions and easing of dyadic sanctions. In a given year, as long as the running count of impositions is greater than that of easings, we consider sanctions to be in place. We also consider sanctions to be in place in the year prior to

the year in which sanction were eased, if there were no new impositions in the mean time. Given that ICEWS uses a proprietary algorithm to collect events data, we cannot be sure exactly the criteria for identification of imposition and easing. However, a glance at the data confirms that ICEWS collects indicators of sanctions with respect to state-based programs as well as entities listed on the US Specially Designated Nationals (SDN) list.

Notably, our coding of sanctions could include relatively minor US sanctions against state 2. While we are unable to categorize by sanction severity, this coding is useful to provide data for recent years, whereas pre-existing measures of sanction presence typically end around 2005, which is barely after our data on OFAC enforcement begin.

Figure A.1 identifies each sanction year in our data. Countries are listed along the y-axis and years along the x-axis. Black areas identify sanctioned years that are included in our models.

9   Controlling for sanction severity/salience to US firms

Next, we present models that include an indicator of sanction salience to US firms, which indirectly captures sanction severity—particularly with respect to escalation and de-escalation. We use ICEWS data to code this variable, as other data sources are less suited to this purpose.[3] As noted in the main text, ICEWS data is somewhat limited in terms of describing sanctions, offering only event counts. While this limitation prevents coding of severity level *per se*, it can offer information on change in severity—for example, if a given state-year sees no new mentions of sanctions imposition but several instances of sanctions easing. More importantly, the overall frequency of impositions and easings provides useful information regarding how salient sanctions are in the media. Assuming that media typically respond to perceived consumer demand for information, ICEWS thus provides us with useful indicators of the salience of sanction escalation and de-escalation from the perspective of US firms. Accordingly, we replicate Tables 1 and 2 with the addition of a variable identifying sanction salience as the count of ICEWS-coded impositions minus the count of ICEWS-coded easings.

Tables A.10 and A.11 present the results of these robustness check models. All of our main results are consistent, whereas the coefficient for the salience measure is not statistically significant in any model.[4]

10   Summary statistics

Finally, we present summary statistics for the variables presented in our models—including lags of our key dependent and explanatory variables.

References

Early, Bryan R. and Keith Preble. 2020. "Going Fishing Versus Hunting Whales: Explaining Changes in How the U.S. Enforces Economic Sanctions." *Security Studies* .

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[3]Other sanctions data, most notably TIES, does not provide us with useful indicators of severity for two key reasons. First, TIES data on new cases end in 2005, offering only two years of overlap with our enforcement data. Second, while TIES code provide us with a count of imposed sanction cases by target-year, its variable on severity with respect to each episode are summed across the entire duration of the episode.

[4]Notably, this measure is quite skewed, ranging from -20 to nearly 800); future research thus should consider severity—and perception thereof by domestic actors—in greater detail.
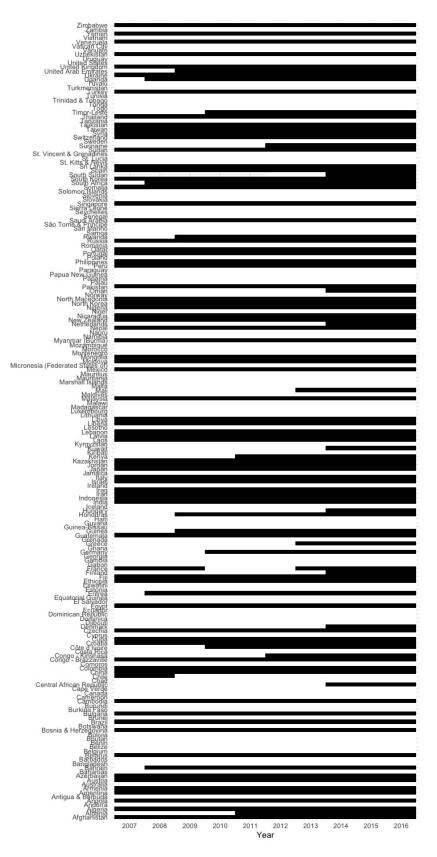
Figure A.1: Sanctioned state years

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Table A.10: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors—controlling for severity.

| | DV = log US imports | | |
	Model 1: 500k threshold	Model 2: 1m threshold	Model 3: 25m threshold
LDV_{t-1}	0.66*** (0.32, 0.99)	0.67*** (0.31, 1.03)	0.66*** (0.34, 0.99)
LDV_{t-2}	−0.09 (−0.65, 0.47)	−0.13 (−0.63, 0.36)	−0.06 (−0.61, 0.49)
LDV_{t-3}	0.40*** (0.17, 0.63)	0.46*** (0.24, 0.68)	0.36*** (0.10, 0.62)
LDV_{t-4}		−0.06 (−0.13, 0.01)	
Dyadic penalty$_t$	−1.46*** (−2.17, −0.74)	−1.89*** (−2.81, −0.97)	−5.69*** (−8.82, −2.56)
Dyadic penalty$_{t-1}$	−0.49 (−2.18, 1.19)	1.28 (−0.56, 3.12)	
Dyadic penalty$_{t-2}$	0.11 (−2.28, 2.51)	−2.20** (−4.18, −0.21)	
Dyadic penalty$_{t-3}$		−2.84** (−5.03, −0.64)	
Dyadic penalty$_{t-4}$		1.10 (−0.77, 2.96)	
US-third penalty$_t$	0.01 (−0.02, 0.05)	0.01 (−0.07, 0.09)	0.10* (−0.01, 0.22)
US-third penalty$_{t-1}$		0.06** (0.00, 0.11)	0.16* (−0.00, 0.32)
US-third penalty$_{t-2}$			0.12 (−0.09, 0.33)
US-third penalty$_{t-3}$			0.20 (−0.10, 0.51)
US-third penalty$_{t-4}$			0.40 (−0.08, 0.87)
Foreign-C2 penalty$_t$	−0.64 (−1.45, 0.17)	−1.27*** (−2.06, −0.47)	−1.93** (−3.42, −0.44)
Foreign-C2 penalty$_{t-1}$	0.56 (−1.02, 2.14)	1.21** (0.04, 2.38)	1.16 (−0.37, 2.68)
Foreign-C2 penalty$_{t-2}$	−0.22 (−0.94, 0.50)	0.07 (−0.39, 0.53)	0.27 (−0.26, 0.79)
Foreign-C2 penalty$_{t-3}$	0.70*** (0.19, 1.21)	1.20* (0.00, 2.39)	0.94* (−0.16, 2.04)
Foreign-C2 penalty$_{t-4}$	−2.95*** (−5.04, −0.85)	−2.26*** (−3.88, −0.63)	
US GDP$_t$	6.45*** (1.91, 10.99)	5.49* (−0.64, 11.62)	−8.55 (−24.67, 7.56)
US GDP$_{t-1}$	−10.47*** (−18.21, −2.72)	−8.50* (−18.36, 1.36)	−10.93** (−21.84, −0.03)
C2 GDP$_t$	−0.15 (−1.05, 0.76)	−0.24 (−1.16, 0.69)	0.39 (−0.20, 0.97)
C2 GDP$_{t-1}$	0.90 (−0.31, 2.10)	0.94 (−0.58, 2.45)	0.16 (−1.03, 1.36)
C2 GDP$_{t-2}$	−1.11 (−2.61, 0.40)	−0.48 (−1.70, 0.73)	−0.07 (−1.39, 1.24)
C2 GDP$_{t-3}$	0.77* (−0.02, 1.57)	0.16 (−0.69, 1.02)	0.09 (−0.90, 1.07)
C2 GDP$_{t-4}$	−0.39 (−1.25, 0.46)	−0.30 (−1.10, 0.50)	−0.52 (−1.47, 0.44)
Sanction severity$_t$	−0.00 (−0.00, 0.00)	−0.00 (−0.01, 0.00)	−0.01 (−0.02, 0.01)
Sanction severity$_{t-1}$	−0.00 (−0.01, 0.00)	−0.00 (−0.01, 0.00)	0.00 (−0.00, 0.01)
Sanction severity$_{t-2}$	0.01** (0.00, 0.03)	0.03 (−0.03, 0.09)	−0.02 (−0.08, 0.04)
Sanction severity$_{t-3}$		0.00 (−0.09, 0.10)	0.07 (−0.04, 0.19)
Sanction severity$_{t-4}$		−0.03 (−0.08, 0.03)	−0.05 (−0.11, 0.02)
US ally	0.06 (−0.11, 0.23)	0.00 (−0.16, 0.17)	0.06 (−0.12, 0.24)
US rival	−0.26 (−0.79, 0.27)	−0.27* (−0.59, 0.04)	−0.34* (−0.75, 0.06)
C2 democracy	0.06 (−0.10, 0.23)	0.04 (−0.10, 0.19)	0.11 (−0.05, 0.27)
log Distance	0.02 (−0.19, 0.23)	−0.09 (−0.27, 0.09)	0.14 (−0.03, 0.31)
Contiguity	0.23 (−0.07, 0.52)	0.08 (−0.18, 0.33)	0.36** (0.07, 0.65)
C2 EU	0.09 (−0.06, 0.25)	0.06 (−0.08, 0.19)	0.14 (−0.03, 0.32)
C2 GATT/WTO	0.03 (−0.13, 0.19)	0.09 (−0.05, 0.24)	0.09 (−0.08, 0.27)
Common language	−0.06 (−0.22, 0.09)	0.02 (−0.12, 0.17)	0.00 (−0.14, 0.14)
Constant	93.36** (11.21, 175.52)	70.68 (−26.28, 167.64)	452.67 (−132.97, 1,038.32)
Observations	605	605	605
Adjusted R^2	0.928	0.94	0.921

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

Table A.11: Coefficients and 95 percent confidence intervals for ADL models with heteroskedasticity-consistent standard errors—controlling for severity.

| | DV = log US exports | | |
	Model 4: 500k threshold	Model 5: 1m threshold	Model 6: 25m threshold
LDV_{t-1}	0.81*** (0.68, 0.93)	0.82*** (0.70, 0.94)	0.82*** (0.71, 0.94)
LDV_{t-2}	0.12** (0.01, 0.24)	0.10 (−0.03, 0.22)	0.10 (−0.02, 0.22)
LDV_{t-3}	−0.04 (−0.18, 0.10)	−0.03 (−0.17, 0.11)	−0.04 (−0.18, 0.11)
LDV_{t-4}	0.09* (−0.01, 0.19)	0.08* (−0.01, 0.18)	0.09* (−0.01, 0.19)
Dyadic penalty$_t$	−0.08 (−0.20, 0.04)	−0.67*** (−0.88, −0.46)	−0.27*** (−0.42, −0.12)
Dyadic penalty$_{t-1}$	−0.02 (−0.13, 0.09)	−0.35*** (−0.53, −0.17)	
Dyadic penalty$_{t-2}$	−0.11 (−0.28, 0.05)		
Dyadic penalty$_{t-3}$	−0.30*** (−0.51, −0.09)		
US-third penalty$_t$	−0.15*** (−0.25, −0.06)	−0.41*** (−0.59, −0.22)	−0.14*** (−0.19, −0.09)
US-third penalty$_{t-1}$	0.01 (−0.01, 0.04)	−0.28*** (−0.41, −0.15)	0.09** (0.01, 0.17)
US-third penalty$_{t-2}$	0.14*** (0.05, 0.24)	0.12*** (0.06, 0.19)	0.28*** (0.09, 0.47)
US-third penalty$_{t-3}$	−0.12*** (−0.18, −0.06)		0.17 (−0.04, 0.38)
US-third penalty$_{t-4}$			0.31* (−0.00, 0.62)
Foreign-C2 penalty$_t$	−0.00 (−0.06, 0.05)	−0.02 (−0.15, 0.10)	−0.06 (−0.20, 0.09)
Foreign-C2 penalty$_{t-1}$	0.10* (−0.00, 0.19)	0.09 (−0.03, 0.21)	0.17*** (0.07, 0.26)
Foreign-C2 penalty$_{t-2}$	0.03 (−0.13, 0.18)	−0.00 (−0.12, 0.11)	0.00 (−0.12, 0.13)
Foreign-C2 penalty$_{t-3}$	0.17*** (0.08, 0.26)	0.18*** (0.09, 0.28)	0.19*** (0.06, 0.32)
US GDP$_t$	−17.04*** (−28.68, −5.41)	0.26 (−1.87, 2.38)	−18.06*** (−29.79, −6.34)
US GDP$_{t-1}$	46.72*** (21.44, 72.00)	3.17* (−0.13, 6.48)	17.96*** (11.76, 24.16)
US GDP$_{t-2}$	−52.76*** (−77.55, −27.97)	−31.74*** (−42.85, −20.63)	−36.74*** (−50.74, −22.75)
US GDP$_{t-3}$	19.19*** (9.78, 28.61)	15.34*** (8.13, 22.54)	9.91*** (5.95, 13.88)
US GDP$_{t-4}$		15.66*** (7.08, 24.24)	
C2 GDP$_t$	0.50*** (0.25, 0.75)	0.48*** (0.24, 0.72)	0.49*** (0.25, 0.72)
C2 GDP$_{t-1}$	−0.33** (−0.60, −0.06)	−0.32** (−0.59, −0.06)	−0.36** (−0.64, −0.08)
C2 GDP$_{t-2}$	−0.13 (−0.41, 0.15)	−0.09 (−0.35, 0.18)	−0.08 (−0.35, 0.20)
C2 GDP$_{t-3}$	0.26* (−0.00, 0.53)	0.21 (−0.07, 0.49)	0.24* (−0.03, 0.50)
C2 GDP$_{t-4}$	−0.27** (−0.53, −0.01)	−0.24* (−0.51, 0.03)	−0.26* (−0.52, 0.01)
Sanction severity$_t$	0.00 (−0.00, 0.00)	0.00 (−0.00, 0.00)	0.00 (−0.00, 0.00)
US ally	−0.01 (−0.07, 0.04)	−0.01 (−0.06, 0.04)	−0.02 (−0.07, 0.03)
US rival	−0.05 (−0.12, 0.02)	−0.02 (−0.10, 0.07)	−0.05 (−0.13, 0.03)
C2 democracy	0.02 (−0.03, 0.07)	0.02 (−0.03, 0.07)	0.02 (−0.03, 0.07)
log Distance	−0.03 (−0.08, 0.03)	−0.04 (−0.10, 0.01)	−0.02 (−0.07, 0.03)
Contiguity	0.04 (−0.04, 0.12)	0.03 (−0.05, 0.11)	0.05 (−0.03, 0.13)
C2 EU	−0.01 (−0.07, 0.05)	−0.02 (−0.08, 0.05)	−0.01 (−0.08, 0.05)
C2 GATT/WTO	−0.03 (−0.08, 0.02)	−0.02 (−0.07, 0.03)	−0.02 (−0.08, 0.03)
Common language	0.04 (−0.02, 0.09)	0.04 (−0.02, 0.10)	0.04 (−0.02, 0.10)
Constant	91.41*** (28.52, 154.30)	−60.34* (−124.65, 3.97)	628.23** (118.78, 1,137.68)
Observations	606	605	605
Adjusted R^2	0.986	0.986	0.985

* p less than 0.1, ** p less than 0.05, *** p less than 0.01

Table A.12: Summary statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Year	1,027	2,009.6	3.7	2,003	2,007	2,013	2,015
log Exports$_t$	1,027	20.6	2.6	8.0	18.7	22.8	26.0
log Exports$_{t-1}$	972	20.6	2.6	8.0	18.6	22.8	26.0
log Exports$_{t-2}$	911	20.5	2.6	8.0	18.6	22.7	25.9
log Exports$_{t-3}$	845	20.5	2.6	8.0	18.5	22.6	25.9
log Exports$_{t-4}$	772	20.5	2.6	8.0	18.5	22.6	25.8
log Imports$_t$	1,027	20.3	4.3	0.0	18.3	23.3	26.6
log Imports$_{t-1}$	972	20.3	4.2	0.0	18.3	23.2	26.6
log Imports$_{t-2}$	911	20.3	4.2	0.0	18.3	23.2	26.6
log Imports$_{t-3}$	845	20.3	4.1	0.0	18.3	23.2	26.5
log Imports$_{t-4}$	772	20.3	4.1	0.0	18.3	23.1	26.5
Dyadic 500k+$_t$	1,027	0.04	0.3	0	0	0	3
Dyadic 500k+$_{t-1}$	972	0.04	0.3	0.0	0.0	0.0	3.0
Dyadic 500k+$_{t-2}$	911	0.04	0.3	0.0	0.0	0.0	3.0
Dyadic 500k+$_{t-3}$	845	0.03	0.2	0.0	0.0	0.0	3.0
Dyadic 500k+$_{t-4}$	772	0.03	0.2	0.0	0.0	0.0	3.0
Dyadic 1m+$_t$	1,027	0.02	0.2	0	0	0	2
Dyadic 1m+$_{t-1}$	972	0.02	0.2	0.0	0.0	0.0	2.0
Dyadic 1m+$_{t-2}$	911	0.02	0.2	0.0	0.0	0.0	2.0
Dyadic 1m+$_{t-3}$	845	0.02	0.2	0.0	0.0	0.0	2.0
Dyadic 1m+$_{t-4}$	772	0.02	0.2	0.0	0.0	0.0	2.0
Dyadic 25m+$_t$	1,027	0.01	0.1	0	0	0	1
Dyadic 25m+$_{t-1}$	972	0.01	0.1	0.0	0.0	0.0	1.0
Dyadic 25m+$_{t-2}$	911	0.01	0.1	0.0	0.0	0.0	1.0
Dyadic 25m+$_{t-3}$	845	0.005	0.1	0.0	0.0	0.0	1.0
Dyadic 25m+$_{t-4}$	772	0.01	0.1	0.0	0.0	0.0	1.0
US-third 500k+$_t$	1,027	3.3	2.3	0	2	4	8
US-third 500k+$_{t-1}$	972	3.2	2.4	0.0	2.0	5.0	8.0
US-third 500k+$_{t-2}$	911	3.3	2.5	0.0	1.0	5.0	8.0
US-third 500k+$_{t-3}$	845	2.9	2.4	0.0	1.0	4.0	8.0
US-third 500k+$_{t-4}$	772	2.9	2.5	0.0	1.0	4.0	8.0
Foreign-C2 500k+$_t$	1,027	0.04	0.3	0	0	0	4
Foreign-C2 500k+$_{t-1}$	972	0.04	0.3	0.0	0.0	0.0	4.0
Foreign-C2 500k+$_{t-2}$	911	0.04	0.3	0.0	0.0	0.0	4.0
Foreign-C2 500k+$_{t-3}$	845	0.03	0.3	0.0	0.0	0.0	4.0
Foreign-C2 500k+$_{t-4}$	772	0.02	0.2	0.0	0.0	0.0	3.0
US-third 1m+$_t$	1,027	2.1	1.6	0	1	3	5
US-third 1m+$_{t-1}$	972	2.0	1.7	0.0	0.0	4.0	5.0
US-third 1m+$_{t-2}$	911	2.0	1.8	0.0	0.0	4.0	5.0
US-third 1m+$_{t-3}$	845	1.7	1.8	0.0	0.0	3.0	5.0
US-third 1m+$_{t-4}$	772	1.7	1.9	0.0	0.0	3.0	5.0
Foreign-C2 1m+$_t$	1,027	0.04	0.3	0	0	0	4
Foreign-C2 1m+$_{t-1}$	972	0.04	0.3	0.0	0.0	0.0	4.0
Foreign-C2 1m+$_{t-2}$	911	0.03	0.3	0.0	0.0	0.0	4.0
Foreign-C2 1m+$_{t-3}$	845	0.03	0.2	0.0	0.0	0.0	4.0
Foreign-C2 1m+$_{t-4}$	772	0.02	0.2	0.0	0.0	0.0	3.0
US-third 25m+$_t$	1,027	0.6	1.3	0	0	0	4
US-third 25m+$_{t-1}$	972	0.7	1.4	0.0	0.0	0.0	4.0
US-third 25m+$_{t-2}$	911	0.7	1.4	0.0	0.0	0.0	4.0
US-third 25m+$_{t-3}$	845	0.5	1.3	0.0	0.0	0.0	4.0
US-third 25m+$_{t-4}$	772	0.5	1.3	0.0	0.0	0.0	4.0
Foreign-C2 25m+$_t$	1,027	0.03	0.2	0	0	0	3
Foreign-C2 25m+$_{t-1}$	972	0.03	0.2	0.0	0.0	0.0	3.0
Foreign-C2 25m+$_{t-2}$	911	0.02	0.2	0.0	0.0	0.0	3.0
Foreign-C2 25m+$_{t-3}$	845	0.02	0.2	0.0	0.0	0.0	3.0
Foreign-C2 25m+$_{t-4}$	772	0.02	0.1	0.0	0.0	0.0	2.0
log US GDP$_t$	1,027	23.3	0.05	23.2	23.3	23.4	23.4
log C2 GDP$_t$	979	18.2	2.0	13.0	16.6	19.6	22.9
log Distance	1,027	9.2	0.4	7.6	9.0	9.4	9.7
Contiguity	1,025	0.01	0.1	0.0	0.0	0.0	1.0
Common language	1,027	0.4	0.5	0	0	1	1
C2 EU	1,027	0.1	0.3	0	0	0	1
C2 GATT/WTO	1,027	0.6	0.5	0	0	1	1
US ally	1,027	0.04	0.2	0	0	0	1
US rival	1,027	0.1	0.3	0	0	0	1
C2 Democracy	1,027	0.4	0.5	0	0	1	1