Appendix A

Table A1: Variables and Data Sources for Dyadic MID Initiation Models

Variable	Measurement	Data Source
Expected Air Superiority (EAS)	State A's CAP2 share/(State A + State B's CAP2 share)	Author
Rival	=1 if Thompson and Dreyer rivalry	Thompson and Dreyer (2011)
Dem Initiator	=1 if State A's polity2 >= 6	Marshall, Jaggers, and Gurr (2010)
Dem Target	=1 if State B's polity2 >= 6	Marshall, Jaggers, and Gurr (2010)
Joint Democracy	=1 if both Initiator and Target polity2 >= 6	Marshall, Jaggers, and Gurr (2010)
Distance	Capital to Capital, Cshapes	Weidman et al (2010)
Contiguity	=1 if < 400 miles of water separation; COW version 3.2	Stinnet et al (2002)
Portfolio Similarity	Unweighted S; COW alliances version 4.1; generated from Eugene	Signorino and Ritter (1999); Bennett and Stam (2000); Gibler (2009)
Peace Years, Squared, and Cubed	Time since last dyadic MID, squared, and cubed	Carter and Signorino (2010)
MID Initiation	MID version 4.2; Dyadic MID version 3.0	Palmer et al (2015); Maoz et al (2018)

Data generated via Eugene (Bennett and Stam, 2000).

Bennett, D. Scott and Allan C. Stam. 2000. EUGene: A Conceptual Manual. *International Interactions* 26 (2): 179-204

Carter, David B. and Curtis S. Signorino. 2010. Back to the Future: Modeling Time Dependence in Binary Data. *Political Analysis* 18 (3): 271-292.

Correlates of War Project. Direct Contiguity Data, 1816-2016. Version 3.2.

Gibler, Douglas M. 2009. International military alliances, 1648-2008. CQ Press.

Leeds, Brett Ashley, Jeffrey M. Ritter, Sara McLaughlin Mitchell, and Andrew G. Long. 2002. Alliance Treaty Obligations and Provisions. *International Interactions* 28 (2): 237-260.

Maoz, Zeev, Paul L. Johnson, Jasper Kaplan, Fiona Ogunkoya, and Aaron Shreve. 2018. The Dyadic Militarized Interstate Disputes (MIDs) Dataset Version 3.0: Logic, Characteristics, and Comparisons to Alternative Datasets, *Journal of Conflict Resolution*, DOI: http://journals.sagepub.com/doi/full/10.1177/0022002718784158.

Marshall, Monty G., Keith Jaggers, and Ted Robert Gurr. 2010. *Polity IV Project: Dataset Users' Manual*. College Park, MD: University of Maryland. Available at http://www.systemicpeace.org/inscr/p4manualv2010.pdf.

Palmer, Glenn, Vito D'Orazio, Michael Kenwick, and Matthew Lane. 2015. "The Mid4 Dataset, 2002–2010: Procedures, Coding Rules and Description." *Conflict Management and Peace Science* 32: 222-42.

Signorino, Curtis S. and Jeffrey M. Ritter. 1999. Tau-b or Not Tau-b: Measuring the Similarity of Foreign Policy Positions. *International Studies Quarterly* 43 (1): 115-144.

Stinnett, Douglas M., Jaroslav Tir, Philip Schafer, Paul F. Diehl, and Charles Gochman. 2002. "The Correlates of War Project Direct Contiguity Data, Version 3." *Conflict Management and Peace Science* 19(2):58-66.

Thompson, William R. and David Dreyer. 2011. *Handbook of International Rivalries*. Washington, DC: CQ Press.

Weidmann, Nils B., Doreen Kuse and Kristian Skrede Gleditsch. 2010. "The Geography of the International System: The CShapes Dataset." *International Interactions* 36(1).

Table A2: Air Power Models 1-3

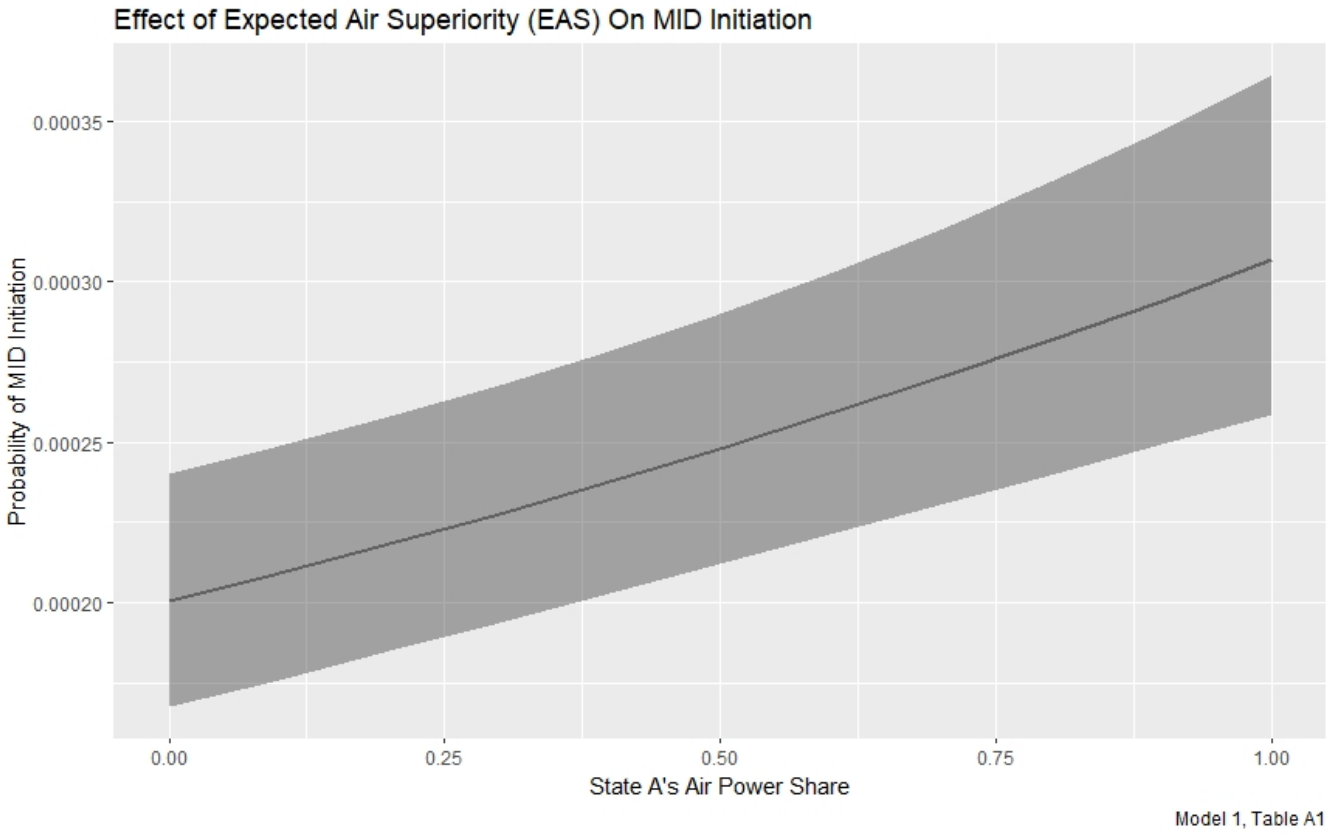
	Dependent variable:		
	Dyadic MID Initiation		
	All Initiators	Dem Initiators	Aut Initiators
EAS	0.426***	0.709***	0.267***
	(0.081)	(0.135)	(0.103)
Rival	1.542***	1.381***	1.558***
	(0.079)	(0.153)	(0.093)
Dem Initiator	0.484***		
	(0.083)		
Dem Target	0.542***	−0.476***	0.593***
	(0.082)	(0.107)	(0.084)
Distance	−0.0003***	−0.0003***	−0.0002***
	(0.00002)	(0.00003)	(0.00003)
Contiguous	2.495***	2.065***	2.862***
	(0.100)	(0.145)	(0.142)
Portfolio Similarity	−0.275***	−0.271**	−0.261**
	(0.083)	(0.124)	(0.112)
Peace Years	−0.133***	−0.142***	−0.130***
	(0.006)	(0.009)	(0.008)
Peace Years Sq	0.002***	0.002***	0.002***
	(0.0001)	(0.0002)	(0.0002)
Peace Years Cubed	−0.00001***	−0.00001***	−0.00001***
	(0.00000)	(0.00000)	(0.00000)
Joint Democracy	−1.070***		
	(0.131)		
Constant	−5.267***	−4.620***	−5.529***
	(0.142)	(0.198)	(0.196)
Observations	766,313	317,040	449,273
Log Likelihood	−6,060.301	−2,469.153	−3,570.018
Akaike Inf. Crit.	12,144.600	4,958.306	7,160.037

Note: *p<0.1; **p<0.05; ***p<0.01
Two-tail significance levels; Clustered standard errors

Table A3: Air Power Models 4-7

	Dependent variable:			
	Dyadic MID Initiation			
	Contiguous	Not Contiguous	Rivals	Not Rivals
EAS	0.476***	0.361***	0.485**	0.446***
	(0.108)	(0.125)	(0.193)	(0.090)
Rival	1.354***	3.878***		
	(0.081)	(0.233)		
Dem Initiator	0.178	1.017***	−0.166	0.688***
	(0.112)	(0.144)	(0.174)	(0.098)
Dem Target	0.501***	0.781***	0.439***	0.599***
	(0.100)	(0.152)	(0.155)	(0.098)
Distance	−0.00001	−0.0003***	0.0001	−0.0003***
	(0.0001)	(0.00003)	(0.0001)	(0.00003)
Contiguous			0.885***	2.559***
			(0.283)	(0.104)
Portfolio Similarity	−0.201*	−0.073	−0.013	−0.293***
	(0.105)	(0.150)	(0.173)	(0.097)
Peace Years	−0.129***	−0.125***	−0.109***	−0.139***
	(0.008)	(0.009)	(0.013)	(0.007)
Peace Years Sq	0.002***	0.002***	0.002***	0.002***
	(0.0002)	(0.0002)	(0.0003)	(0.0001)
Peace Years Cubed	−0.00001***	−0.00001***	−0.00001***	−0.00001***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Joint Democracy	−0.858***	−1.268***	−0.407	−1.289***
	(0.173)	(0.212)	(0.287)	(0.150)
Constant	−2.713***	−5.895***	−2.457***	−5.288***
	(0.141)	(0.221)	(0.363)	(0.158)
Observations	28,488	737,825	3,408	762,905
Log Likelihood	−2,990.870	−2,987.661	−1,105.389	−4,901.749
Akaike Inf. Crit.	6,003.740	5,997.321	2,232.779	9,825.499

Note: *p<0.1; **p<0.05; ***p<0.01
Two-tail significance levels; Clustered standard errors


Effect of Expected Air Superiority (EAS) On MID Initiation
Probability of MID Initiation
0.00035
0.00030
0.00025
0.00020
0.00
0.25
0.50
0.75
1.00
State A's Air Power Share
Model 1, Table A1

Appendix B

Country Air Power Dataset Codebook

Variables and Coding:

Country-Year Data:

For each type of fighter or attack aircraft owned by a country during the years 1973-2013, we record the designation, technological generation, number of squadrons and number of aircraft in inventory. This results in 4 variables per fighter type. The largest number of different fighter/attack aircraft in service with a state for a given year is 32, thus the dataset includes 32 separate groupings of the four variables listed below.

Fighter/Attack Type(X): Name or alphanumeric designation (e.g. "F-15C/D", "Dassault Rafael") of a class of aircraft owned by the listed state in the listed year.

Fighter/Attack Type(X) Generation: This column includes the numerical technology generation to which each type of aircraft has been assigned.

Assignment to a technological generation is based upon the characteristics of a fighter in five separate areas –weapons, speed, avionics, stealth, and airframe/maneuverability. Tirpak (2009) –our source for the description of fighter generations –notes that a step-like or generational nature is forced upon the progress of fighter technology by the aircraft design cycle. Once built, a new fighter will generally be upgraded many times as new technologies become available. Despite this, new technologies are eventually developed that cannot be incorporated into the existing aircraft. For example, adding delta wings to a straight-winged airframe would likely result in an unflyable aircraft. Similarly, more advanced radar systems make greater demands on an aircraft in terms of electrical power and heat dissipation, meaning that powerful new radar units often cannot be incorporated into older airframes. Once a number of such incompatible technologies have been developed so as to make the benefit of designing a new clean-sheet fighter outweigh the cost, a new fighter is designed to incorporate these technologies that will possess radically more advanced capabilities than its predecessor. We take advantage of this enforced generational nature of fighter technology advancement in developing a measure of technology.

Assignment of a generational "score" for a given fighter in each of the five catagories listed above is based on the use of certain key words or inclusion of key descriptive characteristics by our technical sources in describing the aircraft. A summary of key words and the generations they are associated with appears below for each category. In cases where a definition for a given category overlaps (e.g. both Gen 0 and Gen 1 fighters use guns and unguided weapons), the generation score for that category was determined by the highest generation the aircraft falls into across the other categories. For example, the "weapons" score for a subsonic, jet-driven aircraft that uses only guns and unguided weapons would be "1", as the remaining technological characteristics of the aircraft place it among the early jet-fighters of Generation 1 rather than among the late propeller-driven fighters of World War II (Gen 0). In our "basic" typology, used to construct *CAP1*, described below, in cases where an aircraft possesses

characteristics of more than one generation, assignment to a classification is based upon an average, rounded in the direction of the score assigned to the aircraft's weapons. For the "expanded" typology used to construct *CAP2*, these aircraft are instead coded at the mid-point between the neighboring generations to which its components belong.

	Weapons	Speed/Engine	Avionics/Radar	Stealth/Visibility	Airframe/Maneuver
Gen 0	Unguided Weapons	Piston-driven	None*	None	Strait-Wing airframe
Gen 1	Unguided Weapons	Jet-powered + Low subsonic	None*	None	Strait-wing airframe
Gen 2	Infrared-Seeking Missiles	Jet-powered + High subsonic	Basic radar, Range-finding radar	None	Swept-wing airframe
Gen 3	Beyond visual range missiles/ Radar-guided missiles.	Supersonic	Air-to-air radar, missile-illumination radar.	None	Swept-Wings
Gen 4	Beyond visual range missiles/ Radar-guided missiles.	Supersonic	Pulse-doppler radar, look-down-shoot-down capability	None	Fly-by-wire, computer-integrated flight controls, variable wing geometry
Gen 4.5	Beyond visual range missiles/ Radar-guided missiles.	Supersonic	AESA/Active Electronically Scanned Array Radar, Integrated Communications (i.e. Link-16 system), limited sensor fusion	Reduced radar cross section	Limited supermaneuvrability, planned favorable post-stall flight characteristics
Gen 5	Beyond visual range missiles/ Radar-guided missiles.	Supercruise	Full sensor fusion, Integrated modular avionics,	All-aspect stealth	Internal weapons bays, multi-axis thrust vectoring

* Some limited and experimental use of terrain mapping and search radar did occur

Fighter/Attack Type(X) Squadrons: This is the number of squadrons of the type of aircraft in question that are in the country's inventory in the given year.

Fighter/Attack Type(X) Number: This is the number of aircraft of the listed type in the country's inventory in the given year.

CAP1: This is a measure of country air power using the basic technological typology without half-steps between generations 1-2, 2-3, and 3-4. This value is calculated as the sum of the natural log of the number of fighters of each type owned by a country in a given year, each raised to the power of that fighter's generational rating.

CAP2: CAP2 is a measure of country air power that uses the expanded generational typology that includes half-steps between all generations after generation 1. Like CAP1, it is calculated as the sum of the natural log of the number of fighters of each type owned by a country in a given year, each raised to the power of that fighter's generational rating.

Total Combat: This is sum, by year, of all *Fighter/Attack Type(X) Number* values. It is a total count of all fighter/attack aircraft owned by a country in a given year.

We also provide a second dataset that includes the component-level technology coding for each fighter and attack aircraft included in the dataset.

This second dataset includes the following variables:

Aircraft Name/ Designation: This variable lists the generic name or designation for each fighter/attack aircraft. For example, F-15 variants A-D are listed under the designation "F-15."

Variants and Alternate Designations Included: Most aircraft are built in a number of variants and are frequently assigned different designations in the service of different countries. This variable includes information on all variants of a given fighter appearing the dataset (F-15's A, B, C and D, for example) as well as information on any alternate designations of the fighter that might be used by different countries. For example, the F-15E is called the Ra'am in some Israel country-year observations.

Combined Generation: This variable contains the combined generation score for each fighter/attack aircraft, and should be identical to the generational coding appearing in the CAP dataset listed above.

Weapons: This variable contains the generational coding of weaponry for each aircraft.

Speed/Engine: This variable contains the generational coding of the speed and engine type for each *aircraft.*

Avionics/Radar: This variable contains the generational coding of avionics and radar for each aircraft.

Stealth/Visibility: This variable contains the generational coding of visibility characteristics for each *aircraft.*

Airframe and Maneuverability: This variable contains the generational coding of the airframe and maneuverability characteristic for each aircraft.

Source: This variable includes the name of the primary data sources used in coding the component variables for each fighter/attack aircraft.