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Article

Economic Development and Warlikeness

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Abstract

Thinkers have offered four theories for the impact of a state's rising economic development (or riches) on its international warlikeness or proclivity to fight any other state over a dispute. As a state develops it becomes: less warlike; more warlike; first more and then less warlike; or it keeps its warlikeness throughout. Most empirical studies treated riches as a control variable. Extant results painted a mixed picture. We outline prior theoretical and empirical works, mathematically model warlikeness as a choice, operationalize the model for empirical work, and estimate its parameters in a large sample of states and years from 1870 to 2010. We find rising riches made states more warlike on average, *ceteris paribus*. The marginal effect of riches rose with factors such as power, trade, population, and democracy, *ceteris paribus*. We apply the results to evaluate possibilities in the coming decades should riches grow for given control variables' scenarios, assuming history can tell us something of value about the future.

Introduction

Aristotle's Nicomachean *Ethics* said humans seek more riches to attain something else, valued for its own sake. Indeed, states have long sought more riches to boost weighted blends of chosen ends such as power, security, domination, comfort, and ideology. Their blends have sometimes made them warlike. Hereon, a state, war, and warlikeness will mean a nation-state, interstate war, and the state's disposition to fight any state, respectively. Stories of specific warlike choices are usually complex, involving sociopolitical, economic, and military forces. Yet, there may be a tendency for regularity in how such forces affect warlikeness, as humans may act mostly alike in like cases. This possibility is one anchor of our project. The second is the state level of development (or riches)—a composite of *per capita* (PC) factors such as food, drink, healthcare, housing, income, education, technology, transport, and communication.

We can now state the research question of this article. What is the role of rising state riches in its warlikeness or lack thereof? Interest in this question goes back to ancient China and the ancient Greek World. Outlining its key ideas is a natural starting point for our purpose.

In ancient China, Confucian texts such as *Mencius* (bearing his name) and Liu Xiang's *Garden of Eloquence* (*Shuo Yuan*, military section) said rising riches pacify, as preparing for and fighting war spends and ruins wealth. The *Book of Rites* (*Li Ki*) and Pan Ku's *Book of Han* expected rising riches to bring global peace, as people like comfort, which war harms. Xun Kuang's *Xunzi* and Huan Kuan's *Discourses on Salt and Iron* argued that

conquest does not pay, as it faces rebels. Sun Pin's *Military Methods* and *Mencius*[1] reasoned that richer people are more able to see that war gives up life for less dear things, and Li Ching's Questions and Replies argued that they can better grasp it as immoral. *Wei Liao-Tzu* (bearing his name) reasoned that they could pacify foes by paying them.

In another view, Sun Tzu's *Art of War* said that rising riches foster victory, and, like the *Xunzi*, argued that kind conquest can pay by enticing the ruled to collaborate. Victorious wars, Wang An-shih said, pay.[2] Laozi's *Tao Te Ching* said peace prevails when people desire only the basics (e.g., home, food, drink), implying war is rooted in seeking more riches. The *Book of Changes* (*Yi King*, Appendix III) argued rising riches require more military forces to defend them. T'ai Kung's *Six Secret Teachings*, Huang Shih-kung's *Three Strategies*, and Ch'en Liang said rising riches make war seem more just, and the *Mo Tzu* (attributed to Mozi) argued they foster public support for the war. Ch'en Liang noted in the spirit of the *Xunzi* and *Book of Master Fei* (*Han Feizi*) that rising wealth boosts military power, enabling it to make war.[3] The Book of Lord Shang said a state lacking economic and military strength will not survive external foes.

A third group suggested complexity or no effect. *The Book of Lord Shang* also said rising riches lower the willingness to fight. *Mencius* argued that human nature is moral, prosperity can give rise to good people, and war occurs because of the lack of wisdom. The *Xunzi*, Ko Hung, and Liu Zongyuan said they occur because humans tend to be bullies, greedy, and violent (regardless of their riches).[4]

Western thinkers argued along similar lines. In the ancient Greek World, Thucydides' *History of the Peloponnesian War* argued that rising affluence makes states hastier and more violent because it enables them to fund power. Plato's *Phaedo* said it makes them seek the wealth of other states. Xenophon argued in *Hellenica* that richer states dislike war as it ruins their coveted riches. In ancient Rome, Polybius' *Histories* said Rome's rising riches made it aim to build an empire. Diodorus Siculus' *Bibliotheca Historica* said rising riches pacified Rome, except those who gained from war.

At the dawn of the European market economy, Crucé's *The New Cineas* of 1623 projected that war would vanish as riches grow, for it ruins wealth, but Hobbes' *Leviathan* of 1651 expected war would stay as states are selfish and sly. Hume's 1758 *Essays: Moral Political and Literary* said industrialization fosters martial spirit and frees labor to fight by boosting production efficiency; Quesnay's *Tableau Économique* of 1758 said winning wars builds on the taxpayers' wealth. Smith's 1776 *The Wealth of Nations* argued hunter states are poor and cannot raise large armies or easily replace enlisted hunters, agrarian are richer and have lower opportunity costs of enlisting, and industrialized are the richest and have the highest opportunity costs, so warlikeness rises and falls as riches rise. Thomas Jefferson reasoned that industrialization would expose more people to crises, making them more open to blaming other states and enlarging war, but Condorcet argued it would bring peace.[5]

All these processes are sensible and may work in parallel. The total effect may go either way or be null (the effects of the competing processes may about cancel each other). Choosing among these theories to pose a hypothesis would be arbitrary, for they and their

[1] Chen Huan-Chang, *The Economic Principles of Confucius and His School*, Vol. I (London: Longmans, Green & Co., 1911).

[2] James T. C. Liu, *Reform in Sung China: Wang An-shih (1021–1086) and His New Policies* (Cambridge: Harvard University Press, 1968).

[3] Ch'en Liang, trans. Hoyt C. Tillman, *Utilitarian Confucianism* (Cambridge: Harvard University Press, 1982).

[4] Kung-chuan Hsiao, *A History of Chinese Political Thought*, Vol. 1, Chapter Eleven: From Wang Pi to Ko Hung, trans. F. W. Mote, (Princeton: Princeton University Press, 1979/2015).

[5] Saul K. Padover, *Thomas Jefferson on Democracy* (New York: New American Library, 1949); M. De. Condorcet, *Outlines of a Historical View of the Progress of the Human Mind* (London: Forgotten-Books, 1795/2018).

modern elaborations in the next section do not pose the sizes of effects (as is usually the case in social science).

Our research question works at the state level of analysis. We develop a formal model of warlikeness and development to estimate the effect of rising riches on warlikeness in a large sample of states and years. Conflict models have also used country-pairs as their level of analysis, asking, in our context, whether a richer pair is more warlike on average. We will use insights from the latter approach, but the modeling issue is not which level is best; it is what one can examine using a certain level.[6] Levels of analysis are tools to discuss questions, not ends in themselves;[7] the idea is general: Acharya et al. and Yan, for example, applied it to wars in classical China and Thucydides in the ancient Greek world.[8]

We take the EITM (empirical implications of theoretical models) approach, aiming to bring formal social science modeling and empirical analyses closer together.[9] The next two sections outline extant modern theories and empirical models. We use insights gained to design a formal model of warlikeness and development and operationalize it for empirical analysis. We then estimate the model's parameters, discuss the results, and conduct sensitivity analyses. Finally, we use the results to evaluate warlikeness possibilities should riches rise in the future, assuming the control variables follow certain scenarios and history (data) can tell us something of value about the coming decades.

Modern Theories

The modern theories on the role of increased economic development of a state in its warlikeness in world affairs build on the older ideas. We call these theories Optimist, Pessimist, Pessimist-Optimist, and Null (no effect). There is much to cover, and we cannot do so in detail. We outline forces by type.

Optimist

The optimist theory expects that rising development pacifies states. We group its mechanisms into four types. One explanation stresses the idea of evolution. Agrarian states justify war in the name of mystical divine beings and industrializing in the name of abstract. Industrial states are more secular and interested in comfort.[10] Rising wealth has led states from chaos to our era of growing comfort with less war and would usher in an age of world harmony.[11] It first leads states to see their industry as a weapon for military affairs, then fight if the supply of its materials is at risk, and last, cooperate for greater profit.[12]

Another logic stresses socioeconomic progress. Rising development educates against war and empowers labor to voice its pacifism.[13] It bolsters doves and people who value contracts

[6] William R. Thompson et al., "Conflict, Regions, and Regional Hierarchies," in *Regions, Power, and Conflict* (Singapore: Springer, 2022), pp. 175–201; David J. Singer, "The Level-of-Analysis Problem in International Relations," James N. Rosenau, ed., *International Politics and Foreign Policy* (New York: Free Press, 1969), pp. 20–29.

[7] Mark V. Kauppi and Paul R. Viotti, *International Relations Theory* (London: Rowman & Littlefield, 2024); Jack S. Levy and William R. Thompson, *Causes of War* (Chichester: John Wiley & Sons, 2011).

[8] Amitav Acharya et al., *Bridging Two Worlds* (Oakland: University of California Press, 2023); Yan Xuetong, *Ancient Chinese Thought, Modern Chinese Power* (Princeton: Princeton University Press, 2011).

[9] Thomas Bräuninger and Tilko Swalve, "Theory Building for Causal Inference: EITM Research Projects," in Luigi Curini and Robert Franzese, eds., *Research Methods in Political Science and International Relations* (Thousand Oaks: Sage, 2020), pp. 121–41.

[10] Auguste Comte, *The Positive Philosophy of Auguste Comte* (Cambridge: Cambridge University Press, 1853/2009).

[11] Leonard S. Hsu, "The Confucian Concept of Progress," *Chinese Social and Political-Science Review*, Vol. 10, No. 3 (1926), pp. 582–99; K'ang Yu-wei, *Ta-T'ung Shu* (1935), trans. Laurence G. Thompson, *The One-World Philosophy of K'ang Yu-wei* (Abingdon: Taylor & Francis, 1958/2013).

[12] George Modelski, "Agraria and Industria," *World Politics*, Vol. 14, No. 1 (1961), pp. 118–43.

[13] Educate: Steven Pinker, *Enlightenment Now* (New York: Viking, 2019). Empower: Joseph A. Schumpeter., *The Sociology of Imperialism* (Eastland: Martino Fine Books, 1919/2014).

and talks to solve disputes, and it weakens hawks.[14] It pacifies since war harms coveted riches, curbing war to rally critics.[15] It makes arms more harmful and more for them to ruin, raising the cost of war above its gain.[16] It teaches about war costs.[17] It boosts public finance, reducing the need for booty.[18] Rising riches foster foreign trade, limiting war for resources and pacifying as war harms trade.[19] Richer people are likelier to be happy and thus kind, see war as immoral, swap threats with talks, cooperate due to shared needs (not traits like race), stress creation and hence abate the spirit of war,[20] grasp cooperation pays, reject war misery, reject diverting resources to the military as it lowers profit, and sink war glory in running a business.[21]

In another idea, rising development reduces the value of conquest. It makes domestic production rely more on a chain of foreign industries for inputs and outlets.[22] It fosters the specialization of the state's labor force and physical capital stock, increasing the opportunity costs of using these factors to police and govern occupied lands.[23] Rosecrance's 1999 *The Rise of the Virtual State* argues that rising riches make the production factors seized in occupied lands less compatible with those used at home and thus less useful for the occupier's domestic economy.

Finally, there is liberalism. Growing wealth fosters democracy as richer people seek and get a greater political voice.[24] The state becomes more liberal and peaceful by respecting the principles of freedom, international cooperation, and negotiated contracts to resolve disputes.[25] Strong liberal states rebuild war losers in their image and foster international order.[26]

Pessimist

The pessimist theory reasons that increased development increases warlikeness. We categorize the suggested processes into four groups. One maintains that the mechanics of rising

[14] Håvard Hegre, "Development and the Liberal Peace," *Nordic Journal of Political Economy*, Vol. 31, No. 1 (2005), pp. 17–46; Charles A. Beard, "Prospects for Peace," *Harper's Magazine*, Vol. 158, No. 945 (1929), pp. 320–30.

[15] Pacifies: Douglas Lemke, "Development and War," *International Studies Review*, Vol. 5, No. 4 (2003), pp. 55–63. Curbing: Douglass C. North et al., *Violence and Social Order* (Cambridge: Cambridge University Press, 2009).

[16] Arms: Richard Cobden, *The Political Writings of Richard Cobden* (Cambridge: Cambridge University Press, 1867/2011). Ruin: Carl Kaysen, "Is War Obsolete?" *International Security*, Vol 14, No. 4 (1990), pp. 42–64; Ivan. S. Bloch, *Is War Now Impossible?* (London: Grant Richards, 1899). Raising: Lionel Robbins, *The Economic Causes of War* (London: Jonathan Cape (1939/2013); Andrew Mack et al., *Human Security Report 2013: The Decline in Global Violence* (Vancouver: Human Security Press, 2014).

[17] Jonathan Kirshner, *Appeasing Bankers* (Princeton: Princeton University Press, 2008).

[18] Shannon L. Blanton and Charles W. Kegely, *World Politics* (Boston: Cengage Learning, 2017); Patrick J. McDonald, *The Invisible Hand of Peace* (Cambridge: Cambridge University Press, 2009).

[19] Resources: Azar Gat, *The Causes of War & The Spread of Peace* (Oxford: Oxford University Press, 2017); Pacify: John Muller, "International War," *Journal of Global Strategic Studies*, Vol. 1, No. 1 (2021), pp. 1–15.

[20] Kinder: Qin Yaqing, "International Society as Progress," *Chinese Journal of International Politics*, Vol. 3, No. 2 (2010), pp. 129–53. Immoral: Henri C. Saint-Simon, "On the Political History of Industry," in Keith Taylor, ed., *Henri Saint-Simon (1760–1825)* (New York: Routledge, 1818/2020); pp. 174–180. Abate: Ludwig von Mises, *Nation, State, Economy* (Indianapolis: Liberty, 1919/2006); Swap: Herbert Spencer, *Principles of Sociology* (New Brunswick: Transaction. 1898/2010). Cooperate: Emile Durkheim, *The Division of Labor in Society* (New York: Free-Press, 1893/2014).

[21] Grasp: Deirdre N. McCloskey, *The Bourgeois Virtues* (Chicago: Chicago University Press, 2010). Reject: Ronald F. Inglehart et al., "Declining Willingness to Fight in War," *Journal of Peace Research*, Vol. 52, No. 4 (2015), pp. 418–34. Seek: Schumpeter, *The Sociology of Imperialism*. Sink: Joseph Schumpeter, *Capitalism, Socialism, and Democracy* (Radford: Wilder, 1946/2018).

[22] Stephen G. Brooks, *Producing Security* (Princeton: Princeton University Press, 2011).

[23] Norman Angell, *The Great Illusion* (Whitefish: Kissinger, 1913/2007); Kaysen, "Is War Obsolete?"

[24] Daniel Treisman, "Economic Development and Democracy," *Annual Review of Political Science*, Vol. 23 (2020), pp. 241–257.

[25] Reviews of liberalism: Mearsheimer, *The Great Delusion* (New Haven: Yale University Press, 2019); Hans Joas and Wolfgang Knöbl, *War in Social Thought* (Princeton: Princeton University Press, 2013).

[26] Ian Morris, "In the Long Run, Wars Make Us Safer and Richer," *Washington Post*, 25 April, 2014; Steven Pinker, *The Better Angles of Our Nature* (New York: Penguin, 2011).

development fosters conflict. Veblen's 1917 *Inquiry into the Nature of Peace and Terms of its Perpetuation* notes they extol competition to gain more than others. They lure states into foreign exploits for needed materials.[27] They stress the importance of winning commercial or trade wars and funding militarization to avoid foreign domination; rising wealth requires more military strength to secure it, and raising the latter requires more of the former.[28] Poor and military-weak states cannot survive.[29] Rising riches boost confidence in the ability to win wars[30] and afford them.[31]

A second argument centers on militarism and expansion. Rising development fosters militarism and improves the mobilization for war.[32] It mechanizes weapon systems and boosts the nation's life expectancy, motivating expansionism to satiate the greater need for natural resources.[33] Carr's 1946 *The Twenty Years' Crisis 1919–39* said it expands foreign interests and thus the need to defend them. It educates more experts but lowers the need for them via automation, placing them abroad to ease gripes.[34] It sustains a military-industrial complex,[35] which finds real or made-up foes and pushes states to expand and exploit weak states.[36] Fears of riches decline cause states to blame others and people to accept war.[37] Richer and stronger states are more expansionist, raising tension with other states.[38] They gain from conquest by having and sustaining better means of control and offering higher rewards for collaboration.[39]

Another argument works via liberalism. Rising riches foster economic and political liberalism, which, in turn, accept the associated rise in income equality and protests over it. Unable to repress, liberal leaders facing protests blame other states for unifying and soothing with goods from exploiting abroad, raising tension. Liberal states argue they intervene

[27] José Vasconcelos and Manuel Gamio, *Aspects of Mexican Civilization* (Chicago: University of Chicago Press, 1926); Carlton J. H. Hayes, *The Historical Evolution of Modern Nationalism* (Bolton: Russell & Russell 1931/1968).

[28] Feng Guifen, "On the Manufacture of Foreign Weapons," trans. Wm. Theodore de Bary and Richard Lufrano, *Sources of Chinese Tradition* (New York: Columbia University Press, 2000), pp. 235–37; Zheng Guanying, *Words of Warning in a Flourishing Age*, trans. Guo Wu, *Zheng Guanying* (Amherst: Cambria, 2010); Sun Yat-Sen, *San Min Chu I*, trans. Frank W. Price, L. T. Chen, ed., The Three Principles of the People (Shanghai: China Committee Institute of Pacific Relations, 1927).

[29] Haig Patapan, "Legalism and Xi Jinping Thought," in Shipping Hua, ed., *Chinese Legality* (London: Routledge, 2023), pp. 52–70.

[30] Geoffrey Blainey, *The Causes of War* (New York: Free-Press, 1988).

[31] Mearsheimer, *The Great Delusion*; R. Harrison Wagner, *War and the State* (Ann Arbor: University of Michigan Press, 2010).

[32] Rosa Luxembourg, *The Accumulation of Capital* (London: Routledge, 1913/2003); Robert H. Bates, *Prosperity and Violence* (New York: Norton, 2001); Jacek Kugler and Marina Arbetman, "Relative Political Capacity," in Marina Arbetman and Jacek Kugler, eds., *Political Capacity and Economic Behavior* (New York: Routledge, 1997/2018), pp. 11–46.

[33] Hans J. Morgenthau, *Politics Among Nations*, revised by Kenneth W. Thompson (Beijing: Beijing University Press, 1997); William L. Langer, *The Diplomacy of Imperialism, 1890–1902* (New York, NY: Knopf, 1935/1972); Nazli Choucri and Robert C. North, *Nations in Conflict: National Growth and international Violence* (San Francisco: Freeman, 1975); Antony Loewenstein, *Disaster Capitalism* (London: Verso, 2015).

[34] Quincy Wright, *A Study of War* (Chicago: Chicago University Press, 1965).

[35] Alan R. Kimball, "Long-term Historical Reflection on the Rise of Military-Industrial Managerial Statism," in *Kimball File: SAC* (University of Oregon: History Department, 2017).

[36] James McCarty et al., *The Business of War* (Eugene: Cascade Books, 2020); Imad A. Moosa, *The Economics of War* (Cheltenham: Elgar, 2020); Loewenstein, *Disaster Capitalism*; Kathryn S. Olmsted, *Real Enemies* (Oxford: Oxford University Press, 2019).

[37] Michael Mann, *States, War and Capitalism* (Oxford: Blackwell, 1988); William E. Dodd, "The Dilemma of Modern Civilization," in Quincy Wright, ed., *Neutrality and Collective Security* (Getzville: Hein & Company, 1936/2015), pp. 92–108.

[38] John J. Mearsheimer and Stephen M. Walt, "The Case for Offshore Balancing," *Foreign Affairs*, Vol 95, No. 4 (2016), pp. 70–83; Graham Allison, *Destined for War* (Melbourne: Scribe, 2019); Yuan-Kang Wang, *Harmony and War* (New York: Columbia University Press. 2011).

[39] Victoria T. Hui, *War and State Formation in Ancient China and Early Modern Europe* (Cambridge: Cambridge University Press, 2005); Peter Liberman, *Does Conquest Pay*? (Princeton: Princeton University Press, 1998).

abroad to bring freedom.[40] Yet their intrusions foster imperialism of goodwill and free trade,[41] increasing the risk of conflict.[42]

Lastly, some claim that rising development in peace spreads social mediocracy and apathy[43] and stymies talent growth.[44] Leaders may and perhaps should militarize their state to energize and revive it.[45] Militarization will make it great and help it recover and boost its economic and military power and, thus, global status and influence.[46] Militarizing society can scatter the opposition to socioeconomic and political reforms leaders deem required and seek to implement.[47]

Pessimist-Optimist

The Pessimist-Optimist theory suggests that as states develop, their warlikeness increases and then declines. Adam Smith's The Wealth of Nations suggested a channel, as noted; modern studies indicate two more. One idea assumes that rising development lowers the willingness and raises the capability to fight. Accordingly, poor states should have a high willingness and low ability, rich states have low willingness and a high capability, and semi-rich states have a medium willingness and capability to fight, making them the most warlike.[48] In the second idea, civil unrest tends to rise in early industrialization, as most people are poor and unused to factory discipline and city life. Development rising above a high enough level benefits increasingly more people and quells grievances. Civil unrest thus rises and falls as development increases.[49] State leaders who face domestic unrest tend to scapegoat other states to divert the minds of their people from the local problems and unify them around the flag. Joining these effects implies that warlikeness first rises and then falls as riches rise.[50]

Null

The null theory says warlikeness does not depend on the level of development. Logically, there are three possibilities. One, the competing effects of rising development may be about the same. Two, humans are peaceful by nature regardless of their riches. Third, wars occur due to forces active at all levels of development. Logic has little to say about the first possibility, as the rival theories do not project the size of the effects. We do not discuss the second idea, for it flies in the face of history.

[40] Renske Doorenspleet, *Rethinking the Value of Democracy* (Cham: Palgrave Macmillan, 2019).

[41] Sidney Bell, *Righteous Conquest* (Port Washington: Kennikat Press, 1972); John Gallagher and Ronald Robinson, "Imperialism of Free Trade," *The Economic History Review—Second Series*, Vol. 6, No. 1 (1953), pp. 1–15.

[42] Phil W. Reynolds, *Ouroboros: Understanding the War Machine of Liberalism* (Lanham: Lexington Books, 2019); Alan Ryan, *The Making of Modern Liberalism* (Princeton: Princeton University Press, 2014).

[43] Renan-E., "Intellectual and Moral Reform of France," in *What is a Nation? and Other Political Writings* (Cambridge: Cambridge University Press, 1871/2018), pp. 182–246; Spencer, *Principles of Sociology*.

[44] Mao Zedong, "Marginal Notes to: Friedrich Paulsen, *A System of Ethic*, 1917–1918," in Stuart R. Schram, ed., *Mao's Road to Power*, Vol. I: The Pre-Marxist Period, 1912–1920 (New York: Sharp, 1992/2015), pp. 175–313.

[45] Margaret MacMillan, *War: How Conflict Shaped Us* (New York: Random-House, 2020); Ian Morris, *War! What is it Good For? Conflict and the Progress of Civilization from Primates to Robots* (London: Profile Books, 2015).

[46] Theodore Roosevelt, "Washington's Forgotten Maxim," *Proceedings of the United States Naval Institute*, Vol. 33, No. 1 (1897), pp. 447–62; Alan S. Milward, *War, Economy and Society* (Berkeley: University of California Press, 1979); David S. Broder, "The War Recovery?," *The Washington Post*, 31 October 2010, A27.

[47] Mancur Olson, *The Rise and Decline of Nations* (New Haven: Yale University Press, 1982/2008); Tyler Cowen, "The Pitfalls of Peace: The Lack of Major Wars May Be Hurting Economic Growth," *New York Times*, 13 June 2014.

[48] Charles R. Boehmer and David Sobek, "Violent Adolescence," *Journal of Peace Research*, Vol. 42, No. 1 (2005), pp. 5–26.

[49] Douglas A. Hibbs Jr., *Mass Political Violence* (New York: John Wiley & Sons, 1973).

[50] Ernst B. Haas and Allen S. Whiting, *Dynamics of International Relations* (London: Forgotten Books, 1956/2018); Amy Oakes, *Diversionary War* (Stanford: Stanford University Press, 2012).

We sort the third possibility into three types. The first is human nature. Humans accept the banality of evil; they are jealous, violent,[51] vain, cunning, dominating, and seek glory in valor.[52] Elites, moguls, officers, and leaders preach jingoism, manifest destiny, a place under the sun, and fear of others for their gain.[53] War blends human aggression and the need for a foe to blame when things go wrong; it is a reaction to fear or hope that stresses zeal, distrust, xenophobia, a threat to national ideas, sacrifice, valor, and resolve.[54] Others say such manners reflect error and ignorance; humans can learn to avoid them.[55] They abhor harming others; social pressure makes them violent; they are more like sheep than wolves in war as the state directs their violence and finds it hard to overcome their rejection of killing.[56]

The second factor stresses the international system. States seek autonomy and security,[57] are selfish and ready to use force,[58] and need foes to unite and affirm their existence.[59] The international system is anarchic (lacks global authority), so states build military forces for defense. They cannot trust that others do it for defense, making them insecure and warlike.[60] Another view argues states can respect each other's security needs.[61] Warfare is a learned social invention; states can unlearn it.[62]

Lastly, political geography plays a role. The nonrenewable resource stocks on Earth and the renewable stocks' recovery rates are finite. The distributions of both stocks are uneven across states, and humans depend on them. Warlikeness reflects the political geographies of access to resources deemed crucial for desired levels of comfort, power, security, and lifestyle,[63] regardless of riches.[64]

Empirical Models

State-level models emerged in three waves. The first and second waves used small samples of states and years and, respectively, bivariate models and multivariate with no direct riches-to-conflict. The third wave treated development mostly as a control variable in multivariate models for large samples. We outline the waves and take their stock to design our model.

[51] John Gray, "The Truth About Evil," *The Guardian*, 21 October 2014; Jean-Jacques Rousseau, *A Discourse on Inequality* (New York: Philosophical Library, 2016); Gat, *The Causes of War & The Spread of Peace*.

[52] Morgenthau, *Politics Among Nations*; Raymond Aron, "War and Industrial Society," *Millennium: Journal of International Studies*, Vol. 7, No. 3 (1979), pp. 195–210.

[53] Gaetano Mosca, *The Ruling Class* (Westport: Greenwood Press, 1939/1980); Vilfredo Pareto (1916/2019), *The Mind and Society*, Vol 1 (Delhi, Alpha Editions, 1916/2019); Wright, *A Study of War*.

[54] Robin Fox, "Fatal Attraction: War and Human Nature," The National Interest, Winter, No. 30 (1992/1993), pp. 11–20.

[55] Keith L. Shimko, *International Relations* (Boston: Cengage Learning, 2016).

[56] S. I. A. Marshall, *Men Against Fire* (Santa Fe: Martino, 1947/2023); Ashley Montagu, *The Nature of Human Aggression* (Oxford: Oxford University Press, 1976); Dave Grossman, *On Killing* (New York: Open Road Integrated Media, 1995/2014).

[57] Max Weber, *Methodology of Social Sciences* (Piscataway: Transaction, 1917/2011); Ludwig Gumplowicz, *Outlines of Sociology* (New York: Routledge, 1905/2020).

[58] Siniša Malešević, *The Rise of Organized Brutality* (Cambridge: Cambridge University Press, 2017); Mann, *States, War and Capitalism*.

[59] Brett Bowden, *Civilization and War* (Cheltenham: Edward Elgar, 2013); Max Weber, *Economy and Society*, Cambridge: Harvard University Press, 1922/2019).

[60] Wagner, *War and the State*; John H. Herz, "Idealist Internationalism and the Security Dilemma," *World Politics*, Vol. 2, No. 2 (1950), pp. 157–80.

[61] Shimko, *International Relations*.

[62] Margaret Mead, "Warfare Is Only an Invention—Not a Biological Necessity," in Leon Bramson and George W. Goethals, eds., *War* (New York: Basic Books, 1968), pp. 269–74.

[63] Robert D. Kaplan, *The Revenge of Geography* (New York: Random House., 2013), and *Waste Land: A World in Permanent Crisis* (New York: Random House, 2025); Jarius V. Grove, *Savage Ecology* (Durham: Duke University Press, 2019).

[64] Aron, "War and Industrial Society"; Mann, *States, War and Capitalism*.

Three Waves

In the first wave, one model sorted states in 1955–60 as least rich, less, semi, and rich, finding that the rich and least rich states fought the most (∪-shaped effect).[65] In other models, a larger number of phones PC (used as a proxy of riches) did not impact threats to use force in 1955.[66] Sorting states as high, semi, and low by yearly energy consumption PC (ECpc) in 1900–60 showed the semi fought the most (∩ effect).[67] The number of wars in 1955–7 fell as the agrarian population share increased and rose with the railroad freight-to-length ratio, implying warlikeness rises with riches; in this line, military action rose with the economy share of industry, threats to use force with life expectancy at birth, and moving troops to use force with the state share of UN dues, all of which rise with riches.[68]

In the second wave of models, separate analyses for six European states in 1870–1914 found colonial expansion and military power rose with income PC and raised military violence.[69] A similar model for Japan from 1878 to 1941 gave comparable results.[70] In two other works, the trade of the USA, USSR, and China in 1950–72 rose with their gross domestic product PC (GDPpc) and raised their military violence,[71] and four pre-industrial states fought more per decade than five industrial.[72]

We found three relevant war models for the third wave. To gain insight into our model design, we added empirical models that defined their dependent variable (DV) to include both war and milder conflicts such as military interventions, border disputes, and militarized interstate disputes (MIDs) short of war.[73] Table 1 lists 21 state-level empirical models of conflict. Ten models examined yearly conflict as a count variable and 11 as a binary marker. Six models represented development with ECpc and 15 GDPpc, and all except two treated it as a control variable.[74] The effect of rising riches on conflict risk was null in eight models, negative in five, and positive in three. Five other studies added development interactions, two with itself (development squared), finding ∩ and ∪ effects, in turn; and three with other factors, finding positive riches effects rising, in turn, with a binary democracy variable, the population × major power binary × democracy binary, and serving on the United Nations (UN) Security Council (UNSC).

For completeness, we note that studies also modeled the nexus of development and interstate military conflict at other levels of analysis and for intrastate conflict, generating mixed results. For example, the frequency of war hardly varied as the world grew richer from 1820 to 1949.[75] Another study found that the number of yearly FMIDs worldwide fell as the world grew richer from 1816 to 2001, warning the flavor of this result may not

[65] Michael Hass, "Societal Approaches to the Study of War," *Journal of Peace Research*, Vol. 2, No. 4 (1965), pp. 307–23.

[66] Maurice A. East and Phillip M. Gregg, "Factors Influencing Cooperation and Conflict in the International System," *International Studies Quarterly*, Vol. 11, No. 3 (1967), pp. 244–69.

[67] Michael Haas, "Social Change and National Aggressiveness, 1900–1960," in Joel D. Singer and Chadwick. F. Alger, eds., *Quantitative International Politics* (New York: Free Press, 1968), pp. 215–44.

[68] Rudolph J. Rummel, *The Dimensions of Nations* (Thousand Oaks: Sage, 1972).

[69] Choucri and North, *Nations in Conflict*.

[70] Nazli Choucri et al., *The Challenge of Japan Before World II and After* (New York: Routledge 1992).

[71] Richard K. Ashley, *The Political Economy of War and Peace* (London: Frances Pinter. 1980).

[72] Ronald Cohen, "War-Proneness in Pre-Industrial and Postindustrial States," Mary. L. Foster and Robert A. Rubinstein, eds. *Peace and War* (Piscataway: Transaction 1986). pp. 253–67.

[73] On the MID data, see Glenn Palmer et al., *Codebook for the Militarized Interstate Dispute Data*, Version 5.0, Correlates of War (2020). MIDs give the max hostility per case as no action, threat to use force, show force, use force, and war (at least 1000 battle-deaths per year).

[74] Two studies: Boehmer and Sobek, "Violent Adolescence" and Yuri Mansury et al. "Militarized Conflict, Trade, and Economic Development in a Structural Equation Model," *International Regional Science Review*, Vol. 47, No. 6 (2024), pp. 622–54.

[75] David Wilkinson, *Deadly Quarrels: Lewis F. Richardson and the Statistical Studies of War* (Berkeley: University of California Press, 1980/2018).

Table 1. State-Level Models of Conflict and Development (Riches)

Author(s)	Conflict Measure	Riches Measure	Years	Rising Riches Impact
Bussmann	FMID onset b	GDPpc	1980–2000	Negative
Jang and Smith	RMID onset c	GDPpc	1945–2010	Negative
Benoit	War involvement c	ECpc	1960–80[a]	Negative
Thompson et al.	BD involvement b	GDPpc	1960–2011	Negative
Gleditsch and Salehyan	MID involvement b	GDPpc	1950–2001	Negative
Pickering	Hostile intervention c	ECpc	1975–96	Insignificant
Tir and Diehl	War involvement b	ECpc	1930–89	Insignificant
Colgan	RMID onset c	GDPpc	1945–2001	Insignificant
Hendrix	MID initiation c	GDPpc	1947–2001	Insignificant
Chatagnier and Castelli	FMID involvement b	GDPpc	1960–2007	Insignificant
Henderson	War onset b	ECpc	1946–92	Insignificant
Bareis	MID initiation b	GDPpc	1963–2010	Insignificant
Ko et al.	MC25 involvement c	GDPpc	1995–2020	Insignificant
Kim	RMID initiation c	GDPpc	1950–2009	Positive
Mansury et al.	MID involvement c	GDPpc	1950–2010	Positive
Markovitz et al.	RLMID involvement b	$GDPpc^m$	1816–2001	Positive
Smith and Vreeland	MID initiation c	GDPpc, GDPpc × peu	1951–2014	Positive
Souva and Prins	FMID initiation b	GDPpc, GDPpc × dem	1950–99	Positive if dem = 1
Cranmer and Siverson	SMID initiation c	ECpc, ECpc × pop × mpdem	1816–1994	Positive if mpdem = 1
McDonald	MID onset b	GDPpc, $GDPpc^2$	1970–2001	∪-shaped
Boehmer and Sobek	FMID involvement b	ECpc, $ECpc^2$	1870–1992	∩-shaped

Source: The author(s)' works cited in the table are listed in Margit Bussmann, "Foreign Direct Investment and Militarized Conflict," *Journal of Peace Research*, Vol. 47, No. 2 (2010), pp. 143–53; Hye Ryeon Jang and Benjamin Smith, "Pax Petrolica?" *Security Studies*, Vol. 30, No. 2 (2021), pp. 159–81; Kenneth Benoit, "Democracies Really Are More Pacific in General," *Journal of Conflict Resolution*, Vol. 40, No. 4 (1996), pp. 636–57; William R. Thompson, et al., "Bad Neighborhoods in World Politics," in *Regions, Power, and Conflict* (Singapore: Springer, 2022), pp. 227–50; Kristian Skrede Gleditsch and Idean Salehyan, "Civil Wars and Interstate Disputes," in Magnus Öberg and Kaare Strøm, eds, *Resources, Governance, and Civil Conflict* (London: Routledge; 2008), pp. 58–76; Jeffrey Pickering, "War Weariness and Cumulative Effects," Subsequent Interstate Intervention," *Journal of Peace Research*, Vol. 39, No. 3 (2002), pp. 313–37; Jaroslav Tir and Paul F. Diehl, "Demographic Pressure and Interstate Conflict," *Journal of Peace Research*, Vol. 35, No. 3 (1998), pp. 319–39; Jeff D. Colgan, "Oil and Revolutionary Governments," *International Organization*, Vol. 64, No. 4 (2010), pp. 661–94; Cullen S. Hendrix, "Oil Prices and Interstate Conflict," *Conflict Management and Peace Science*, Vol. 34, No. 6 (2017), pp. 575–96; Chatagnier and Castelli, "A Modern Peace?"; Errol A. Henderson, *Democracy and War: The End of Illusion?* (Boulder: Lynne Rienner, 2002); Luka Bareis, "Interstate Resource Conflicts," *Journal of Conflict Resolution*, Vol. 68, No. 7–8 (2024), pp. 1387–416; Jeremy Ko et al., "War and warming," *Innovation and Green-Development*, Vol. 3, No. 4 (2024), pp. 1–12; Nam K. Kim, "Are Military Regimes Really Belligerent," *Journal of Conflict Resolution*, Vol. 62, No. 6 (2017), 1151–78; Yuri Mansury et al. "Militarized Conflict, Trade, and Economic Development in a Structural Equation Model," *International Regional Science Review*, Vol. 47, No. 6 (2024), pp. 622–54; Johanthan M. Markowitz et al., "Productive Pacifists," *International Studies Quarterly*, Vol. 64, No. 3 (2020), pp. 558–72; Alastair Smith and James R. Vreeland, "UN Security Council membership," *International Interactions*, Vol. 49, No. 4 (2023), pp. 525–56; Mark Souva and Brandon Prins, "The Liberal Peace Revisited," International Interactions, Vol. 32, No. 2 (2006), pp. 183–200; Skyler J. Cranmer and Randolph M. Siverson, "Demography, Democracy, and Disputes," *Journal of Politics*, Vol. 70, No. 3 (2009), pp. 794–806; Patrick J. McDonald, *The Invisible Hand of Peace* (Cambridge: Cambridge University Press, 2009); Charles R. Boehmer and David Sobek, "Violent Adolescence," *Journal of Peace Research*, Vol. 42, No. 1 (2005), pp. 5–26.
Note: c: count, b: binary, FMID: fatality ≥1, MID: any; SMID: ≥ show force, RMID: revisionist, RLMID: over land resources, BD: border dispute, MC25: military conflict, fatalities ≥25, m: model-created, dem: democracy binary, mpdem: major power binary × dem, peu: probability of being elected to the UNSC. [a]One cross-section.

hold for other levels of analysis.[76] As a state pair develops, its risk falls for a war,[77] rises for a land dispute[78] and a MID between noncontiguous states, and does not vary for a MID among contiguous.[79] As a state develops, its civil war risk falls,[80] rises and falls,[81] or does not vary.[82] More research in these areas will complement our focus on the role of growing state riches in its warlikeness.

Taking Stock of the Empirical Modeling Literature

Let us take stock of the empirical modeling literature on our research question to gain insight for designing our empirical model. Existing studies used yearly data. Six supported the Optimist theory, eight the Pessimist, nine the Null, two the Pessimist-Optimist (∩-shaped), three the Pessimist with interactions, and two a ∪-shaped impact. The overall picture is unclear, suggesting room for more research.

We plan to develop a model for examining our research question with a large sample of years and states, so let us take stock of the studies in Table 1. Seven of these studies defined the DV in their models as conflict *initiation*, five as *onset*—combining joining a conflict, initiating a conflict, and first responding to an attack. Another nine studies defined it as *involvement*—combining all the events of a certain conflict (including joining, initiating, and first responding) as long it lasts.

The studies by Cranmer and Siverson, Rousseau, and especially Bennett and Stam assess the implications of employing these dependent variables from a view of war as a choice.[83] The use of the onset DV, they explain, implies that the incentives for initiating and first responding to a conflict are similar. Using involvement implies assuming identical incentives for these actions, as well as for continuing conflict. Yet the incentives should differ, as initiation comes from peace, first-responding follows attack by another state, and continuation follows conflict. Using onset or involvement as the DV boosts the problem of temporal dependence of events in a dataset; using initiation does the opposite. Combining initiating and first responding under the onset DV or joining initiation, first-response, and continuation under the involvement DV muddles the question and modeling. These three studies recommend, therefore, modeling conflict initiation and excluding the ongoing years of conflicts as they do not denote initiation. We should revisit this paragraph when designing our model.

In Table 1, two datasets started in 1816, one in 1870, one in 1930, and the rest in 1945 or later. Development has evolved slowly at varied paces by state. Larger samples may naturally provide more insight into investigating our research question.

The studies in Table 1 lumped MIDs, including wars, less intense engagements with and without fatalities, shows of force, threats to use force, and minor events (e.g., fishing disputes, warning shots, mistakes, and actions with no response). The wider umbrella explicitly or implicitly assumes a milder conflict form has the same factors and choice

[76] Erik Gartzke and Alex Weisiger, "Under Construction," *International Studies Quarterly*, Vol. 58, No. 1 (2014), pp. 130–45.
[77] Stuart A. Bremer, "Dangerous Dyads," *Journal of Conflict Resolution*, Vol. 36, No. 2. (1992), pp. 309–41.
[78] Paul D. Senese and John A. Vasquez, *The Steps to War: An Empirical Study* (Princeton: Princeton University Press, 2010).
[79] Seung-Whan Choi, *New Explorations into International Relations* (Athens: University of Georgia Press. 2017).
[80] Dominic Rohner, "How to Curb Conflict," in Courtney J. Fung et al., eds., *New Paths and Policies Towards Conflict Prevention* (New York: Routledge. 2024), pp. 54–61.
[81] Cristopher Blattman and Edward Miguel, "Civil War," *Journal of Economic Literature*, Vol. 48, No. 1 (2010), pp. 3–57.
[82] Lindsay Reid et al. "Conflict Environments and Civil War Onset," *Journal of Global Security Studies*, Vol. 6, No. 2 (2021), pp. 1–12.
[83] Scott D. Bennett and Alan C. Stam III, *The Behavioral Origins of War* (Ann Arbor: University of Michigan Press, 2009); David L. Rousseau, *Democracy and War* (Redwood City: Stanford University Press, 2005); Cranmer and Siverson, "Demography, Democracy, and Disputes."

process as war. More events in a dataset make it easier to find statistically significant results, as MIDs are rare. But this assumption may not hold. For example, logic and experience suggest that a threat to use force may be "cheap talk," the show of force may be bravado, and minor events may have no leader input.[84] Wars occur due to deliberate leaders' decisions that translate to intense use of force, so the results for the role of rising riches in all MIDs, and even only those with fatalities falling short of the war threshold, may not apply to war. An EITM study such as ours that asks a question about war should better focus its empirical part on war *per se*.

Consider next whether to model war as a count or a binary event. Table 1's studies did not take an EITM approach. Choice naturally links to a binary concept. Formally modeling the number of wars per period as a choice seems (to us, anyway) awkward; we have not seen such a model in the literature. We suggest that even wannabe empire-builders do not plan to fight so many wars in a year. A count model treats the wars it totals per year as similar and matches them with the same yearly state factors; the implied assumption seems too strong as the willingness and capability to fight another war in a year may vary depending on the number of existing wars. We prefer to model war as a binary choice.

Six models in Table 1 used EPpc to measure riches, and Chatagnier and Castelli used the GDP share of industrial goods.[85] These measures seem too narrow for our purpose; we defined development as a broader concept in the introduction. Fifteen other studies used the GDPpc for development, all but one from standard sources. GDPpc captures our idea of riches, as it correlates highly with the features we stated in the introduction.[86] One study created its GDPpc with a model joining GDP adjusted to purchasing power parity (PPP), GDP unadjusted for PPP, non-PPP GNP, and population, all from various sources.[87] We prefer to use GDPpc from standard sources.

Two models added development interactions with itself (squared), and another three, respectively, with binary democracy, population × binary major power × binary democracy, and serving on the UNSC. Using development squared can assess the Pessimist-Optimist theory. Adding development interactions with other factors is insightful, but doing so with binary measures seems too crude and the UNSC too narrow for our purposes. In Table 1, models usually include factors such as democracy, power, population, trade, years in peace, and borders. The channels of the four competing theories of riches and warlikeness involved such factors, and riches seem central enough to interact with them. This possibility is intriguing (to us, anyway).

Formal Model of Warlikeness Choice

We raised various issues about the design of prior empirical models that say something about our research question. In truth, all models, empirical or not, are imperfect creatures, as they simplify reality to gain generality and clarity. We learned from the prior modeling efforts for our modeling effort. This section first develops a formal (mathematical) model for examining the state's choice of international warlikeness. It then shows how to link the model to conducting empirical work on the role of rising development considering the extant theories we discussed.

[84] Douglas M. Gibler, *International Conflicts, 1816–2010* (Lanham: Rowman & Littlefield, 2018); Alexander B. Downes and Todd S. Sechser, "The Illusion of Democratic Peace," *International Organization*, Vol. 66, No. 3. (2012), pp. 457–89; Cranmer and Siverson, "Demography, Democracy, and Disputes."

[85] J. Tyson Chatagnier and Emanuele Castell, "A Modern Peace?" *Political Research Quarterly*, Vol. 69, No. 4. (2016), pp. 852–64.

[86] Hal Brands and Michael Beckley, *Danger Zone* (New York: W.W. Norton, 2022).

[87] Jonathan N. Markowitz et al., "Productive Pacifists," *International Studies Quarterly*, Vol. 64, No. 3 (2020), pp. 558–72.

Bargaining

The bargaining theory of war offers a good start, for it treats war as a rational choice; being warlike and fighting are not the same thing, but logic has it they are related. Levy and Thompson's *Causes of War* suggests the view of war as the outcome of failed bargaining entered international relations from economics with Blainey's *The Causes of War*. The idea assumes that the disputing states expect war over a stake will divide it according to their relative powers. If they agree on their relative powers, they should prefer to divide the disputed stake in peaceful bargaining, as it would avoid the costs of fighting; otherwise, war will ensue. The bargainers may twist their power (to gain more) and expect war to entail surprises. War embeds uncertainty, a point making it from antiquity to the modern era.[88]

Fearon extends this logic. Assuming states are rational unitary (fully unified) actors who think combat is costly, he asks why bargaining over a disputed stake sometimes fails to prevent war.[89] The failure, he says, is puzzling, as formal modeling indicates that risk-averse and risk-neutral actors have a range of jointly liked deals to choose from; risk lovers have none, but people (and hence states) usually dislike risk. Fearon argues the failure reflects the bargainers' private info, incentives to overstate power, inability to commit, and viewing the stake as indivisible, adding quickly that leaders' personalities and biases, domestic forces (e.g., economic), global anarchy, and the security dilemma may also play a role.

Things may be more complex than in the Fearon formulation. Leaders may think the benefit of combat (divorced from its outcome) exceeds its cost because it unifies and diverts minds from a crisis, scatters barriers to needed reforms, boosts innovation and talent, and energizes.[90] Fearon says risk-neutral actors have a range of deals to choose from; elaborate modeling shows they only accept dividing the stake by the power ratio.[91] Fearon says most people are risk averse; results show people take risks to avoid losing their assets.[92] Fearon glosses over domestic factors, but they may play a decisive impact.[93]

Putting it together, a state's choice of whether to be warlike may reflect private info, incentives to distort it, commitment issues, risk propensity, beliefs on the utility of combat (regardless of its outcome) and stake divisibility, and leader personality and biases. Anarchy and the security dilemma may play a role. Logic has it that beliefs about the choice's impact on war risks, feelings (e.g., fear), chance, and data issues can also be at play; data on factors such as GDP and power may be imprecise, as states may err in creating them or have reasons to distort them. All these forces bring uncertainty into the choice and the ability to model it. Modelers rarely, if ever, observe them systematically across states and over time. Our formal model should find a place for uncertainty and express the warlikeness choice as probabilistic.

Mathematical Model

We make five basic assumptions. One, a state is a unitary actor, as in Fearon.[94] This idea simplifies a complex entity but has things going for it; societies have usually followed the

[88] Ancient: Sun-Tzu, *The Art of War*; Thucydides, *History of the Peloponnesian War*. Modern: Carl von Clausewitz, *On War* (Oxford: Oxford University Press, 1832/2008); Mosca, *The Ruling Class*.

[89] James D. Fearon, "Rationalist Explanations for War," *International Organization*, Vol. 49, No. 3 (1995), pp. 379–414.

[90] Bruce Bueno de Mesquita and David Lalman, *War and Reason* (New Haven: Yale University Press. 1992/2008); Dan Reiter, "Bargaining and War," in Reiter, ed., *Understanding War and Peace* (Cambridge: Cambridge University Press, 2024), pp. 13–43. Our prior section discussed this point in the context development and warlikeness.

[91] Wagner, *War and the State*.

[92] Levy and Thompson, *Causes of War*.

[93] Charles H. Anderton, "The Bargaining Theory of War and Peace," *Economics of Peace and Security Journal*, Vol. 12, No. 2 (2017), pp. 10–15.

[94] Fearon, "Rationalist Explanations for War."

flag, especially since nationalism began to rise in the mid-1800s. Second, the state considers adopting a warlike or pacific stance in world affairs. Third, using relevant data, the state selects the stance expected to maximize its perceived utility or net benefits (NB), defined as the total benefit minus total cost. Fourth, the state's war decision is also subject to obscure factors and pure chance. The basics of this approach have a long history.[95] Fifth, each NB reflects state factors (e.g., economic and political), aligning with the state-level analysis idea that state features shape its international behavior in addition to the security dilemma, global anarchy, and uncertainty.[96]

Let us present these ideas formally. The index i denotes a state, and the t denotes a period. State i chooses whether to become warlike or pacific in period t. It projects its NB by stance (S_{it}), denoted as $NB_{w,it}$ for warlike and $NB_{p,it}$ for pacific. It takes the stance expected to give a higher NB. We assume the state computes its NBs as weighted sums of the K country features in the column vector X_{it}, a form handy for analysis. The actor keeps the weights in line vectors α_w (for warlike) and α_p (peaceful) and assumes the role of other states stays the same in the comparison. Each NB also depends on those unobserved uncertainties: their total impacts are $\varepsilon_{w,it}$ and $\varepsilon_{p,it}$, respectively.

Equations (1) and (2) give the NB by stance.

$$NB_{w,it} = \alpha_w X_{it} + \varepsilon_{w,it} \tag{1}$$

$$NB_{p,it} = \alpha_p X_{it} + \varepsilon_{p,it} \tag{2}$$

The first term in X_{it} captures the security dilemma and global anarchy, assuming it is constant, which seems right for our world; the first terms in α_w and α_p, respectively, equal one.

The state computes the difference between the NBs, where $\beta \equiv \alpha_w - \alpha_p$ and $\varepsilon_{it} \equiv \varepsilon_{w,it} - \varepsilon_{p,it}$, assuming all else is equal for each possibility.

$$NB_{w,it} - NB_{p,it} = \beta X_{it} + \varepsilon_{it} \tag{3}$$

If the difference in Equation (3) is positive, the state chooses to be warlike on the world stage and *vice versa*.

$$S_{it} = \begin{cases} \text{warlike} & \text{if} \quad \beta X_{it} + \varepsilon_{it} > 0 \\ \text{pacific} & \text{if} \quad \beta X_{it} + \varepsilon_{it} \leq 0 \end{cases} \tag{4}$$

In Equation (4), the *ex-ante* choice of stance reflects ε_{it}, β, and X_{it}. We only observe X_{it}, but can approximate S_{it} by the observed war action and add assumptions on ε_{it} to enable saying something about the β.

Linking war start to Equation (4) is theoretically relevant, as its choice occurs *ex-ante*. Let us set $w_{it} = 1$ if the state started or first joined a war at t, and $w_{it} = 0$ otherwise. In line with our discussion in the prior section, this condition includes only situations in which the state decides to go to war over an underlying dispute without any state attacking it. If $w_{it} = 1$, the underlying disputed issue is not a concern for our model, but we know that the state chose to fight over it. An X factor raising the probability of $w_{it} = 1$ thus contributed positively to the choice to be warlike. One could use involvement or onset as a proxy for warlikeness. However, as the prior section discussed, it would muddle the question

[95] See, for example, Sun-Tzu, *Art of War*; Thucydides, *History of the Peloponnesian War*; Wei, *Wei Liao-Tzu*; Li Ching, *Questions and Replies Between T'ang T'ai-tsung and Li Wei-kung*; Clausewitz, *On War*; Theodore Abel, "The Element of Decision in the Pattern of War," *American Sociological Review*, Vol. 6, No. 4 (1941), pp. 853–59; Morgenthau, *Politics Among Nations*.

[96] Levy and Thompson, *Causes of War*; Greg Cashman, *What Causes War?* (Lanham: Rowman and Littlefield, 2014).

and analysis and increase the temporal dependence between events in the data. It is unclear whether it is possible to address these difficulties satisfactorily; in any case, doing so falls outside our scope.

In any case, in this article, we use the conditional probability (given X_{it}) of initiating or first joining war to approximate the conditional probability of choosing to be warlike.

$$\text{Probability}\left(S_{it} = \text{warlike} \mid X_{it}\right) \approx \Pr\left(w_{it} = 1 \mid X_{it}\right) = \Pr\left(\varepsilon_{it} > -\beta X_{it}\right) \tag{5}$$

We assume that ε_{it} has a standard logistic probability distribution function (PDF). This function is handy for empirical analysis, and its cumulative distribution function (CDF) varies from 0 to 1, similar to the concept of probability. Probability $(w_{it} = 1)$ equals the area under our PDF(Z) for $Z > -\beta X_{it}$. The assumed PDF is symmetric around zero, so the Probability $(w_{it} = 1)$ equals the area under it for $Z \leq \beta X_{it}$, which Equation (6) gives for our CDF at $Z = \beta X_{it}$.

$$\text{Probability}\left(w_{it} = 1 | X_{it}\right) = \frac{\exp\left(\beta X_{it}\right)}{1 + \exp\left(\beta X_{it}\right)} \tag{6}$$

Equation (7) writes Equation (6) as log odds to get a linear form. The Pessimist-Optimist theory expects the ∩-shaped effect, so we add development interacting with itself (squared). Two studies found this impact in the first and third waves of empirical research, respectively, as noted. We will see shortly that the math of this interaction may also generate the ∪ shaped effect reported in Table 1.

Next, we call the weight of the first term in the X_{it} as β_0, the second term in X_{it} development_{it}, the third development_{it} times Development_{it} (development squared), and the next terms, generically, x_j, where j is an index distinguishing them from one another. Last, X_{it} holds interactions of development with each x-factor. Equation (7) centers development and the x-factors around their respective mean value in the data when they appear in interactions for a reason discussed shortly. We get the following equation, where K is the number of terms included in the vector X_{it}.

$$\begin{aligned}\ln\left(\frac{\text{Probability}\left(w_{it} = 1 | X_{it}\right)}{1 - \text{Probability}\left(w_{it} = 1 | X_{it}\right)}\right) &= \beta_0 + \beta_1 \text{development}_{it} + \\ \beta_2 \left(\text{centered development}\right)_{it} &\left(\text{centered development}\right)_{it} + \\ \sum_{j=4}^{K} \beta_j x_{j,it} + \sum_{j=4}^{K} \beta_j &\left(\text{centered development}\right)_{it} \left(\text{centered x}\right)_{j,it}\end{aligned} \tag{7}$$

Equation (7) does not exhaust the possibilities for model specification. For example, development interacts with itself and the x-factors; the x-factors do not interact with themselves or other x-factors. The latter, however, will be the control factors in empirical models, so we naturally give them less attention. Their effects on warlikeness can be research topics, including, for example, having them interact with themselves and even with each other; no model can hope to address all the possibilities.[97]

Illustrating the Impact of Development

The marginal effect of increased level of state development on its choice of warlikeness in Equation (7) depends on the values of the parameters β_1 and β_2, holding all the other variables at their respective average values in the data. We computed synthetic values and

[97] Bennett and Stam, *The Behavioral Origins of War*; Jeffrey M. Wooldridge, "Why Does Clogit Offer Clustered Standard Errors While Xtlogit Does Not," *Statalist: The Stata Forum*, 2 June 2022.

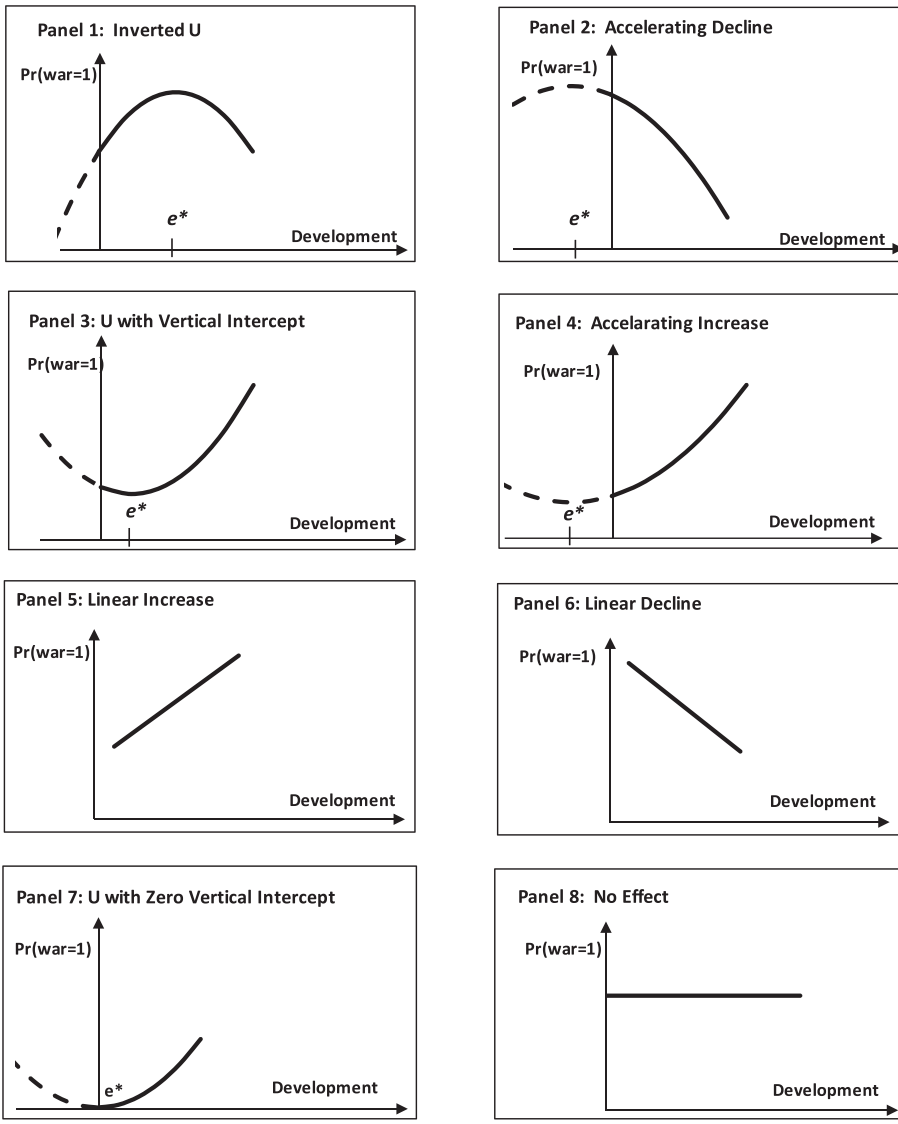

Fig. 1. Possible Effects of Development on the Probability of War, All Else Equal

plotted them to show the development possibilities in the model. Figure 1 includes eight panels that depict behaviors depending on the values of β_1 and β_2. We link them to the four theories for the role of development in warlikeness we covered and provide short state examples for rough insight. Our examples are necessarily imperfect, as Figure 1 assumes that the values of all the other model variables equal their respective means. Such a "state creature" exists only in math; still, our examples are useful as a heuristic device.

Panel 1: The Pessimist-Optimist Theory

For Panel 1, $\beta_1 > 0$ and $\beta_2 < 0$, capturing the Pessimist-Optimist theory. Warlikeness rises as riches rise to level e* and then falls as riches continue to increase above e*. For example, Japan developed since the late 1800s and at the same time became warlike; it then became less warlike as it developed after 1945.

Panels 2 and 6: The Optimist Theory

For Panel 2, $\beta_1 < 0$ and $\beta_2 < 0$. The negative part of riches in Panel 2 exists only mathematically. The positive development part depicts the Optimist theory: warlikeness declines as development rises. In Panel 6, $\beta_1 < 0$, and $\beta_2 = 0$, depicting a linear variant of the optimist theory. The two panels may depict Sweden, which became less warlike as it developed since the end of the Napoleonic wars.

Panel 3: ∪-shaped

In Panel 3, $\beta_1 < 0$ and $\beta_2 > 0$. In this case, warlikeness first falls as riches rise and then rises as riches continue to grow, depicting ∪-shaped behavior. Theorists spent little time, if any, discussing this possibility. We saw that two empirical studies reported it. For example, Israel fought from 1948 to 1949, then did not fight as it got richer until late 1956, after which it continued to develop and initiate wars.

Panels 4, 5, and 7: The Pessimist Theory

In Panel 4, $\beta_1 > 0$ and $\beta_2 > 0$. The part with positive riches depicts the Pessimist theory: warlikeness rises with the level of development. Its part with negative riches exists only mathematically. In Panel 5, $\beta_2 = 0$, depicting a linear variant of the Pessimist Theory. Panel 7 ($\beta_1 = 0, \beta_2 > 0$) depicts a variant with $e^* = 0$. This group of panels may illustrate the case of the USA; it developed since it gained independence and has increasingly fought wars ever since.

Panel 8: The Null Theory

In Panel 8, $\beta_1 = \beta_2 = 0$. It depicts the Null theory: development does not impact warlikeness. For example, Switzerland has developed since the early 1800s and remained peaceful. As another example, China's GDPpc has risen much since it fought Vietnam in 1979, and it has not fought wars ever since; there is more to say about China *per se*, and we will revisit this case at the end of the article.

Empirical Model

Our empirical model follows Equation (7), which aligns with the EITM approach. This section prepares Equation (7) for empirical analysis. We specify the data and measures for all the model's variables and highlight theories and results for the impacts of x_j ($j = 4, \ldots, K$), our control variables, on warlikeness. Finally, we present the estimated model equations. The model measures all the variables by year (t) and state (i), like the models in Table 1.

Dependent Variable

Warlikeness, our dependent variable (DV), stands for the tendency of a state to be warlike toward other states in international affairs. As discussed in the prior section, we approximate warlikeness with the probability of a binary event (w), which we set to one if the state initiated or first joined a war in a year and zero otherwise. The data comes from Correlates of War. We follow the studies of Bennett and Stam, Rosseau, and Cranmer and Siverson (see *Taking Stock* section) and drop the next years of a war that lasts longer than a year from the analysis; in this practice, we are not alone.[98]

[98] Bennett and Stam, *The Behavioral Origins of War*; Rousseau, *Democracy and War*; Cranmer and Siverson, "Demography, Democracy, and Dispute." Studies that code the DV like us include, for example, Erik Gartzke and Kristian S Gleditsch, "The Ties That Bias in International Conflict," *International Studies Quarterly*, Vol. 66, No. 1 (2022), pp. 1–13; James L. Ray and Allan Dafoe, "Democratic Peace versus Contractualism," *Conflict Management and Peace Science*, Vol. 35, No. 2 (2018), pp. 193–203; Stephen L. Quackenbush and Michael Rudy, "Evaluating the Monadic Democratic Peace," *Conflict Management and Peace Science*, Vol. 26, No. 3 (2009), pp. 268–85.

Key Independent Variable

Development is the state's GDPpc in constant international dollars (constant_I$), a computed notional currency adjusting for purchasing power variations across states (i) and years (t). As noted, GDPpc highly correlates with the development traits in our introduction.[99] One I$ has the same buying power over GDP as one US$ (or $) has in the USA. GDP in constant_I$ is comparable across i and t (unlike that in current_I$). We discuss the basic computation of the constant_I$ GDP. In a benchmark year, the ICP (International Comparison Program) collects local currency (LC) prices of similar goods and services (products) and spending on identical GDP subgroups, s_{gi} ($g = 1,2$ to G), by i. Prices are restated as ratios of the matching $ prices in the USA and averaged by g, obtaining purchasing power parity (PPP) and notional quantities by g and i: $ppp_{gi} = p_{gi}/p_{gUS}$; $q_{gi} = s_{gi}/ppp_{gi}$. The ppp_{gi} and q_{gi} enter the so-called Geary-Khamis equations to get price levels by state (PL_i) and I$ prices by subgroup (Π_g). The current_I$ GDP of state i is $\sum_g \Pi_g q_{gi}$. The procedure converts it to constant_I$ as usual. It defines the exchange rate (ER) from LC to I$ (PPP_ER) as current_LC GDP at local prices/current_I$ GDP at I$ prices.[100] Our GDPpc data for 1870 to 1998 is from Maddison, who compiled GDPpc stated (or restated) in 1990 constant_I$ using ICP benchmarks circa 1990, national accounts, population data, and Heston et al.[101] For 1949–1870, a period without systematic national accounts, he extended his 1950 data using existing economic growth estimates by state. We expanded the data as he did and then extended it to 2010 using Heston et al. and WDI.[102]

Control Variables

Our controls are in the mold of those used in Table 1. Their data is from the *Correlates of War* website unless otherwise stated. Their war effects are topics of ongoing research. We outline ideas and results.

Trade

Trade is the GDP share of the total exports (X) plus imports (M), giving the economic importance of trade. Some studies got Trade from the current_$ X, M, and GDP, converted from LC by the market exchange rate (M_ER); this measure assumes M_ER = PPP_ER or similar goods have similar $ prices across i.[103] The assumption does not hold to a degree

[99] Brands and Beckley, *Danger Zone*.

[100] There is more to say, for example, managing nonbenchmarked years or states and quality differences by i; it falls outside our scope. See, for example, Robert Summers and Alan Heston, "The Penn World Table (Mark 5)," *Quarterly Journal of Economics*, Vol. 106, No. 2 (1991), pp. 327–68; Angus Maddison, *The World Economy* (Paris: OECD, 2006); Angus Deaton and Alan Heston "Understanding PPPs and PPP-based National Accounts," *American Economic Journal: Macroeconomics*, Vol. 2, No. 4 (2010), pp. 1–35; Jutta Bolt and Jan Luiten van Zanden, "Maddison-style Estimates of the Evolution of the World Economy," *Journal of Economic Surveys*, Early View (2024), pp. 1–41.

[101] Angus Maddison, *Monitoring the World Economy 1820–1992* (Paris: OECD, 1995), and *The World Economy*; Robert Heston et al., *Space–Time of National Account aka Penn World Table 5.6* (Center for International Comparisons of Production, Income, and Prices (CICPIP): University of Pennsylvania (UOP), 1994), and *Penn World Table Version 6.1* (CICIP: UOP, 2002). For 1950–98, Maddison extended benchmarked GDPpc c. 1990 with national accounts real growth and added Heston et al. data put in 1990 constant_I$. Heston et al. get PPP for nonbenchmarked states from cost-of-living surveys by major city.

[102] Heston et al., *Penn World Table Version 6.1*; WDI, *World Development Indicators* (World Bank: Washington DC, 2020).

[103] Some studies: John R. Oneal and Bruce Russett, "Clear and Clean: The Fixed Effects of the Liberal Peace," *International Organization*, Vol. 55, No. 2 (2001), pp. 469–85; Jeff D. Colgan and Jesica L.P. Weeks, "Revolution, Personalist Dictatorships, and International Conflict," *International Organization*, Vol. 69, No. 1 (2016), pp. 163–94; Stephen B. Long and Jeffrey Pickering, "Display and Mediation: Domestic Economic Inequality and MID Initiation," *Foreign Policy Analysis*, Vol. 18, No. 1 (2022), pp. 1–19; Eric C.C. Chang and Web-Chin Wu, "Autocracy and Human Capital," *World Development*, Vol. 157, No. 105929 (2022), pp. 2–11.

varying by *i* and *t*, distorting Trade.[104] Alcalá and Ciccone (A&C) showed that nontraded goods (NT) distort the current_$ GDP comparability across *i* but not the current_I$ GDP comparability. They used the latter and current_$ X and M to get Trade for one year.[105] For panel data, Heston et al. used constant_I$ GDP and current_$ X and M. Dollar and Kraay (D&K) adjusted these X and M for inflation with the US GDP deflator.[106] Thennakoon and Dissanayake say the D&K Trade is the norm in trade studies. Ciccone (the C in A&C) says it is very sensible. We follow these authors and others who use this measure.[107] We get current_$ X and M from Barbieri and Keshk.[108] We adjust them with the US GDP deflator at base 1990, divide the result by the product of our constant_I$ GDPpc and population, and take the result's natural log, limiting left distortions.[109] Studies argue rising Trade brings peace as it deepens ties, signals resolve by willing to lose its gains in war, lowers the value of conquest by fostering global production, and war harms its gains.[110] Others say more Trade raises tension as states deploy forces to defend trade lanes, sources, and outlets deemed at risk, and it intensifies competition as they aim to gain more than others.[111] Models find that increased trade has mixed or null risk effects on war and FMID and a negative effect on a MID with at least the use of force (UMID).[112]

Democracy

Democracy is an integer varying from a level of max autocracy to a level of max democracy.[113] Machiavelli's *Discourses on Livy* says a democracy is well-suited for war. Its leaders blame other states for diverting and unifying minds as they cannot repress domestic

[104] Robert C. Feenstra et al., "The Next Generation of the Penn World Table," *American Economic Review*, Vol. 105, No. 10 (2015), pp. 3150–82; Hai Long Vo and Duc Hong Vo, "The Purchasing Power Parity and Exchange Rate Economics half a century on," *Journal of Economic Surveys*, Vol. 37, No. 2 (2023), pp. 446–79; Kian Ong, "Adjusting toward Long-Run Purchasing Power Parity," *Journal of International Money and Finance*," Vol. 149, No. 103204 (2024), pp. 1–11.

[105] Francisco Alcalá and Antonio Ciccone, "Trade and Productivity," *Quarterly Journal of Economics*, Vol. 119, No. 2 (2004), pp. 613–46, and *Discussion Paper 3095* (London: CEPR, 2001) show trade raises efficiency in traded goods (TR) more than NT. The rise in P_{NT_i}/P_{TR_i} changes by *i* (sectors vary by *i*), making the current_$ GDP incomparable. The current_I$ GDP is comparable, for it values good *g* by a similar $ price across *i*.

[106] Heston et al., *Penn World Table Version 6.1*; David Dollar and Aart Kraay, "Institutions, Trade and Growth," *Journal of Monetary Economics*, Vol. 50, No. 1 (2003), pp. 133–62.

[107] Norm: Jayanthi Thennakoon and Jagath Dissanayake, "Trade openness, income, and role of institutions," Cogent Economics & Finance, Vol. 3, No. 1020031 (2015), pp. 1–9. Sensible: Antonio Ciccone, University of Mannheim (Germany), *Email on D&K trade openness*, 2024; User examples: Markus Brueckner and Daniel Lederman, "Trade Openness and Economic Growth," *Economica*, Vol. 82, No. s1 (2015), pp. 1302–23; Chatagnier&Castelli, "A Modern Peace?"; Edward D. Mansfield and Helen V. Milner, "The Domestic Politics of Preferential Trade Agreements in Hard Times," *World Trade Review*, Vol. 17, No. 3 (2018), pp. 371–403; Addisu A. Lashitew et al., "What Drives Successful Economic Diversification in Resource-Rich Countries?" *The World Bank Research Observer*, Vol. 36, No. 2 (2021), pp. 164–96.

[108] Katherine Barbieri and Omar M.G. Keshk, Trade Dataset Codebook, Version 4.0, Correlates of War Project, 2016.

[109] Using X, M, and GDPpc in constant_I$, each with its own PPP, is better; such X and M are unavailable. Feenstra et al., "The Next Generation of the Penn World Table" give current_I$ X and M, excluding services trade and incomparable concurrently by *i* and *t*—Robert Inklaar, University of Groningen (the Netherlands), *Email on Current_I$ X and M in Penn World Tables*, 2024.

[110] Ties: Karl W. Deutsch et al., *Political Community and the North Atlantic Area* (Princeton: Princeton University Press, 1968). Resolve: James D. Fearon, "Domestic Political Audiences and the Escalation of International Disputes," *American Political Science Review*, Vol. 88, No. 3 (1994), pp. 577–92. Conquest: Brooks, *Producing Security*. Gains: Solomon Polachek, "How Trade Affects International Interactions," *Economics of Peace and Security Journal*, Vol. 2, No. 2 (2007), pp. 60–68.

[111] Defend: Morgenthau, *Politics Among Nations*; Maria P. Paganelli and Reinhard Schumacher, "Do not take peace for granted," *Cambridge Journal of Economics*, Vol. 43, No. 3 (2019), pp. 785–97. Intensify: Wagner, *War and the State*.

[112] War: Kenneth Benoit, "Democracies Really Are More Pacific in General"; William K. Domke, *War and the Changing Global System* (New Haven, Yale University Press, 1988). FMID: Nam K. Kim, "Are Military Regimes Really Belligerent?" *Journal of Conflict Resolution*, Vol. 62, No. 6 (2018), pp. 1151–78; Chatagnier and Castelli, "A Modern Peace?"; Colgan and Weeks, "Revolution, Personalist Dictatorships, and International Conflict"; Souva and Prins, "The Liberal Peace Revisited." UMID: Long and Pickering, "Display and Mediation."

[113] Monty G. Marshall and Ted R. Gurr, *Polity Project* (Center for Systemic Peace, 2018).

political opponents.[114] They mobilize their people to fight for freedom and justice, and their people exhibit war fever and follow agitators.[115] Others say a democracy finds it harder to make war as it allows debate, and people who can choose tend to reject war misery.[116] Results show rising Democracy raises war risk, does not impact war and SMID, and a democratic state is as warlike as an autocratic.[117] The flavor of these results differs from that of the democratic peace for state pairs. The latter still faces critique and contra results (e.g., the effect is null, states with democratic features fought one another, and democracy came after solving disputes).[118] At any rate, as noted, the flavor of model results may vary across units of analysis.

Population Growth

We refer to the yearly population growth of a state as PopulationG. Theorists argue population growth raises the risk of conflict as it lowers the food PC, and the population rises faster than food. Studies usually credit this idea to Malthus's 1798 *An Essay on the Principle of Population*; Hung-Liang-Chi said it earlier.[119] In one logic, states with higher population growth accept more war risk as they feel stronger, can afford more fatalities, need more resources, and are more likely to scapegoat other states as they face more strain.[120] Others think states with rising populations are more pacific as they feel weaker due to the strain, feel safer with more people, and can better ease the strain as they have more brains.[121] Models find no effect on war and positive impacts on FMID and SMID.[122]

Relative Power

The state's relative power (Rpower) is the average of its shares in the international system's total military expenditure, military personnel, population size, iron and steel production,

[114] Cashman, *What Causes War*.

[115] Mobilize: Ryan Balot, "Courage in the Democratic Polis," *Classical-Quarterly*, Vol. 54, No. 2 (2004), pp. 406–423; Alberto Vesperoni and Karl Wärneryd, "Democracy and International Conflict," (Munich: CESifo 2019); Robert Draper, *To Start a War* (New York: Penguin. Draper 2020). Fever: John A. Vasquez, "Anomalies of the Wilsonian (Monadic) Democratic Peace in the Nineteenth Century," *EUI Working Papers*, No. RSCAS 31 (2020); Jack Snyder, *Myth of Empire* (Ithaca: Cornell University Press, 1991/2013); Elihu Root, "A Requisite for the Success of Popular Diplomacy," *Foreign Affairs*, Vol. 1, No. 1 (1922), pp. 3–10.

[116] Debate: Randolph J. Rummel, "Libertarianism and International Violence," *Journal of Conflict Resolution*, Vol. 27, No. 1 (1983), pp. 27–31. Misery: Elihu Root, *The Effect of Democracy on International Law* (London: Creative Media Partners, 1917/2018); Immanuel Kant, *Perpetual Peace* (Indianapolis: Hackett, 1795/2003).

[117] Raises: Henderson, *Democracy and War*. No impact: Quackenbush and Rudy, "Evaluating the Monadic Democratic Peace"; Long and Pickering, "Display and Mediation. As warlike as: Doorenspleet, *Rethinking the Value of Democracy*.

[118] Democratic peace: Kauppi and Viotti, *International Relations Theory*. Critique: Mearsheimer, *The Great Delusion*. Fought: Sebastian Rosato, "On the Democratic Peace," in Christopher J. Coyne and Rachel L. Mathers, eds., *Handbook on the Political Economy of War* (Cheltenham: Elgar, 2011), pp. 281–314. Null: Henderson, *Democracy and War*; Joanne S. Gowa, "The Democratic Peace After the Cold War," *Economics & Politics*, Vol. 23, No. 2 (2011), pp. 153–71. Timing: Andrew P. Owsiak and John A. Vasquez, "The Cart and the Horse Redux," *British Journal of Political Science*, Vol. 49, No. 1 (2019), pp. 339–54.

[119] Food: Han Fei, trans. Brandon Watson, *Han Feizi: Basic Writings* (New York: Columbia University Press, 2003); Shiwei Zhang, "Tan Qiao's Theory of Transformation and His Political Critique," *The Logical Deduction of Chinese Traditional Political Philosophy* (Singapore: Springer, 2022), pp. 348–50. Faster: Hung-Liang-Chi. (1793), "On Peaceful Reign" and "On Livelihood," trans. Leo Silberman, "Hung Liang-Chi: A Chinese Malthus," *Population Studies*, Vol. 13, No. 3 (1960), pp. 257–65.

[120] Stronger: William H. McNeill, *Population and Politics Since 1750* (Charlottesville: University of Virginia Press, 1990); Deaths: B. A. Thayer, "Considering Population and War: a Critical and Neglected Aspect of Conflict Studies," Philosophical-Transactions of the Royal Society-B, Vol. 364, No. 1532 (2009), pp. 3081–92; Edward N. Luttwak, "Blood and Computers," in Zeev Maoz and Azar Gat, eds. *War in a Changing World* (Ann Arbor: University of Michigan Press, 2001), pp. 49–76; Gung-ho: Choucri and North, *Nations in Conflict;* Scapegoat: Katherine F. Organski and A. F. K. Organski, *Population and World Power* (London: Forgotten Books, 1961/2017).

[121] Strain: Sam C. Sarkesian, "The Demographic Component of Strategy," *Survival*, Vol. 31, No. 6 (1989), pp. 549–64. Brains: Julian Simon, *The Ultimate Resources 2* (Princeton: Princeton University Press, 1998/2023). Safer: Wright, *A Study of War*.

[122] War: Jaroslav Tir and Paul F. Diehl, "Demographic Pressure and Interstate Conflict"; FMID: Boehmer and Sobek, "Violent Adolescence." SMID: Cranmer and Siverson, "Demography, Democracy, and Disputes."

urban population size, and energy consumption. Authors suggest a more powerful state is more warlike, as it has a relatively lower cost of fighting, usually defends more allies and bases abroad, and should estimate a higher chance of winning.[123] In another theory, a more powerful state may feel more secure in its strength to deter threats short of war;[124] we add to this idea that a stronger state may also get its way in disputes without war. Models find a more powerful state is at a higher risk of war, FMID, and UMID.[125]

Number of Borders

Nborders is the number of borders a state has with other states by land or within four hundred miles of water. Theories say a rise in Nborders raises warlikeness by making it easier to use force, increasing a sense of unsafety, and creating reasons for land disputes.[126] Other theories argue that a rise in Nborders pacifies by enticing good relations to lessen the risk of attack, motivating cooperation by lowering cost, and boosting a sense of safety by making it easier to collect data.[127] Studies find a rise in Nborders raises the risk of war and FMID, or the effect is null for war and UMID.[128]

Number of Peace Years

The Npeaceyears factor is the number of years a state has been at peace since its last war. Studies often expect rising Npeaceyears to lower war risk but say little about why.[129] The reasons may be war-weariness (a fall in the willingness to fight again),[130] peace self-reinforces as more are born into it, public spending shifts to nonmilitary areas, enmity fades,[131] and issues get resolved.[132] Rising Npeaceyears may also raise war risk as states fix war damages and reassert power, issues simmer, elites use conflict for their aims, a culture lionizing soldiers arises, and memory of misery fades.[133] The effect may create temporal

[123] Cost, defends: Vesna Danilovic, *When the Stakes Are High Deterrence and Conflict Among Major Powers* (Ann Arbor: University of Michigan Press, 2010); Tudor A. Onea, *The Grand Strategies of Great Powers* (New York: Routledge, 2021). Winning: Errol A. Henderson and Reşat Bayer, "Wallets, Ballots, or Bullets: Does Wealth, Democracy, or Military Capabilities Determine War Outcomes?" *International Studies Quarterly*, Vol. 57, No. 2 (2013), pp. 303–17; Senese and Vasquez, *The Steps to Way*.

[124] Anders Wivel, "Realism and Peaceful Change," in Davide Orsi et al., eds., *Realism in Practice: An Appraisal* (Mountain View: E-International Relations Publishing, 2018), pp. 102–18.

[125] War: Daina Chiba et al., "Major Powers and Militarized Conflict," *Journal of Conflict Resolution*, Vol. 58, No. 6 (2014), pp. 976–1002. FMID: Colgan and Weeks, "Revolution, Personalist Dictatorships, and International Conflict"; Kim, "Are Military Regimes Really Belligerent?" UMID: Long and Pickering, "Display and Mediation."

[126] Easier: Wright, *A Study of War*; Uncertainty: Manus I. Midlarsky, "Power, Uncertainty and the Onset of International Violence," *Journal of Conflict Resolution*, Vol. 18, No. 3 (1974), pp. 395–431. Location: Barbara F. Walter, "Explaining the Intractability of Territorial Conflict," *International Studies Review*, Vol. 5, No. 4 (2003), pp. 137–53.

[127] Kenneth A. Schultz, "Borders, Conflict, and Trade," *Annual Review of Political-Science*, Vol. 18, No. 1 (2015), pp. 125–45; Harvey Starr, "Geopolitics and Conflict: Reconciling Spatiality, Borders, and Sovereignty in the Modern World System," *The Journal of Territorial and Maritime Studies*, Vol. 2, No. 1 (2015), pp. 139–48.

[128] War: Mary Caprioli and Peter F. Trumbore "First Use of Violent Force in Militarized Interstate Disputes, 1980–2001," *Journal of Peace Research*, Vol. 43, No. 6 (2006), pp.741–9. FMID, War: Tir and Diehl, "Demographic Pressure and Interstate Conflict." UMID: Long and Pickering, "Display and Mediation."

[129] Nathaniel Beck, et al., "Improving Quantitative Studies of International Conflict: A Conjecture," *American Political Science Review*, Vol. 94, No. 1 (2000), pp. 21–35; Gleditsch and Salehyan, "Civil Wars and Interstate Disputes"; Katherine Barbieri, *The Liberal Illusion* (Ann Arbor: University of Michigan Press, 2009); Bussmann, "Foreign Direct Investment and Militarized Conflict"; Alex Braithwaite, *Conflict Hot Spots* (Farnham: Ashgate, 2016).

[130] Jack Levy and T. Clifton Morgan, "The War Weariness Hypothesis," *American Journal of Political Science*, Vol. 30, No. 1 (1986), pp. 26–49. Blainey, *The Causes of War*; Bradford I. Stapleton, "An Examination of War-Weariness Theory," *Journal of Cold War Studies*, Vol. 17, No. 3 (2015), pp. 36–81; Stephen L. Quackenbush, "Outcomes and Consequences of War," in Sara McLaughlin Mitchell and John A. Vasquez, eds., *What Do We Know about War?* (Lanham: Rowman & Littlefield, 2024), pp. 120–38.

[131] Senese and Vasquez, *The Steps to War*; Kwang-Jin Kim and Patrick James, "Learning from the Great War?" *Defence and Peace Economics*, Vol. 21, No. 5–6 (2010), pp. 487–505; Blainey, *The Causes of War*.

[132] Beck et al., "Improving Quantitative Studies of International Conflict" state the effect in this way without motivation.

[133] Reassert: Robert Jervis, *System Effects: Complexity in Political and Social Life* (Princeton: Princeton University Press, 1998/2022). Other routs: Cashman, *What Causes War?*

dependence, which some seem to view as a nuisance to ease,[134] showing Npeaceyears results without discussion,[135] using it but not showing results,[136] or not using it.[137] Results paint a mixed picture. Some states fight repeatedly,[138] great powers fight shortly after fighting great powers,[139] military interventions follow one another,[140] and war and the number of peace years are unrelated.[141] In other results, war-weariness fostered relative peace in the post-1815 1800s and interwar period; war is less likely after a prior war; the number of a great power's wars in a period slightly lowers the number in the next,[142] the marginal effect of Npeaceyears in models is usually negative, and excluding Npeaceyears greatly impacts results.[143]

Development Interactions

Beck et al. quickly said that the effect of one conflict factor might vary as a function of another, or interactions can be important, but including too many interactions in a model may intensify collinearity.[144] We include interactions of development with itself and, respectively, other factors, aligning with Equation (7). We discussed the logic for allowing development to interact with itself. For its interactions with other factors, higher Democracy for a state, for example, may have a larger pacifying effect in richer states if it boosts doves, *ceteris paribus*, and vice versa if it boosts hawks. Rising riches may boost autocrats, who can be hawks or doves. As another example, higher Trade may have a larger pacifying effect in richer states if the Trade rise boosts doves and *vice versa*. The rationale for including other development interactions with the model's factors follows suit. That said, we need to do something to ease the noted risk of collinearity harming the estimation precision, a point discussed next.

Estimated Model Equations

We use the natural log of Trade, as noted. We log Development and Rpower, as they have outliers in the sample, and include integers (i.e., Nborders, Npeaceyears, and Democracy)

134 Nethaniel Beck et al., "Taking Time Seriously," *American Journal of Political Science*, Vol. 42, No. 4 (1998), pp. 1260–88. In another way, John R. Oneal and Bruce Russett, "Assessing the Liberal Peace with Alternative Specifications: Trade Still Reduces Conflict," *Journal of Peace Research*, Vol. 36, No. 4 (1999), pp. 423–42, and Souva and Prins, "The Liberal Peace Revisited," assume the error's temporal dependence is AR1 and use the Generalized Estimating Equations (GEE).

135 For example, Allan Dafoe, "Statistical Critiques of the Democratic Peace: Caveat Emptor," *American Journal of Political Science*, Vol. 55, No. 2, 2011, pp. 247–62; Boehmer and Sobek, "Violent Adolescence"; Colgan and Weeks, "Revolution, Personalist Dictatorships, and International Conflict"; Chatagnier and Castelli, "A Modern Peace?"; Haixia Qi et al., "Leadership Transition, Ally Restraints, and Target State Resistance," *Frontiers in Political Science*, Vol. 6, No. 1459665 (2025), pp. 1–15.

136 See, for example, Bareis, "Interstate Resource Conflicts"; McDonald, *The Invisible Hand of Peace*; Smith and Vreeland, "UN Security Council membership"; Jang and Smith, "Pax Petrolica?"

137 Examples include Ko et al., "War and Warming"; Mansuri et al., "Militarized Conflict, Trade, and Economic Development"; Pickering, "War Weariness and Cumulative Effects."

138 William W. Davis et al., "The Dynamic of Warfare: 1816–1965," *American Journal of Political Science*, Vol. 22, No. 4 (1978), pp. 772–92.

139 Levy and Morgan, "The War Weariness Hypothesis."

140 Pickering, "War Weariness and Cumulative Effects."

141 David Garnham., "War Proneness, War Weariness, and Regime Type," *Journal of Peace Research*, Vol. 23, No. 3 (1986), pp. 279–89; Henderson, *Democracy and War.*

142 After 1815: Blainey, *The Causes of War*. Less: David Singer and Melvin Small, *The Wages of War, 1816–1965* (New York: Wiley, 1972); Benjamin Most and Harvey Starr, "Diffusion, Reinforcement, Geopolitics, and the Spread of War," *American Political Science Review*, Vol. 74, No. 4 (1980), pp. 932–46. Lowers: Levy and Morgan, "The War Weariness Hypothesis."

143 Negative: for example, Dafoe, "Statistical Critiques of the Democratic Peace"; Qi et al., "Leadership Transition, Ally Restraints, and Target State Resistance"; Senese and Vasquez, *The Steps to War*; Bussmann: "Foreign Direct Investment and Militarized Conflict"; Barbieri, *The Liberal Illusion*; Chatagnier and Castelli, "A Modern Peace?"; Bareis, "Interstate Resource Conflicts." Excluding: Dafoe, "Statistical Critiques of the Democratic Peace."

144 Beck et al., "Improving Quantitative Studies of International Conflict."

and rates (PopulationG) in their original form.[145] "L" at the end of a factor name says it enters as a log. We ease the possible effect of war on its factors by using their first lag; this also aligns with the fact that state data at t (e.g., GDP, trade) are usually from $t-1$. We center factors on their means in the interactions; it usually lowers the correlations between interactions and their standalone factors, raising estimation precision.[146] In models (8) and (9) below, w is one for war and zero otherwise; s1, s2, and s3 are natural cubic regression splines in the peace years; t is this year; $t-1$ is the prior year; and i denotes state. The λ are the parameters to estimate, u is the error term, and a bar above a variable indicates a sample mean.

Model (8) has DevelopmentL interacting only with itself.

$$\ln\left(\frac{\text{Probability}\left(w_{it}=1\right)}{1-\text{Probability}\left(w_{it}=1\right)}\right)=\lambda_0+\lambda_1\text{DevelopmentL}_{i,t-1}+\lambda_2\text{TradeL}_{i,t-1}+\lambda_3\text{RpowerL}_{i,t-1}+$$
$$\lambda_4\text{Democracy}_{i,t-1}+\lambda_5\text{PopulationG}_{i,t-1}+\lambda_6\text{Nborders}_{i,t-1}+\lambda_7\text{Npeaceyears}_{i,t-1}+$$
$$\lambda_8\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)^2+\lambda_9 s1_{it}+\lambda_{10}s2_{it}+\lambda_{11}s3_{it}+u_{it} \quad (8)$$

Model (9) adds interactions of DevelopmentL with the other factors.

$$\ln\left(\frac{\text{Probability}\left(w_{it}=1\right)}{1-\text{Probability}\left(w_{it}=1\right)}\right)=\lambda_0+\lambda_1\text{DevelopmentL}_{i,t-1}+\lambda_2\text{TradeL}_{i,t-1}+\lambda_3\text{RpowerL}_{i,t-1}+$$
$$\lambda_4\text{Democracy}_{i,t-1}+\lambda_5\text{PopulationG}_{i,t-1}f+\lambda_6\text{Nborders}_{i,t-1}+\lambda_7\text{Npeaceyears}_{i,t-1}+$$
$$\lambda_8\left(\text{Development}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{Development}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)+$$
$$\lambda_9\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{TradeL}_{i,t-1}-\overline{\text{TradeL}_{i,t-1}}\right)+$$
$$\lambda_{10}\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{RpowerL}_{i,t-1}-\overline{\text{RpowerL}_{i,t-1}}\right)+$$
$$\lambda_{11}\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{Democracy}_{i,t-1}-\overline{\text{Democracy}_{i,t-1}}\right)+$$
$$\lambda_{12}\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{PopulationG}_{i,t-1}-\overline{\text{PopulationG}_{i,t-1}}\right)+$$
$$\lambda_{13}\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{Nborders}_{i,t-1}-\overline{\text{Nborders}_{i,t-1}}\right)+$$
$$\lambda_{14}\left(\text{DevelopmentL}_{i,t-1}-\overline{\text{DevelopmentL}_{i,t-1}}\right)\left(\text{Npeaceyears}_{i,t-1}-\overline{\text{Npeaceyears}_{i,t-1}}\right)+$$
$$\lambda_{15}s1_{it}+\lambda_{16}s2_{it}+\lambda_{17}s3_{it}+u_{it} \quad (9)$$

Estimation

We compiled a sample with yearly observations for 162 states from 1870 to 2010. The number of observations by state (T_i) varies due to missing data and different state lifetimes in the international system. Table 2 gives the summary statistics. The appendix discusses the bivariate correlation matrix for the variables, where the bivariate correlation between development and war is positive and significant at the 5% level. The individual variance inflation factors (VIF) are smaller than 1.82 for model (8) and smaller than 1.97 for model (9). The average VIF is 1.36 for model (8) and 1.41 for model (9); multicollinearity is thus not a concern with our mean-centering of the factors in interactions.

[145] Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* (Boston: Cengage, 2019).
[146] Dawn Iacobucci et al., "Mean Centering, Multicollinearity, and Moderators in Multiple Regression," *Behavior Research Methods*, Vol. 49, No. 1 (2017), pp. 403–4; Scott Menard, *Logistic Regression* (Thousand Oaks: Sage, 2013).

Table 2. Summary Statistics

Variable Meaning	Mean	SD	Min	Max
w	0.0131	0.114	0	1
DevelopmentL	7.910	1.121	4.167	10.823
Democracy	1.006	7.356	−10	10
PopulationG	0.0176	0.026	−0.387	0.716
RpowerL	−6.189	1.899	−11.536	−0.957
TradeL	−1.534	0.842	−7.933	3.007
Nborders	5.626	3.097	0	22
Npeaceyears	48.377	36.781	0	137
Natural cubic spline1	−89 345.14	112 674.1	−424 243	0
Natural cubic spline2	−153 582.1	211 752.5	−806 870	0
Natural cubic spline3	−168 634.5	255 129.3	−1 000 000	0

Note: w is a binary variable set to one for war and zero otherwise; G in PopulationG denotes growth; L denotes the natural log; N in Nborders denotes the number of; R in RpowerL denotes relative.

Our logs ease the possibility of heteroskedasticity in our panel.[147] Our dropping of the ongoing war years prevents serial correlation from war spells. Npeaceyears eases serial correlation from peace spells. We fit it with three natural cubic regression splines and add them to the model as the effect may be nonlinear.[148] We can use one-tailed tests as the rival theories expect signs of impact, but we use the more demanding two-tailed tests. Combining these tools makes it harder to find statistically significant results; we choose to be careful. Our estimators are variants of the unit-effects form, where the estimator's error term $u_{it} = \alpha_i + \varepsilon_{it}$; i denotes a unit (state); t denotes time (in our case, a year); u_{it}, α_i, and ε_{it} are random variables and unobserved; u_{it} and ε_{it} vary by i and t; α_i varies by i and is unrelated to ε_{it}. In this section, we use the popular pooled logit estimator.[149] It is a proper estimation method for a DV that consists of rare events, assuming all the available data in the estimation sample is relevant,[150] as we do here. The pooled logit estimator applies maximum likelihood estimation (MLE) to get the parameters, assuming $E(u_{it}|X_i, \alpha_i) = 0$, where $X_i \equiv X_{i1}, \ldots, X_{iT_i}$, units have the same α_i, and, using y for the DV, the distribution model of $y_{it} \mid X_{it}$ is correctly specified. Pooled logit can give cluster-robust standard errors, as its estimates are consistent with heteroskedasticity and serial correlation. It infers for the sample's underlying population and gives the partial effects on the Probability($y = 1$).

Results

Table 3 shows Stata's estimated coefficients and cluster-robust standard errors computed for models (8) and (9). The estimation samples (esamples) have 7837 observations. The coefficients of the natural cubic splines are insignificant, indicating nonlinear temporal dependence is not a concern.

The coefficients of DevelopmentL and DevelopmentL × DevelopmentL in Equation (8) are significant and positive, backing the Pessimist theory. The marginal effect is $0.247 + 2{\cdot}0.153 \cdot [\ln(\text{GDPpc}) - 7.91]$, all else at the mean; 7.91 is the mean DevelopmentL (Table 2). When it is zero, $\ln(\text{GDPpc}) = 7.103$, so e* in Figure 1 is 1216 1990I$. The warlikeness effect of higher riches is positive if GDPpc >1216 1990I$. For insight, the 1990I$ GDPpc of the USA, Canada, West European states, and Australia topped 1216 before 1870, Japan in 1906, Romania in 1926, Turkey in 1949, and China in 1975. All else

147 Wooldridge, *Introductory Econometrics*.
148 Beck et al., "Taking Time Seriously."
149 Examples: Thompson et al., "Bad Neighborhoods in World Politics"; Long and Pickering, "Display and Mediation"; Chatagnier and Castelli, "A Modern Peace?" Bussmann, "Foreign Direct Investment and Militarized Conflict"; Souva and Prins, "The Liberal Peace Revisited"; Henderson: *Democracy and War*.
150 Casey Crisman, "Estimating Substantive Effects in Binary Outcome Panel Models," *Journal of Politics*, Vol. 83, No. 2. (2021), pp. 532–46.

Table 3. Estimated Parameters by Model Variable

Variable	Equation (8)	Equation (9)
Constant	−3.573***	−3.637***
	(1.329)	(1.320)
DevelopmentL	0.247**	0.267**
	(0.099)	(0.117)
TradeL	−0.191*	−0.189*
	(0.101)	(0.104)
RpowerL	0.423***	0.441***
	(0.058)	(0.0703)
Democracy	−0.035**	−0.0419**
	(0.017)	(0.022)
PopulationG	2.506†	5.456**
	(1.851)	(2.689)
Nborders	−0.031	−0.048
	(0.036)	(0.045)
Npeaceyears	−0.056*	−0.056*
	(0.029)	(0.029)
DevelopmentL × DevelopmentL	0.153**	0.073
	(0.053)	(0.067)
DevelopmentL × TradeL		0.092
		(0.095)
DevelopmentL × RpowerL		−0.024
		(0.069)
DevelopmentL × Democracy		0.026*
		(0.015)
DevelopmentL × PopulationG		3.015**
		(1.527)
DevelopmentL × Nborders		0.026
		(0.030)
DevelopmentL × Npeaceyears		0.0002
		(0.002)
Natural cubic spline1	−8.68e−05	−9.34e−05
	(9.38e−05)	(9.42e−05)
Natural cubic spline2	4.89e−05	5.38e−05
	(7.15e−05)	(7.12e−05)
Natural cubic spline3	−8.85e−06	−9.69e−06
	(2.32e−05)	(2.29e−05)
Observations	7837	7837
Wald χ^2	247.400	290.590
Probability > χ^2	0.000	0.000
Log Likelihood	−483.977	−481.429
Pseudo R^2	0.118	0.122

Note: Variables centered on their sample means in the interactions (not shown to simplify). L is a natural log; G in PopulationG denotes growth; N in Nborders denotes the number of; R in RpowerL denotes relative. Cluster-robust standard errors in parenthesis; two-tailed tests: ***$p < 0.01$, **$p < 0.05\%$, *$p < 0.1$. one-tailed test: †$p < 0.1$.

at the mean in each case, rising TradeL, Democracy, and Npeaceyears lower warlikeness, rising RpowerL raises it, and larger Nborders and PopulationG have no effect. In model (9), the coefficient of DevelopmentL is also positive and significant. The marginal impact of riches rises with PopulationG and Democracy, in turn, all else at the mean in each case. The results for other standalone effects are comparable to those in Equation (8), except that the coefficient of PopulationG is now also significant and positive.

Figure 2 graphs the change in the probability of war in model (9), ΔProbability(war), where Δ means change, due to a 10% rise in development (GDPpc) from a given level G, against each factor, *ceteris paribus*. The dashed 5% confidence intervals are from a

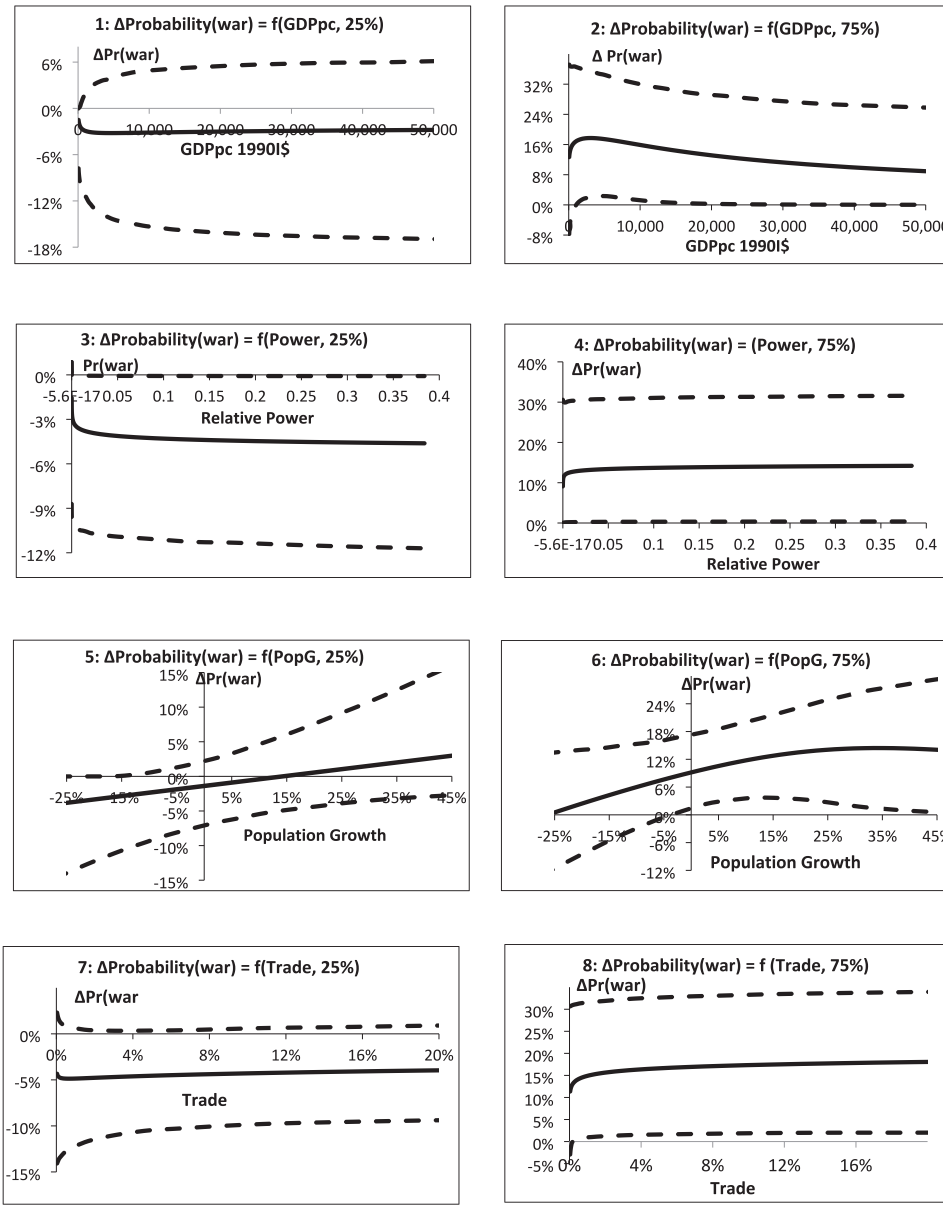

Fig. 2. Warlikeness Change Due to a 10% Increase in Development
Note: The vertical axis' label ΔPr(war) stands for ΔProbability (war), where the Greek letter Δ denotes change.

simulation drawing 10 000 results from a multivariate normal distribution with the estimates' variances and means.[151] Intervals holding the horizontal axis imply an insignificant effect. The expressions $\Delta\text{Probability(war)} = f(\text{x},25\%)$ and $\Delta\text{Probability(war)} = f(\text{x},75\%)$ in the panel's titles set the levels of G and x factors that do not vary along the horizontal axis at 25% or %75 above their sample mins, respectively. The 25-state

[151] Thomas Brambor, William R. Clark, and Matt Golder, "Understanding Interaction Models: Improving Empirical Analyses," *Political Analysis*, Vol. 14, No. 1 (2006), pp. 63–82.

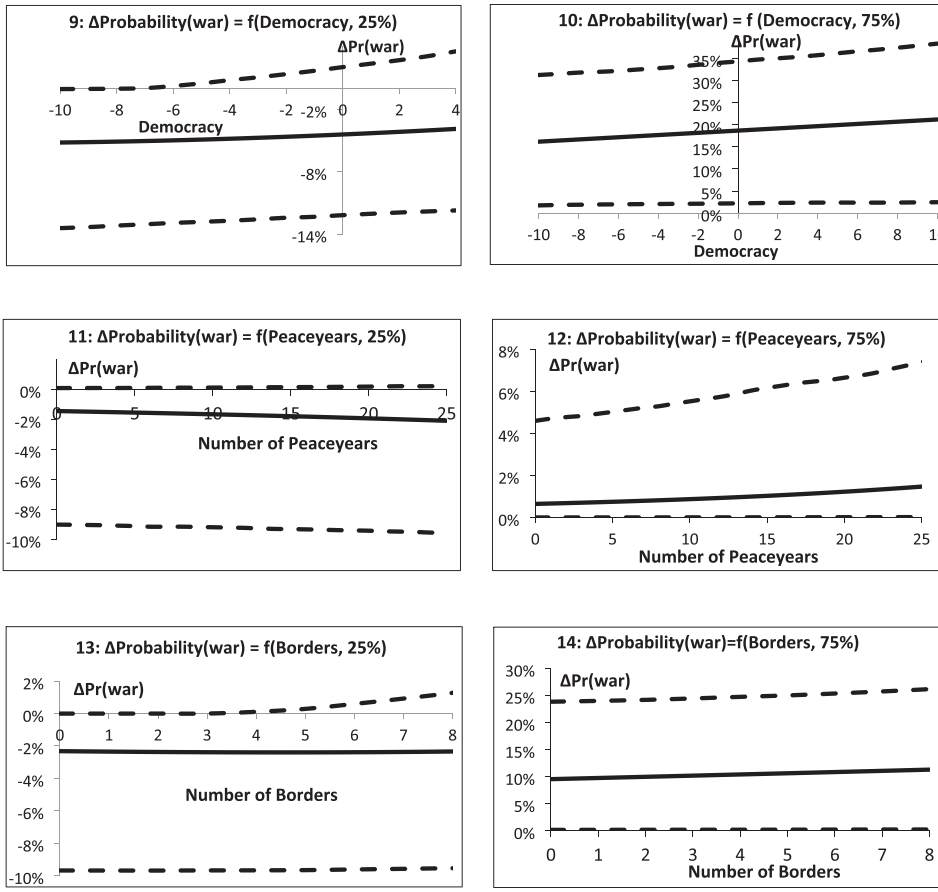

Fig. 2. Continued

is poorer, less democratic and open for trade, weaker militarily, and has fewer peace years and shared borders than the 75-state. For example, Panel 3 plots the change in Probability(war) = Probability(war|GDPpc = 1.1G) − Probability(war|GDPpc = G) against Rpower for a 25-state. There is often more than one way to interpret interaction results. We read the results for ours follows.

Panels 1 and 2: Development Interaction with Itself

In Panel 1, ΔProbability(war) due to a 10% rise in GDPpc for a 25-state is insignificant. In Panel 2, the probability change for a 75-state is 12–18% if GDPpc tops about 1500 1990I$, in the spirit of model (8). This result suggests that as its GDPpc rises, the 75-state gets more warlike than the 25-state. In our reading, the 75-state is more warlike in this case because it can better build up military power and achieve its goals in a dispute, and it is more confident of winning should it start a war. The rise in the probability of war as development increases declines from about 18% for GDPpc around the low end to about 12% for GDPpc around the high end. The USA and Israel, for example, have tended to behave in the spirit of rising warlikeness in our era near the higher end GDPpc, and Russia and India near the lower.

Panels 3 and 4: Development Interaction with Relative Power

A 25-state gets ≈3% less warlike when its GDPpc rises 10% as its relative power rises (Panel 3) and a 75-state 12% more warlike (Panel 4). We read this result to say a richer 25-state

gets less violent as its power rises, feeling safer and more content and having more to lose from war. A 75-state gets more warlike as it can better afford the power rise and war harms, fight with less effort, and is more certain it will win.

Panels 5 and 6: Development Interaction with Population Growth

As its population growth rate rises, a 25-state turns less warlike in our GDPpc scenario, but the decline tapers off (Panel 5). A 75-state becomes more warlike in this case (Panel 6). Increased population growth rate puts more pressure on a 75-state to keep or increase its PC wealth, compared to a 25-state, and doing so at the expense of other states seems more appealing, making it more warlike. The faster-growing population also feels more able to afford battle death, making it more warlike.

Panels 7 and 8: Development Interaction with Trade

In Panel 7, trade does not affect the warlikeness of a 25-state whose GDPpc increases by 10%. In Panel 8, rising trade raises the warlikeness of a 75-state from 12% to 16%. More trade amplifies the positive effect of increased development on warlikeness. The impact is larger on a 75-state than a 25-state, as the former gains more from trade and is thus more prone to defend its trade markets and routes forcefully.

Panels 9 and 10: Development Interaction with Democracy

In Panel 9, a 25-state becomes 3–4% less warlike when its GDPpc rises 10%, as its democracy rises from −10 to −7. The effect fosters the influence of doves but peters out. In Panel 10, a 75-state 16–22% becomes more warlike. The effect fosters the sway of hawks. A rise in democracy pacifies at the min GDPpc (2724.391990 I$), all else at the mean, and raises warlikeness at the max GDPpc (50 161.351990 I$), where the max GDPpc = exp(logged max in Table 2) and min GDP pc = exp(logged min in Table 2). The effect gets positive for GDPpc >13 321.32 (the GDPpc solution of marginal effect = $-0.0419 + 0.0264 \cdot [\ln(\text{GDPpc}) - 7.91)] > 0$). Rising democracy makes a state more warlike on average when its GDPpc is high enough. The flavor of this result differs from the democratic peace result for a state pair.

Panels 11 and 12: Development Interaction with the Number of Peace Years

An increased Npeaceyears for a 25-state does not affect warlikeness as GDPpc rises (Panel 11). A similar rise for a 75-state raises warlikeness by 0.5–1.5% (Panel 12). Peace does not beget peace as a rich state gets richer. Peace time allows it to rearm, forget horrors, and reclaim status.

Panels 13 and 14: Development Interaction with the Number of Borders

Warlikeness falls ≈2.5% if GDPpc rises 10% for a 25-state whose Nborders rise from 0 to 3 (Panel 13). It increases 9–11% for a 75-state as the GDPpc rises 10% and the state's number of borders rises from 0 to 8 (Panel 14). Richer states with more Nborders have more border reasons to fight than poorer and are more able to do so.

Sensitivity Analyses

Sensitivity analyses know no bounds. We changed model (9) in 11 ways, one at a time, citing studies that took the associated approach. This section presents and evaluates the results.

Results

Table 4 presents the results. Model (9) in Table 3 used the data for the development factor at period $t-1$ to explain warlikeness. A state's development level may vary slowly, so Models lma2 and lma3 use logit and moving averages for Development over two years (ma2) or three (ma3). Their esample sizes are slightly smaller than the esample for model (9), as one

cannot get ma2 and ma3 at data spell edges. The estimation results are comparable to those obtained for model (9), except that the coefficient estimate for the development interaction with population growth is now insignificant but is still positive.

Model lye in Table 4 adds year-fixed effects (YE) to model (9) and estimates with logit.[152] The idea is to account for the total impact of potentially unobserved omitted variables (OV) that varied only by year. The estimator drops one YE to avoid perfect collinearity. The esample size is now less than half that for model (9), as the estimator drops years with YE = 1 matching $y = 0$ (peace) for all states. The estimated effects are as in model (9), except for trade and the interaction of development with itself, which are now null and significantly positive, respectively.

Model lpa uses the population average (PA) logit estimator, a variant of the generalized estimation equations (GEE) method. Studies say that the GEE approach is indispensable for generalizing results and ensuring the robustness of the estimation results to the (assumed) serial correlation form.[153] PA-logit starts with formulas for the conditional expectation and variance matrix of y_{it}, where the α_i are averaged out. It then obtains an initial estimate, figures the serial correlation form, gets the variance matrix, uses it in solving the GEE, and iterates. PA-logit generates consistent coefficient estimates even if the serial correlation form is misspecified. It implies inference to the average unit in the underlying population and gives the partial effects on Probability($y = 1$). We assume the serial correlation is exchangeable, a usual form in panel data, and we compute heteroskedasticity-robust standard errors. The results agree with those for model (9).

Model lre treats α_i as state-random effects (RE) and uses the RE logit estimator[154] In general, models with sluggish X_i (i.e., vary slowly over time within the data for a unit) may require RE estimation to study the underlying population parameters, and one might believe that the associated RE assumption that α_i and X_i are not related holds for models with good controls.[155] The RE logit estimator randomly draws α_i by i from a $N(0,\sigma_\alpha^2)$ distribution, integrates the α_i out, and applies MLE to obtain the σ_α and parameters. It is consistent in the presence of serial correlation and heteroskedasticity, provides cluster-robust standard errors, infers to the population holding the unit fixed, and gives partial effects on the Probability($y = 1$) conditional on removing the α_i. The results support those for model (9).

The above models used the within (state) variation (WV) and between states variation (BV) of the variables. Model clfe uses the conditional logit (clogit) estimator, which relies solely on the WV.[156] Clogit treats α_i as state-fixed effects (FE) and conditions MLE on $\sum_{t=1}^{T_i} y_{it}$ = i's total events, dropping states with fixed y_{it} and the FE. It is consistent if y_{it} has conditional independence (CI). It does not give cluster-robust standard errors

[152] See, for example, Jared F. Edgerton, "Cooperative Communities in the International System," *Journal of Politics*, Vol. 86, No. 4 (2024), pp. 1509–23; Jang and Smith, "Pax Petrolica?"; Kim, "Are Military Regimes Really Belligerent?"; Cranmer and Siverson, "Demography, Democracy, and Disputes."

[153] Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data* (Cambridge: The MIT Press, 2010). GEE users include, for example, Souva, "The Liberal Peace Revisited"; McDonald, *The Invisible Hand of Peace;* Costel Calin and Brandon Prins, "The Sources of Presidential Foreign Policy Decision Making," *International Journal of Peace Studies,* Vol. 20, No. 1 (2015), pp. 17–34; Sambuddha Ghatak, et al., "External Threat and the Limits of Democratic Pacifism," *Conflict Management and Peace Science,* Vol. 34, No. 2 (2017), pp. 141–59.

[154] RE-logit users include, for example, Jang and Smith, "Pax Petrolica?" Thompson et al., "Conflict, Regions, and Regional Hierarchies"; Minnie M. Joo et al., "Right-Wing Populist Leaders, Nationalist Rhetoric, and Dispute Initiation in International Politics," *Journal of Conflict Resolution*, Vol. 69, No. 2–3 (2025), pp. 321–51; Mariya Y. Omelicheva and Brittnee Carter, "The Queens' Gambit," *British Journal of Politics and International Relations*, Vol. 26, No. 4 (2024), pp. 1055–79.

[155] Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, and *Introductory Econometrics*.

[156] Clogit users include, for example, Donald P. Green et al., "Dirty Pool," *International Organization*, Vol. 55, No. 2 (2001), pp. 441–68; Kim, "Are Military Regimes Really Belligerent?"; Kyungwon Suh, "Does the Bomb Really Embolden?" *Journal of Conflict Resolution*, Vol. 67, No. 6 (2023), pp. 1067–94; Smith and Vreeland, "UN Security Council Membership."

Table 4. Sensitivity Analysis

Variable	lma2 logit	lma3 logit	lye logit	lpa logit-pa	lre logit-re	clfe clogit	lpxfe xtreg-fe	lpaye logit-pa	lreyelogit-re	clfeye clogit	lfeye logit
DevelopmentL	0.310**	0.310**	0.211†	0.288**	0.267**	−0.899*	−0.008**	0.227*	0.212†	−0.808	−0.934
	(0.126)	(0.129)	(0.139)	(0.116)	(0.117)	(0.510)	(0.004)	(0.137)	(0.136)	(0.880)	(1.103)
Trade	−0.209*	−0.211*	0.036	−0.197*	−0.188*	0.077	0.000	−0.004	0.035	0.467	0.465
	(0.108)	(0.110)	(0.155)	(0.104)	(0.109)	(0.241)	(0.003)	(0.150)	(0.180)	(0.439)	(0.512)
RpowerL	0.459***	0.464***	0.573***	0.428***	0.441***	−0.257	−0.008*	0.550***	0.573***	0.114	0.165
	(0.075)	(0.075)	(0.104)	(0.070)	(0.073)	(0.227)	(0.004)	(0.102)	(0.104)	(0.477)	(0.411)
Democracy	−0.044**	−0.044**	−0.039*	−0.040*	−0.042**	−0.094**	−0.001**	−0.040*	−0.038†	−0.132**	−0.141*
	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.045)	(0.000)	(0.021)	(0.024)	(0.045)	(0.074)
PopulationG	6.227*	7.852**	10.242**	5.495**	5.456**	0.873	0.054	10.504**	10.241**	0.578	0.760
	(3.23)	(3.682)	(4.193)	(2.652)	(2.742)	(2.123)	(0.050)	(4.044)	(4.223)	(6.261)	(6.383)
Nborders	−0.055	−0.057	−0.047	−0.048	−0.048	0.122	0.000	−0.046	−0.047	0.217**	0.242**
	(0.047)	(0.046)	(0.049)	(0.045)	(0.045)	(0.109)	(0.002)	(0.049)	(0.051)	(0.106)	(0.124)
Npeaceyears	−0.065**	−0.068**	−0.114***	−0.055*	−0.056*	−0.109***	−0.001	−0.114***	−0.115**	−0.168***	−0.185***
	(0.030)	(0.029)	(0.044)	0.029	(0.030)	(0.033)	(0.001)	(0.043)	(0.046)	(0.050)	(0.064)
DevelopmentL × DevelopmentL	0.067	0.056	0.166**	0.071	0.073	−0.025	0.001	0.154**	0.166**	0.185	0.206
	(0.077)	(0.080)	(0.065)	(0.066)	(0.068)	(0.166)	(0.002)	(0.065)	(0.071)	(0.250)	(0.223)
DevelopmentL × Trade	0.099	0.109	0.142†	0.082	0.092	0.370	0.004**	0.127	0.141	0.795**	0.888**
	(0.099)	(0.099)	(0.110)	(0.094)	(0.095)	(0.251)	(0.002)	(0.242)	(0.112)	(0.339)	(0.412)
DevelopmentL × RpowerL	−0.050	−0.050	−0.036	−0.035	−0.024	0.187	0.002	−0.043	−0.036	0.023	0.036
	(0.076)	(0.079)	(0.082)	0.068	(0.074)	(0.150)	(0.004)	(0.080)	(0.094)	(0.239)	(0.356)
DevelopmentL × Democracy	0.027*	0.028*	0.022†	0.028*	0.027*	−0.008	0.000	0.024†	0.021	−0.062†	−0.073†
	(0.016)	(0.016)	(0.017)	(0.015)	(0.016)	(0.037)	(0.000)	(0.015)	(0.018)	(0.044)	(0.046)
DevelopmentL × PopulationG	2.449	2.030	7.051***	3.005**	3.015**	0.507	0.040	7.237***	7.050***	1.494	1.7632
	(1.948)	(1.932)	(2.433)	(1.504)	(1.534)	(1.128)	(0.033)	(2.356)	(2.463)	(3.976)	(3.5287)
DevelopmentL × Nborders	0.029	0.032	(0.036	0.026	0.026	0.002	0.001	0.036	(0.037)	0.047	0.049
	(0.030)	(0.030)	(0.029)	(0.029)	(0.031)	(0.051)	(0.002)	(0.029)	(0.033)	(0.055)	(0.074)
DevelopmentL × Npeaceyears	0.000	0.000	−0.001	0.000	0.000	−0.014	0.000†	0.001	−0.001	−0.018**	−0.021†
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.011)	(0.000)	(0.002)	(0.003)	(0.009)	(0.014)
Observations	7708	7599	3518	7837	7837	2947	7837	3518	3518	1261	1261

Note: variables centered on their sample means in the interactions (not shown to simplify); L denotes the natural log; G in PopulationG denotes growth; R in RpowerL denotes relative; N in Nborders denotes the number of; cluster-robust standard errors in parentheses except clfe and clfeye (unavailable); two-tailed tests: $^{***}p < 0.01$, $^{**}p < 0.05\%$, $^{*}p < 0.1$; one-tailed tests: $^{\dagger}p < 0.1$; the spline parameters are insignificant and not shown; yearly effect, fixed effects dummies (in lfeye), and constant term not shown.

as serial correlation violates CI.[157] It infers to the esample and gives partial effects on Probability($y=1$) only if $\alpha_i = 0$, α_i = set values, or $y=1$ once per i. Model clfe dropped 62% of model (9)'s obs.[158] Its estimated effects differ from model (9) for relative power, population growth, and the development-population growth interaction (now all null) and development (now negative and significant).

Model lpxfe is a linear probability model (LPM). This method treats α_i as state-FE (i.e., it drops them from the computation by applying the FE transformation).[159] It keeps the fixed-y states and relies solely on the WV. Its fitted Probability($y=1$) can be negative or larger than one, for which the estimates are inconsistent; otherwise, they are consistent.[160] It gives cluster-robust standard errors, assuming $0 \leq$ Probability($y=1$) ≤ 1. The signs and cluster-robust p-levels are quite like those obtained for model clfe but are significant for relative power, the number of peace years, and the interaction of development with trade (as the esample is larger).

Models lpaye, lreye, and clfeye add YE to models lpa, lre, and clfe and estimate with PA-logit, RE-logit, and clogit, respectively. The esamples have 3518 observations for lpaye and lreye and 1261 clfeye (down from 7837 for model (9)). The results for lpaye and lreye are quite like those for model (9); the clfeye signs and p-levels differ from model (9) for development (now null), the number of borders, and the development-trade interaction (significant and positive), and the development interaction with the number of peace years (significant and negative).

Model lfeye adds state-FE to model lye as parameters to estimate by logit.[161] This estimator ignores the BV and drops perfectly peaceful states and years.[162] Model lfeye is inconsistent due to the incidental parameter problem (IPP), which intensifies as T_i falls for a given N (number of units in the sample), and as N rises for a given T_i.[163] Simulations suggest the bias is $\lesssim$5–6% when the number of states is 100 and T_i >15–20.[164] Model lfeye infers to the esample, holding a state fixed, and gives partial effects on the Probability($y=1$) conditional on states having fought wars. Our average $T_i \approx 28$, and the esample's number of states is 45, suggesting the IPP bias may be 5% or less. Indeed, the lfeye estimates resemble those for model clfeye, which is not subject to the IPP.

Evaluation

[157] Do Won Kwak et al., "The Robustness of Conditional Logit for Binary Response Panel Data Models with Serial Correlation," *Journal of Econometric Methods*, Vol. 12, No. 1 (2023), pp. 33–56; Jeffery M. Wooldridge, "Fixed Effects Logit—Standard Errors," *Statalist: The Stata Forum*, 15 July, 2014.

[158] Our % decline is the ballpark of that for other studies, including, for example, Green et al., "Dirty Pool": 93%; James D. Fearon and David D. Laitin, Ethnicity, "Insurgency, and Civil War," *American Political Science Review*, Vol. 97, No. 1 (2003), pp. 65–90: 56%,; Bussmann, "Foreign direct investment and militarized conflict": >50%.

[159] LPM users include, for example, Casper Sakstrup, "What's going on next door?" *Journal of Peace Research*, Vol. 58, No. 3 (2021), pp. 539553.; Suh, "Does the Bomb Really Embolden?"; Lars-Erik Cederman et al., "The Future is History: Restorative Nationalism and Conflict in Post-Napoleonic Europe," *International Organization*, Vol. 78, No. 2 (2024), pp. 259–92.

[160] William C. Horrace and Ronald L. Oaxaca, "Results on the Bias and Inconsistency of Ordinary Least Squares for the Linear Probability Model," *Economics Letters*, Vol. 90, No. 3 (2006), pp. 321–27.

[161] User examples include Able Escribà-Folch and Joseph Wright, "Human Rights Prosecutions and Autocratic Survival," *International Organization*, Vol. 69, No. 2 (2015), pp. 343–73; Joshua J. Fink and David Brady, "Immigration and Preferences for Greater Law Enforcement Spending in Rich Democracies," *Social Forces*, Vol. 98, No. 3 (2020), pp. 1074–111; and Crisman, "Estimating Substantive Effects in Binary Outcome Panel Models"

[162] See Amrei Stamman et al., "Estimation of Fixed Effects Logit Models with Large Panel Data," *Beiträge zur Jahrestagung des Vereins für Socialpolitik: Demographischer Wandel—Session: Microeconometrics*, No. G01-V3 (2016).

[163] Tony Lancaster, "The Incidental Parameters Problem Since 1948," *Journal of Econometrics*, Vol. 95, No. 2 (2000), pp. 391–413.

[164] William H. Greene, *Econometric Analysis* (New York: Pearson: 2018).

What should we make of the coefficient estimates in Table 4? We examined the literature for insight. Econometrics usually lets the regressors be endogenous, provided they relate only to unobserved FE. Other areas of applied statistics typically assume that the regressors are exogenous.[165] The FE model assumes the unobserved variables affected the observed, the pooled model says they did not, and the RE and PA models assume they did by pure chance. The unobserved variables are mysterious, but there is more to say.

In 2001, Green et al. used state-pair FE to explain the presence or absence of MIDs for state-pairs and made a splash. The estimator rejected the known democratic peace result but dropped all the peaceful state pairs (as noted, 93% of the obs) from the esample.[166] Three articles, written respectively, by Beck and Katz, Oneal and Russett, and King, criticized the work of Green et al., warning against using FE for models that explain rare events like MID.[167] More generally, other scholars warned that the FE model ignores the BV,[168] raises inefficiency and proneness to measurement error bias and Type II error,[169] biases to zero,[170] and infers only to the esample.[171] In simulations, the FE-model rmse exceeded the pooled and RE models rmse with sluggish factors[172] and the RE-model rmse when the correlation between the effects and factors was smaller than about 0.4.[173] With dynamic OV, the Hausman test erred, the FE-model was more biased than the pooled and RE models, and the bias rose with T_i. The same occurred with dynamic and fixed OV, and factors more correlated with the former than the latter.[174]

Studies have quickly listed criticisms of this type to avoid using unit-fixed effects in binary DV models.[175] We could have followed suit, but we suggest that going deeper is helpful. Data quality for state factors such as GDPpc, trade, population growth, and military power reflect the ability to collect, compute, store, and report data, which varies across states and time. Occasional data revisions suggest such variables have measurement errors. The FE model's higher proneness to measurement error bias is thus a concern here.

[165] A. Colin Cameron and Pravin K. Trivedi, *Microeconometrics using Stata* (College Station: Stata Press, 2022).

[166] Green et al., "Dirty Pool."

[167] Nethaniel Beck and Jonathan N. Katz, "Throwing out the Baby with the Bath Water," *International Organization*, Vol. 55, No. 2 (2001), pp. 487–95; Oneal and Russett, "Clear and Clean"; Gary King, "Nouns and Methodological Propriety," *International Organization*, Vol. 55, No. 2. (2001), pp. 497–507.

[168] Joshua D. Angrist and Jörn-Steffen Pischke, *Mostly Harmless Econometrics* (Princeton: Princeton University Press, 2009), Marc Nerlove (2005), *Essays in Panel Data Econometrics* (Cambridge: Cambridge University Press, 2005).

[169] Jared Jennings et al, "Measurement Error, Fixed Effects," *Review of Accounting Economics*, Vol. 29, No. 2 (2024), pp. 959–99; Hill et al., "Limitations of Fixed-Effects Models for Panel Data."

[170] Samuel Bazzi and Christopher Blattman, "Economic Shocks and Conflict," *American Economic Journal*, Vol. 6, No. 4 (2014), pp. 1–38.

[171] Edward C. Norton, "Log Odds and Ends," *NBER Working Paper*, No. 18252 (2012), pp. 1–32.

[172] Scott J. Cook, *Rare Events in International Relations*, PhD dissertation, University of Pittsburgh, 2014; Thomas Plümper, "Efficient Estimation of Time-Invariant and Rarely Changing Variables in Finite Sample Panel Analyses With Unit Fixed Effects," *Political Analysis*, Vol. 15, No. 2 (2007), pp. 124–39.

[173] Tom S. Clark and Drew A. Linzer, "Should I Use Fixed or Random Effects?" *Political Science Research and Methods*, Vol. 3., No. 2 (2015), p. 399–408. Also, rmse $\equiv \sqrt{\sum_{j=1}^{j=R}\left(\hat{\beta}_j - \beta\right)^2/R}$; R = number of runs, β = true coefficient, $\hat{\beta}_j$ = estimate in run *j*.

[174] Thomas Plümper and Vera E. Troeger, "Not so Harmful After All: The Fixed-Effects Model," *Political Analysis*, Vol. 27, No. 1 (2019), pp. 21–45. Vilde L. Djuve and Carl H. Knutsen, "Economic Crisis and Regime Transitions From Within," *Journal of Peace Research*, Vol. 61, No. 3. (2024), pp. 446–61.

[175] Examples: they (1) mislead by dropping data, Mansfield and Milner, "The Domestic Politics of Preferential Trade Agreements in Hard Times," Chang and Wu, "Autocracy and Human Capital"; (2) harm inference, Håvard Hegre et al., "Evaluating the Conflict-Reducing Effect of UN Peacekeeping Operations," *Journal of Politics*, Vol. 81, No. 1 (2019), pp. 215–32; (3) raise standard errors as IR factors are sluggish, Hoshik Nam, "The Cause of Congressional Oversight Effort in US Arms Sale Plans," *International Politics*, Vol. 12, No. 4 (2023), pp. 1–24; (4) bias with dynamic OV, Djuve and Knusten, "Economic Crisis and Regime Transitions from Within"; (5) report little of interest, Crisman, "Estimating Substantive Effects in Binary Outcome Panel Models."

Table 5. The Between Variance (BV) and Within Variance (WV) Shares

Variable	BV (%)	WV (%)
DevelopmentL	80.0	20.0
TradeL	68.9	31.1
RpowerL	96.7	3.3
Democracy	61.5	38.5
PopulationG	86.6	13.4
Nborders	83.0	17.0
Npeaceyears	70.1	29.9
DevelopmentL × DevelopmentL	64.3	35.7
DevelopmentL × TradeL	67.7	32.3
DevelopmentL × RpowerL	66.1	33.9
DevelopmentL × Democracy	54.8	45.2
DevelopmentL × PopulationG	91.9	8.1
DevelopmentL × Nborders	64.3	35.7
DevelopmentL × Npeaceyears	56.2	43.8

Note: Variables centered on their sample means in the interactions (not shown to simplify); L denotes the natural log; G in PopulationG denotes growth; R in RpowerL denotes relative; N in Nborders denotes the number of.

Table 5 reports the variables' BV and WV variance shares in the sum of the two variances.[176] We see that the BV is larger than twice the WV across the board, except for the development-democracy interaction term (1.3 WV) and the interaction of development with the number of peace years (BV $\approx$ 1.2 WV). Our factors are thus sluggish, and the state-FE models ignore about half the information rooted in two factors and more than two-thirds in the rest. The FE model's higher proneness to Type II error is also a concern.

The state-FE models we estimated, except model lpfe, dropped 62% of the observations (for the peaceful states), and those including both the state-FE and year-FE dropped 84% (also dropping the years without war). Model lpfe kept peaceful states but used only the WV. It is hard to justify ignoring info. Indeed, epidemiologists studying the causes of a disease do not ignore people and periods that never had it. Similarly, the theories we examine apply across states and times, so evaluating them by ignoring observations creates selection bias.

Panel data is usually serially correlated within units.[177] The clogit estimates are inconsistent with serial correlation, as noted. Clogit also does not give cluster-robust standard errors, piling error on error. Its partial effects on the Probability($y = 1$) are not helpful: setting the FE to zero contradicts using them, setting them to nonzero values is arbitrary (they are unobserved), and assuming each state fought once in 1870–2010 is ahistorical. The logit and LPM estimators with state-FE as dummies give partial effects, but LPM drops the peaceful states, and both ignore the BV. Our state-FE models are thus problematic. In contrast, the pooled, RE, and PA logit models are consistent with SC; the first two give cluster-robust standard errors, the third models the serial correlation and gives heteroskedasticity-robust standard errors, and all three give useful partial effects on Probability($y = 1$), making them viable options.

The PA logit estimator is appealing, as it infers to the average state in the population underlying the esample, aligning with our goal. What about the FE and RE models? Studies rarely exemplify FE,[178] but doing so is vital.[179] Exceptions provide insight. Green et al.'s

[176] Cameron and Trivedi, *Microeconometrics Using* Stata.

[177] Kwak et al., "The Robustness of Conditional Logit for Binary Response Panel Data Models with Serial Correlation."

[178] Examples of studies that do not exemplify FE include, Long and Pickering, "Display and Mediation"; Bareis, "Interstate Resource Conflicts"; Smith and Vreeland, "UN Security Council membership"; Suh, "Does the Bomb Really Embolden?"

[179] Terrence D. Hill et al., "Limitations of Fixed-Effects Models for Panel Data," *Sociological Perspectives*, Vol. 63, No. 3 (2020), pp. 357–69.

Dirty Pool said its state-pair FE totaled the MID effects of language, diplomacy, and economic endowments in 1951–92. Bazzi and Blattman's Economic Shocks and Conflict said its state-FE totaled the impacts of poverty and institutions on civil wars from 1957 to 2007. Wooldridge's *Introductory Econometrics* said its city-FE total the crime effects of age and race makeup in 1982–87, as they *hardly changed during the five years*. Casual observation suggests the FE candidates of Green et al. and Bazzi and Blattman varied in their lengthy periods.

One may sensibly believe that all models have OV,[180] but what do the unit-fixed effects represent? Hill et al. (cited shortly) note that the answers provided are usually vague. What do they capture in our cases? Wooldridge, we just saw, stressed their time constancy during his five-year time period. Yet, it seems the effects of essentially all things-state varied in 1870–2010 (e.g., institutions, regime, technology, views, culture, religion, education, demography, resources, economy, military, historical legacy); things varied even over the shorter periods of several decades many studies use, suggesting, as Hill et al. imply, that state-FE in such cases may cause model misspecification.[181] The state random effects are also time-invariant, but their shared distribution may represent the international system.[182] It seems reasonable to indicate the system's impact on a state's ability to act unilaterally has not changed much since it entered esamples.

What can the yearly FE capture in a case such as ours? Most conflict studies that use YE ignore this question.[183] Others say they capture the total impact of global recessions, booms, treaties, pandemics, and crises.[184] Yet, such impacts may vary by state, as stylized facts suggest occurred for the effects of COVID-19, the Great Depression, the Paris Climate Accord, and the OPEC oil crisis.

Table 6 shows the link test results. This test regresses the dependent variable (y) on its fitted variable ($\hat{y}$) and the latter's square ($\hat{y}^2$) using the estimator applied to y. If y's model is well-specified, the coefficient estimated for $\hat{y}^2$ should be insignificant. We applied the test to models lma2, lma3, lye, lfeye, lpxfe, model (9), and LPM with state-FE as estimated dummy variables (lpfe); Stata says the test does not cover Table 4's other models.[185] The results say models (9), lma2, and lma3 are well-specified, and models lpxfe, lfeye, lpfe, and lye are not, advising against adding state-FE and year-FE to model (9).

Projection raises two more issues. One, the clogit condition $\sum_{t=1}^{T_i} y_{it}$ = state i's total number of wars in the data implies the decisionmaker at $t-1$ knew *our* T_i and wars yet to occur in the interval from t to T_i, which is hard to justify; clogit, in other words, misleads for projection, as current actors do not have this knowledge.[186] Two, the estimates of the state-FE and year-FE models apply only to states that fought in 1870–2010 and years with war, in turn. They are thus not useful for saying something general about warlikeness in the future, given scenarios of riches and other factors. Peaceful states from 1870 to 2010 can fight after 2010, and the future might have years without war. One should not drop their

[180] Wooldridge, "Why Does Clogit Offer Clustered Standard Errors While Xtlogit Does Not."

[181] Hill et al. "Limitations of Fixed-Effects Models for Panel Data" warn the FE assumption of time constancy is often questionable. Thompson et al., "Conflict, Regions, and Regional Hierarchies" use this point to reject region FE.

[182] Edgerton, "Cooperative Communities in the International System"; Jang and Smith, "Pax Petrolica?"

[183] Cranmer and Siverson, "Demography, Democracy, and Disputes"; Kim, "Are Military Regimes Really Belligerent?" Jang and Smith, "Pax Petrolica?" Edgerton, "Cooperative Communities in the International System."

[184] Bruce E. Hansen, *Econometrics* (Princeton: Princeton University Press, 2022); A. Colin Cameron and Douglas L. Miller, "A Practitioner's Guide to Cluster-Robust Inference," *Journal of Human Resources*, Vol. 50, No. 2 (2015), pp. 317–72.

[185] Carlo Lazzaro, "Panel Data Binary Logistic Regression Xtlogit," *Statalist: The Stata Forum*, 19 July, 2022.

[186] King, "Nouns and Methodological Propriety." Mundlak's model inclusion of the factors' means over T_i also implies knowing the future; Cameron and Trivedi, *Microeconometrics Using Stata* note its results usually resemble clogit (it uses only the WV for the nonmean factors), which is what we find.

Table 6. Link Test Results

Model	Table	$\hat{y}^2$ p level
Equation (9)	3	0.383
lma2	4	0.631
lma3	4	0.639
lye	4	0.106
lpxfe	4	0.000
lfeye	4	0.001
lpfe[a]	–	0.000

[a] Model lpfe is LPM with state dummies as estimated parameters.

data if the goal is to use the results to project warlikeness, on average, across all states and years.

To summarize, models ma2 and ma3 and those applying PA-logit and RE-logit backed model (9); the link test backed all of them. The year-FE model offered less support for model (9) but kept its general picture intact, and the models with state-FE offered the least support; the link test rejected all of them. The results of model (9) and the models backing it imply inference to all the states in our 1870–2010 world. The models with year-FE and state-FE infer only to the states in their esamples. We stand behind the results in Table 3. "All that remains" is the toughest task: use our results to say something about the future. A full-blown projection is outside our scope, but we already have enough for a meaningful discussion.

Conclusion: Possible Futures

Experience has taught humans that they seem to have lost the ability to make divine prophecies; nowadays, no one can predict the future with certainty. We assume analyzing the past (i.e., data) may tell us something of value about the future. This section uses our results "and then some" to guesstimate the future of warlikeness this century. The topic has recently elicited renewed scholarly interest, leading to an ongoing debate. Let us first examine this debate.

In 1509, Luigi da Porto wrote, as war returned to his rich region in Italy: "I have always heard it said that peace brings riches; riches brings pride [power]; pride brings anger; anger brings war; war brings poverty; poverty brings humanity; humanity brings peace; peace, as I have said, brings riches, and so the world's affairs go round." G. N. Clark, who quoted da Porto for his 1948 *Creighton Memorial Lecture on History*, expected rising riches to sustain peace hereon[187], just like the *Book of Rites* and the *Book of Han* did more than two millennia before. The 1950s were violent. By 1959, Miller's *A Canticle for Leibowitz* told of a once-rich world rising from a dark age, forgetting the war causing it; it got rich and plunged into another awful war. Optimism rose after the Cold War ended. Pinker sees a fall in great power wars after 1945 and concludes that humans have finally found better angles. Muller says they had grasped peace and raised riches.[188] Others observe that nationalism, state egoism, distrust, and interest groups that gain from war are still strong and suggest that

[187] G. N. Clark, *The Cycle of War & Peace in Modern History* (Cambridge: Cambridge University Press, 1949), pp. 9–10. For Clark's discussion, see pp. 18–25. We say implied as Clark noted his view indirectly and quickly; see Arnold J. Toynbee, "The Cycle of War and Peace in Modern History by G. N. Clark," *International Affairs*, Vol. 25, No. 4 (1949), pp. 499–500.

[188] Pinker, *The Better Angles of Our Nature*; Muller, "International War."

the post-1945 fall in the Great Power War reflects primarily the fear of nukes.[189] Modelers debated the significance of the fall.[190]

What should we make of this debate for the future of warlikeness? Barring prophecy, we can only learn from history. Prior periods of great-power relative peace (e.g., Pax-Britannica, various Pax-Sinica) did not last; this alone suggests the current Pax-Americana may, too, end.

Our model may offer more insight, assuming data analysis may tell us something of value about the future. We found the marginal effect of riches on warlikeness was positive; it rose with riches, trade, democracy, relative power, population growth, the number of peace years, and the number of borders, in turn, all else equal in each case. Projection with models needs to assume scenarios for the factors. Let us say states will, on average, get richer, trade more, be more years at peace, and keep their population growth, number of borders, democracy score, and relative power, as generally occurred in 2011–24. In this case, our model projects that states should have become more warlike, on average.

We can broadly assess how this expectation faired from 2011 to 2024. Fourteen years may seem too short for development to leave a large mark. Still, Pinker's 2019 *Enlightenment Now* said 7 years can inform the power of his 2011 better-angles message. He noted that the post-2011 Azerbaijan-Armenia and Russia-Ukraine fights seemed to have annulled his 2011 better-angles message, but their limited intensity supported it; both fights had since intensified.[191]

From 2011 to 2024, states such as the USA, UK, France, Iran, China, Russia, Israel, India, North Korea (NK), Pakistan, Ukraine, Azerbaijan, and Armenia fought other states; some of them fought quasi-states (e.g., Houthi, Hamas, ISIL, Taliban, Donetsk, Nagorno-Karabakh).[192] States chose sides in wars and gave them military and economic aid. Iran, China, and India aided Russia in Ukraine; NK sent both weapons and troops.[193] The USA, UK, France, and Germany aided Ukraine.[194] Iran, NK, and, likely, Russia helped the Houthi[195] and Russia, NK, China, and Pakistan Iran.[196] The USA and UK have aided Israel, bombed the Houthi, which attacked Israel, and helped Israel shoot down incoming Iranian drones and missiles.[197] Tension rose amid nuclear states: the Western accepted a 2023 UN call telling Russia to withdraw from Ukraine; Russia and NK rejected it; China, India, and

[189] Mearsheimer, *The Great Delusion*; Malešević, *The Rise of Organized Brutality*.

[190] Pasquale Cirillo, "Forecasting Risk for Violence and Wars," *International Journal of Forecasting*, Vol. 38, No. 3 (2022), pp. 798–9; Bear F. Braumoeller, *Only the Dead: The Persistence of War in the Modern Age* (New York: Oxford University Press, 2019).

[191] Shawn Davies et al. "Organized violence 1989–2022, and the Return of Conflict Between States," *Journal of Peace Research*, Vol. 60, No. 4 (2023), pp. 691–708.

[192] Wikipedia, *List of Wars: 2003-Present*, 17 February, 2025.

[193] Jeremy Howell, "Which Kontris Dey Supply Weapons Give Russia," *BBC News Pidgin*, 16 October 2024); Christopher S. Chivvis and Jack Keating, *Cooperation Between China, Iran, North Korea, and Russia* (Washington DC: Carnegie, 2024); Chietigj Bajpaee and Lisa Toremark, *India-Russia Relations* (London: Chatham, 2024); News Desk, "Russia Buys Billions Worth of Indian Weapons using Local Currency," *The Cradle.co*, 13 May 2024; Michael Schwirtz and Julian E. Barnes, "North Korea Enters Ukraine Fight for First Time, Officials Say," *New York Times*, 5 November 2024.

[194] US: Wikipedia, *Foreign Involvement in the Russia Invasion of Ukraine*, 10 February 2025; UK: *UK Support to Ukraine: Factsheet* (London: Gov.UK, 2025). France: *French Military Equipment Delivered to Ukraine* (Paris: Ministère-Des-Armées, 2024); Germany: *The Arms and Military Equipment Germany is sending Ukraine* (Berlin: Bundeswehr, 2024).

[195] House of Commons Library, *UK and International Response to Houthis in the Red Sea 2024/25*, Research Briefing, No. 9930, 4 February 2025; Wikipedia, *Houthis*, 10 February, 2025.

[196] Jeffrey Krause, *2024 Worldwide Threat Assessment* (Washington DC: Defence Intelligence Agency, 2024); By Maariv, "Pakistan Announces Intention to Supply Arms to Iran at OIC meeting," *Jerusalem Post*, 6 August 2024.

[197] Julian Borger, "US and UK forces help shoot down Iranian Drones over Jordan, Syria, and Iraq," *The Guardian*, 13 April 2024; Becky Morton and Chris Mason, "UK Forces Involved in Response to Iran Attacks on Israel," *BBC.com*, 2 October 2024; Alys Davies and Tom Bateman, "US Says it Helped Israel Shoot Down Iran Missiles," *BBC.com*, 1 October 2024.

Pakistan abstained.[198] Russia warned to use nukes in Ukraine.[199] The USA and UK let Ukraine fire their missiles into Russia, which said it sees such attacks as joint with the nuclear state and fired into Ukraine nuclear-capable ballistic missiles with multiple heads.[200] India clashed with China and Pakistan.[201] Israel (said to be nuclear) clashed with Iran (maybe).[202] All these states except NK grew richer since 2010,[203] supporting our results.

Statistical model results from a large N sample of years and states apply on average and may not necessarily emerge for each year and state. Still, our model has more things going for it. For example, on 25 February 2025, the US stated that it would continue to arm Ukraine and support its economy if Ukraine shared its vast rare Earth mineral stocks with it; these minerals are critical for producing advanced weapon systems, as well as electronics and energy technologies that fuel the rising wealth.[204] The two countries signed a critical minerals agreement on 5 May 2025.[205] Russia and Ukraine have continued to fight with devastating effects, including estimated totals of 950,000 Russian casualties by June 2025, with 250,000 dead, and 400,000 Ukrainian casualties, with 60,000-100,000 killed.[206] Canada and Western European states promised to continue arming Ukraine; by early 2025, they had given it roughly 61 Billion Euros in military aid and 70 billion in economic aid since the war began (the US had given 65 billion and 45 billion, in turn); all these states have grown richer. By the end of 2024, Defense industries produced two-thirds of the arms these states had given to Ukraine. The European Union (EU) announced a plan of $841 billion to beef up its defenses and further arm Ukraine.[207] Israel and the US bombed Iranian facilities critical for making nuclear weapons in an intense 12-day campaign, causing much destruction and many casualties; Iran responded in kind, mostly against Israel.[208] All these events, too, align with the Pessimist theory of warlikeness and development.

We would be remiss had we ignored two emerging riches-related forces. The scientific community finds that burning fossil fuels—our key energy source for raising riches—is warming the Earth and altering its climate system (e.g., larger temperature and precipitation

198 Jared Gans, "These 6 Countries Side with Russia in UN Vote on Ukraine War," 23 February *The Hill*, 2023.

199 Mariana Budjeryn, "Why Russia Is More Likely To Go Nuclear in Ukraine If It Is Winning," *Bulletin of the Atomic Scientists*, 2 October 2024.

200 Christian Edwards, "Ukraine Fire US-made Longer-Range Missiles into Russia for the First Time," *CNN.com*, 19 November 2024; Anna Chernova, "Putin Fine-Tunes Russia's Nuclear Doctrine after Biden's Arms Decision on Ukraine, in Clear Signal to West," *CNN.com*, 19 November 2024. Brad Lendon, "Russia's Use of a Nuclear-Capable Missile is a Clear Departure from Cold War Doctrine of Deterrence," *CNN.com*, 22 November 2024.

201 Yudhijit Bhattacharjee, "Why Do India and China Keep Fighting Over This Desolate Terrain?" *New York Times*, 27 June 2024; Center for Preventive Action, *Conflict Between India and Pakistan* (New York: Council for Foreign Relations, 2024).

202 Efrat Lachter, "Israel's Targeted Response Against Iran Sends New Warning to Regime about IDF's Capabilities, Experts Say," *Fox News*, 28 October 2024.

203 In 2010–23, Russia's real GDPpc rose about 19%, Armenia's 93%, Azerbaijan's 9%, China's 116%, Pakistan's 29%, India's 81%, Israel's 29%, the US 23%, the UK 11%, and France's 9%; Ukraine's GDPpc rose 6% in 2010–21 and then fell due to war ruins—data: WDI, World Development Indicators (Washington DC: World Bank, 2024); NK's real GDPpc hardly changed; see Bolt and van Zanden, "Maddison-style Estimates of the Evolution of the World Economy."

204 Abdujalil Abdurasulov et al., "Ukrainian Official Says Minerals Deal Agreed with US," *BBC.com*, 25 February 2025; Abbey Fenbert, "'Military Equipment and the Right to Fight on'—Trump on what US minerals deal gives Ukraine," *The Kyiv Independent*, 25 February 2025.

205 Victoria Butenko et al., "US and Ukraine Sign Critical Minerals Deal after Months of Tense Negotiations," *CNN.com*, 1 May, 2025.

206 Seth G. Jones and Riley McCabe, *Russia's Battlefield Woes in Ukraine* (Washington, DC: Center for Strategic & International Studies, 2025).

207 Pietro Bomprezzi et al., *Ukraine Support After Three Years of War* (Kiel: Kiel Institute for the World Economy, 2025); Edward Szekeres, "Western Allies Rally Around Zelensky after Trump Spat Deepens Rift with Europe," *CNN.com*, 1 March 2025; Alexandra Sharp, "Is Europe on Its Own?" *Foreign Policy—World Brief*, 6 March 2025.

208 Israel's Defense & Security Forum, "*Final Situation Report | "Rising Lion", Israel-Iran War, Day 1–12 | Updated June 26, 2025 14:00PM (Israeli Standard Time GMT+3)*," (Herzliya, David Institute for Policy and Strategy, 2025); Human Rights Activists, *Twelve Days Under Fire: Comprehensive Report on the Iran-Israel War, 13-24 June 2025* (Fairfax: Human Rights Activists in Iran, 2025).

volatility and deviations from long-term patterns, more frequent and intense climate-related disasters). Empirical models indicate greenhouse gas emissions, climate-related migration, rapid-onset climate-related disasters, precipitation variation, and temperature volatility have raised the risk of armed interstate conflict.[209] The risk may grow due to climate change-related balance of power changes and diverting attention from losses.[210] Crossing tipping points (e.g., Greenland ice sheet meltdown) may render all bets off.[211]

The second force is the rise of China. Power transition theory says that a great power war is more likely when a challenger's military-economic power catches up with the hegemon's power, aligning with the spirit of the Pessimist theory. Studies see China as the contender and the US hegemon.[212] As noted, China's real GDPpc rises faster than that of the USA. Its PPP GDP, army, navy, and hypersonic missile stock are the world's largest.[213] It ranks top in electronic warfare, swarming drones, autonomous undersea vehicles, advanced aircraft engines, and several other key areas.[214] It aids the US foes of Iran and NK; the USA aids Taiwan, which China claims. The two forbid selling each other certain goods.[215] In early 2025, the USA raised tariffs on Chinese goods, accusing it of forced tech transfer and other actions. China countered this by raising tariffs on US goods, expanding export controls, and imposing sanctions on US companies.[216]

Ancient China fought more when it thrived.[217] A rising China may be peaceful. Its Confucian culture admires harmony.[218] China can kindly foster global stability.[219] War will harm its vast foreign trade and, thus, its power.[220] But it may also turn more warlike,

[209] Greenhouse: Ko et al. "War and Warming"; Climate migration: Christina Cattaneo and Timothy Foreman, "Climate Change, International Migration, and Interstate Conflicts," *Ecological Economics*, Vol. 211, No. 107890 (2023), pp 1–12; Disasters: Bomi K. Lee et al., "Disasters and the Dynamics of Interstate Rivalry," *Journal of Peace Research*, Vol. 59, No. 1 (2022), pp. 12–27. Precipitation and temperature: Cody J. Schmidt et al., "Climate Bones of Contention," *Journal of Peace Research*, Vol. 58, No. 1 (2021), pp. 132–50.

[210] National Intelligence Council, *Global Trends 2040: A More Contested World* (Washington DC: Office of the Director of National Intelligence, 2021). H. O. Pörtner et al., "Technical Summary," in H. O. Pörtner et al., eds., *Climate Change 2022: Impacts, Adaptation, and Vulnerability* (Cambridge: Cambridge University Press, 2022), pp. 44–118; Office of the Director of National Intelligence, *Annual Threat Assessment of the U.S. Intelligence Community* (Washington DC: US Intelligence Community, 2023); Nathan Chandler et al. *Pathways from Climate Change to Conflict in U.S. Central Command* (Santa Monica: Rand Corporation, 2023); Krause, *2024 Worldwide Threat Assessment*.

[211] William J. Ripple et al., "The 2024 State of the Climate Report: Perilous Times on Planet Eart" *BioScience,* Vol. 74, No. 12 (2024), pp. 1–13; *Climate Change 2023: Synthesis Report* (Geneva: Intergovernmental Panel on Climate Change, 2023).

[212] Xinru Ma and David C. Kang, *Beyond Power Transitions: The Lessons of East Asian History and the Future of U.S.-China Relations* (New York: Columbia University Press, 2024); Randall L. Schweller, *Maxwell's Demon and the Golden Apple* (Baltimore: Johns Hopkins University Press, 2014); Brands and Beckley, *Danger Zone*.

[213] Eagle v Dragon, "In Some Areas of Military Strength, China has Surpassed America," *The Economist*, 4 November 2024; Fox News, *China* (2025), https://www.foxnews.com/category/world/world-regions/china.

[214] Jennifer W. Leung et al., *ASPI's Two-Decade Critical Technology Tracker* (Canberra: ASPI, 2024).

[215] Julia Liu and Sean Lyngaas, "China Hits Out at the Latest US Effort to Block Beijing's Access to Chip Technology," *CNN.com*, 3 December 2024.

[216] *President Donald J. Trump Imposes Tariffs on Imports from Canada, Mexico and China* (Washington DC: The White House, 2025); Simon McCarthy, "China Hits Back as Trump's Tariffs Go into Effect," *CNN.com*, 4 February 2025; Elisabeth Buchwald, "China and Canada Immediately Retaliate against Trump's Tariffs. Mexico is Next," *CNN.com*, 4 March 2005.

[217] Yuan-kang Wang, *Harmony and War: Confucian Culture and Chinese Power* (New York: Columbia University Press, 2011); Victoria Tin-bor Hui, "Evolution of Confucianism: Construction of Confucian Pacifism and Confucian Autocracy in Chinese History," in Dimitr M. Bondarenko et al., eds., *The Evolution of Social Institutions* (Cham: Springer, 2020), pp. 205–24.

[218] Xuetong Yan, "The Rise of China in Chinese Eyes," *Journal of Contemporary China*, Vol. 10, No. 26 (2001), pp. 33–39; Bijian Zheng, "China's 'Peaceful Rise' to Great-Power Status," *Foreign Affairs*, Vol. 84, No. 5 (2005), pp. 18–24.

[219] Xuetong Yan, "A Comparative Study of Pre-Qin Interstate Political Philosophy," in *Ancient Chinese Thoughts, Modern Chinese Power*, pp. 21–69; Yan Xuetong, "How China Can Defeat America," *New York Times*, 21 November 2011.

[220] John Muller, "China: Rise or Demise?" *Policy Analysis, Cato Institute*, No. 917, 18 May 2021.

facing threats to its interests like other great powers, upsetting the USA.[221] In early 2025, it announced a large rise in military spending, as it had for several decades.[222] It may attack Taiwan if the latter asserts statehood;[223] its outrage after the USA recently deleted "We do not support Taiwan independence" from its policy is a case in point.[224] Some may call such an attack unjust, but this may not hold China back.[225] Its 2024 war games around Taiwan probably aimed to signal this point.[226] China may also become warlike if its rise slows down or reverses, trying to seize hegemony before it gets too late;[227] this possibility, too, aligns with the spirit of the Pessimist theory of riches and warlikeness.

In 1886, Nietzsche said that industry "teaches the dovetailed working of masses of men"; it is the model of warfare" (*Human, All Too Human*, II:218). In 1888, he said there would soon be "wars such as there have never yet been on Earth" (*Ecce Homo*, IV:1); he was right. In 1918, Spengler, who admired Nietzsche, said in *The Decline of the West* that technological advances deepened gigantic wars in the past and would intensify an even larger war within 50 years; the next century (ours) would see war over continents. His 1931 *Man and Technique* said humans are beasts of prey and industry is their weapon; optimism about peace is cowardice to face the inevitable. Spengler's within-50-year war emerged; the jury is still out about our century. Peace via rising riches now reigns in the West, but even its states still build up their military power, suggesting a belief that interstate war will not soon disappear. Our article does not bode well for global peace in a future with rising riches. But then, as Aron said in his *Auguste Comte Memorial Lecture* of 1958 about war and industrial society, let us not forget our duty of hope.

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[221] Chen Qi and Liu Lanyu, "The Debates among Chinese IR Scholars on China's National Interest Strategy," in Huiyun Feng et al. eds., *Chinese Scholars and Foreign Policy* (New York: Routledge, 2019), pp. 63–85; Paolo Urio, *China: From Poverty to World Power* (Singapore: Springer Nature, 2024).

[222] Alexandra Sharp, "Big Spender," *Foreign Policy—World Brief*, 3 March 2025.

[223] Xuetong Yan, "Becoming Strong: The New Chinese Foreign Policy," *Foreign Affairs*, Vol. 100, No. 4 (2021), pp. 40–47.

[224] Anders Hagstrom, "China Outraged after Trump State Department Deletes Key Phrase on Taiwan Relations," *Fox News*, 17 February 2025.

[225] Daniel A. Bell, "Mencius on Just War," in Acharya et al. eds., *Bridging Two Worlds* (Oakland: University of California Press, 2023), pp. 208–20.

[226] Ben Blanchard and Yimou Lee, "China Ends War Games around Taiwan but Leaves Door Open for More," *Reuters*, 14 October 2024.

[227] Brands and Beckley, *Danger Zone*; Win McCormack, "The Thucydides Trap," *The New Republic*, 17 March 2023.

Appendix

This appendix presents and discusses the bivariate correlations table for the model and lists the countries included in the estimation sample.

Bivariate Correlations

Table A1 presents the bivariate correlation matrix for the variables included in our models. The t statistics for correlation $= r\left(\sqrt{N-2}\right)/\sqrt{\left(1-r^2\right)}$; N = total obs, r = correlation. Critical t for a two-tailed 5% test = 1.95996. For N = 7837 and t = 1.95996, $0.022 \leq r$ and $r \leq -0.022$ are significant at 5%. We mark the significant values in bolded font. The correlations between war and development, power, borders, and the interactions of development with democracy, power, and borders are significant and positive. The correlations between war and peace years, trade, and the interaction of development with peace years are significant and negative. Higher development positively links with more war. Higher military power and democracy and more borders boost this link for a given development; more peace years weaken it. Other statistically significant correlations are outside our scope, but they support the theories that democracy and trade rise with development, and population growth declines as development rises.

Table A1. Bivariable Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. War	1.000														
2. DevelopmentL	**0.042**	1.000													
3. DevelopmentL × DevelopmentL	0.020	**−0.025**	1.000												
4. Democracy	0.012	**0.465**	**0.062**	1.000											
5. DevelopmentL × Democracy	**0.031**	**0.233**	**0.371**	**0.254**	1.000										
6. DevelopmentL × TradeL	0.019	**0.269**	**0.116**	**0.051**	**0.189**	1.000									
7. DevelopmentL × RpowerL	**0.034**	**0.113**	**0.360**	**0.145**	**0.317**	**−0.224**	1.000								
8. DevelopmentL × PopulationG	0.012	**0.043**	**−0.102**	**−0.056**	**−0.183**	−0.005	**−0.096**	1.000							
9. DevelopmentL × Nborders	0.007	**0.172**	**0.129**	**0.101**	**0.072**	**−0.078**	**0.385**	**−0.029**	1.000						
10. DevelopmentL × Npeaceyears	**−0.025**	**0.257**	**0.098**	**0.173**	**0.263**	**0.225**	**−0.055**	**−0.055**	0.011	1.000					
11. PopulationG	−0.001	**−0.191**	0.020	**−0.189**	**−0.114**	−0.010	**−0.046**	**−0.325**	**−0.066**	**−0.088**	1.000				
12. RpowerL	**0.111**	**0.333**	**−0.092**	**0.185**	**0.086**	**0.113**	−0.006	0.007	−0.009	−0.019	**−0.143**	1.000			
13. TradeL	**−0.036**	**0.274**	**0.295**	**0.216**	**0.121**	**−0.142**	**0.223**	−0.008	**0.163**	**0.162**	**−0.037**	**−0.274**	1.000		
14. Nborders	**0.030**	**0.134**	0.014	−0.006	**0.051**	**0.101**	**−0.038**	**−0.028**	**0.236**	**0.032**	**−0.042**	**0.379**	**−0.101**	1.000	
15. Npeaceyears	**−0.069**	**0.130**	**0.029**	**0.121**	**0.099**	**0.089**	**−0.084**	**−0.038**	0.022	**0.236**	0.006	**−0.172**	**0.104**	**−0.060**	1.000

Note: We center the variables around their sample average when they appear in the interaction terms. Bolded: significant at two-tailed test for $p < 5\%$. L denotes the natural log; R in RpowerL denotes relative; G in PopulationG denotes growth; N in Nborders denotes the number of.

Countries

Table A2 lists the countries included in the estimation sample.

Table A2. Countries in the Sample

Afghanistan	Denmark	Kenya	Russia
Albania	Djibouti	Kuwait	Rwanda
Algeria	Dominican Republic	Kyrgyzstan	Saudi Arabia
Angola	Ecuador	Laos	Senegal
Argentina	Egypt	Latvia	Serbia
Armenia	El Salvador	Lebanon	Sierra Leone
Australia	Equatorial Guinea	Lesotho	Singapore
Austria	Estonia	Liberia	Slovakia
Azerbaijan	Ethiopia	Libya	Slovenia
Bahrain	Fiji	Lithuania	Solomon Islands
Bangladesh	Finland	Macedonia	Somalia
Belarus	France	Madagascar	South Africa
Belgium	Gabon	Malawi	South Korea
Benin	The Gambia	Malaysia	Spain
Bhutan	Georgia	Mali	Sri Lanka
Bolivia	East Germany	Mauritania	Sudan
Bosnia Herzegovina	West Germany	Mauritius	Swaziland
Botswana	Germany	Mexico	Sweden
Brazil	Ghana	Moldova	Switzerland
Bulgaria	Greece	Mongolia	Syria
Burkina Faso	Guatemala	Morocco	Tajikistan
Burundi	Guinea	Mozambique	Tanzania
Cambodia	Guinea Bissau	Myanmar	Thailand
Cameroon	Guyana	Nepal	Togo
Canada	Haiti	Netherlands	Trinidad Tobago
Cabo Verde	Honduras	New Zealand	Tunisia
Central African Rep.	Hungary	Nicaragua	Turkey
Chad	Iceland	Niger	Uganda
Chile	India	Nigeria	Ukraine
China	Indonesia	Norway	United Arab Emirates
Colombia	Iran	Oman	United Kingdom
Comoros	Iraq	Pakistan	USA
Congo	Ireland	Panama	Uruguay
Costa Rica	Israel	Papua New Guinea	Soviet Union
Croatia	Italy	Paraguay	Uzbekistan
Cuba	Côte d'Ivoire	Peru	Venezuela
Cyprus	Jamaica	Philippines	Yemen
Czech Republic	Japan	Poland	Yugoslavia
Czechoslovakia	Jordan	Portugal	
Democratic Congo Rep.	Kazakhstan	Qatar	
Zambia	Zimbabwe	Romania	

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