



BACK TO THE FUTURE

Trajectories, Simulations and Alternative Futures of Great Power Competition

Dr. Mark Abdollahian

12 JUL 23



OVERVIEW

Understanding fundamental GPC trajectories, drivers, potential policy interactions and spaces of alternative futures

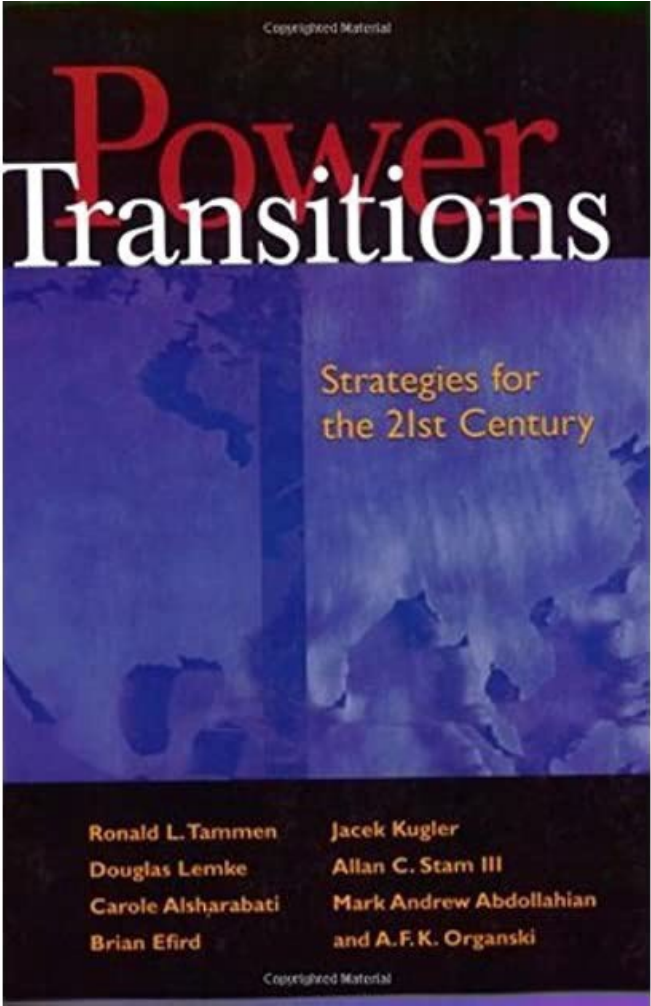
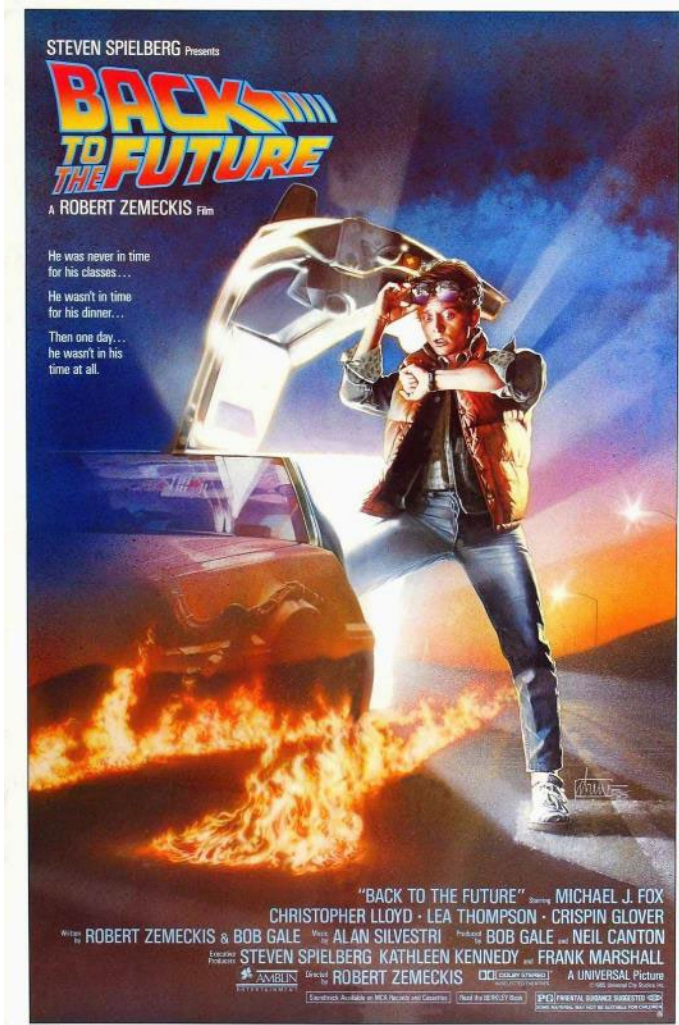
THE STRATEGIC GPC LANDSCAPE + TRAJECTORIES

US-CHINA POLICY INTERACTIONS + SIMULATIONS

GLOBAL ALTERNATIVE GPC FUTURES

PART 1: THE STRATEGIC GPC LANDSCAPE + TRAJECTORIES

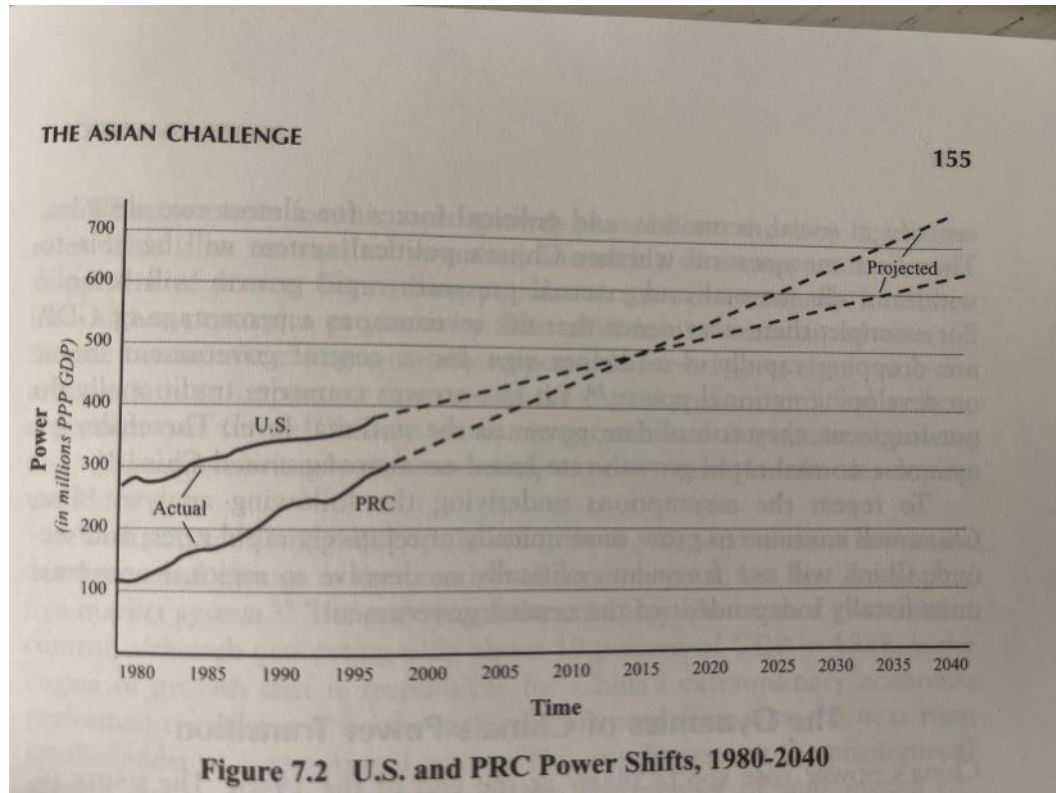
Great power competition of US-CH rivalries for the 21st century



Tammen et al 2000

THE TRANSITION HAS ALREADY BEGUN

Many of our strategic policy challenges we discuss and debate today were known decades ago

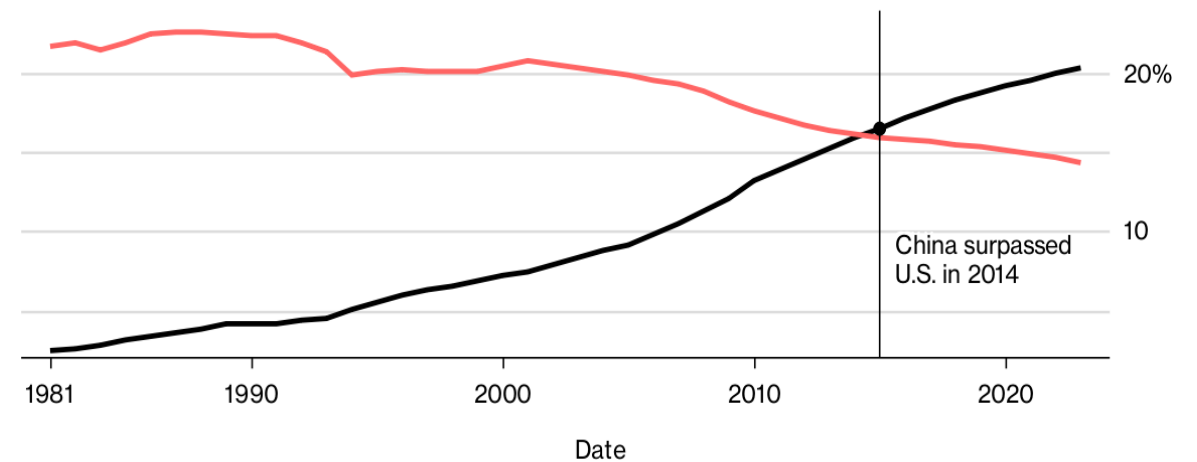


Tammen et al 2000

Biggest Economy*

China eclipses U.S. in share of global GDP measured by purchasing-power parity

■ China ■ U.S.



GDP based on purchasing-power parity share of world total

Source: International Monetary Fund

Bloomberg

GLOBAL GPC PERSPECTIVES

How power and satisfaction with international economic and political norms shapes peace and conflict

Power Transition theory describes the international system as a hierarchy based on power. Atop this hierarchy sits the dominant power, which organizes the global status quo. This status quo is the combined pattern of economic, military, and other interactions by which the members of the international system come into contact with one another. Within the global hierarchy some states associate with and are benefited by their relationship to the dominant power. Others, dissatisfied with their role and share of benefits in the system, seek to alter the status quo.

Tammen et al 2000

GPC DYNAMICS CAN BE UNDERSTOOD

However, power and satisfaction are not forever

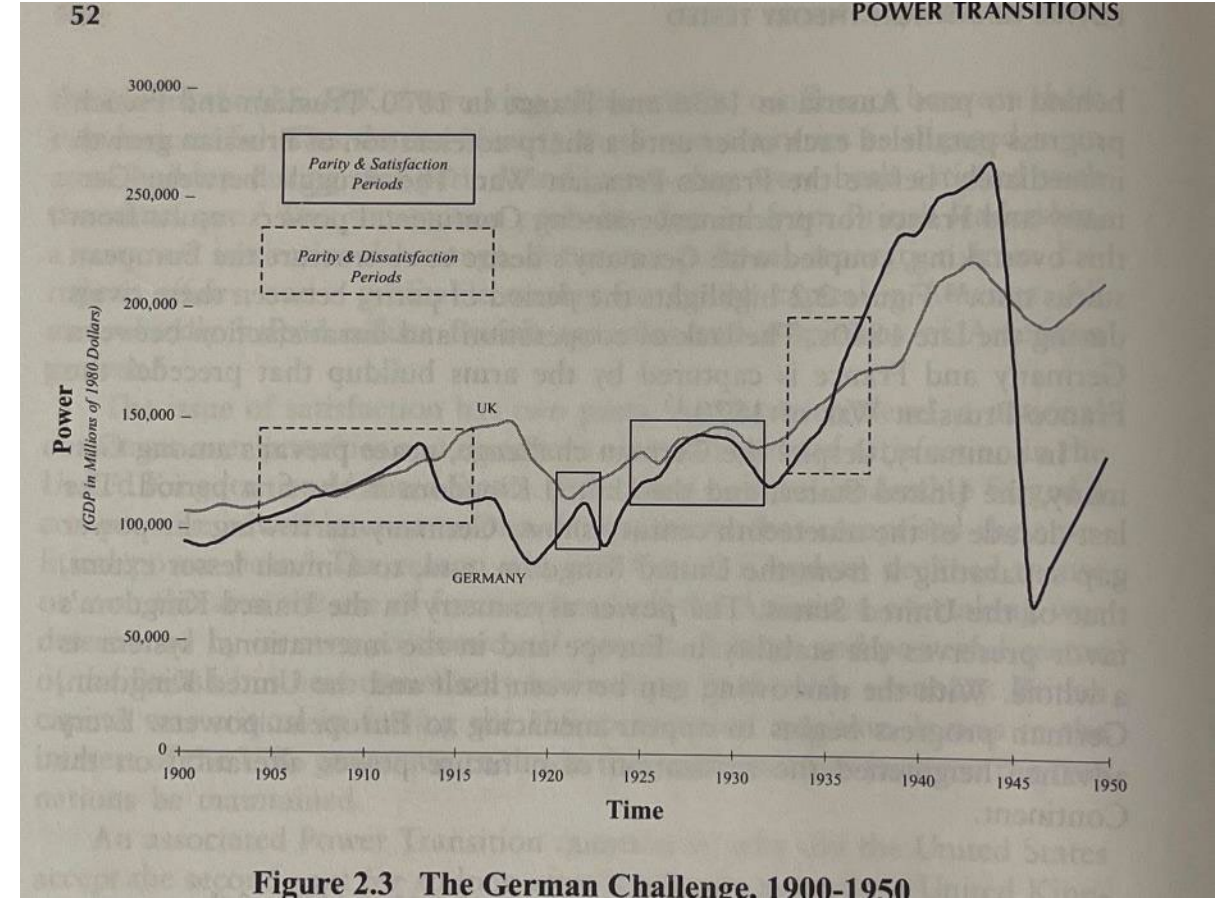
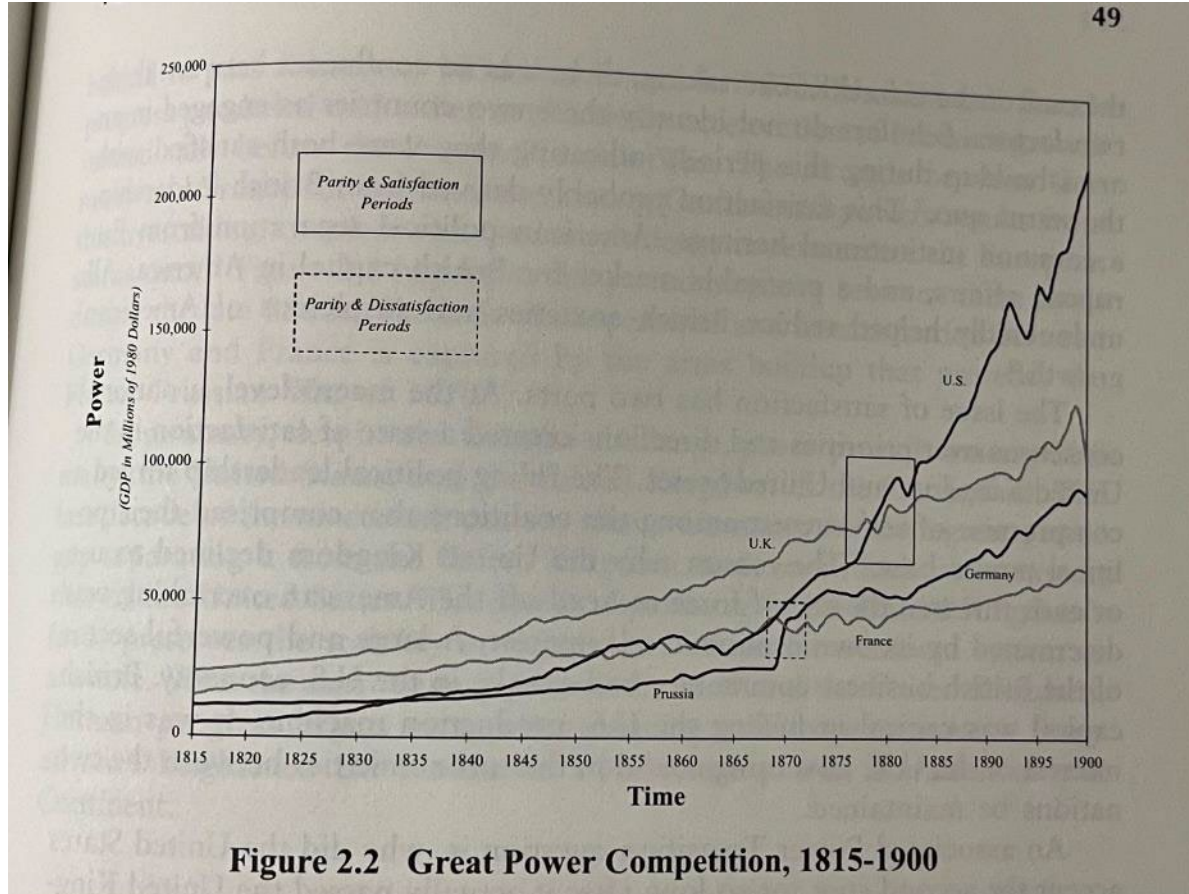
...in the system, seek to alter the status quo.

The power hierarchy of the international system is dynamic. States grow at different rates, thereby altering their relative positions in the hierarchy. The relationship between the dominant power and other countries, satisfied and dissatisfied, is in flux. From time to time a challenger manages to overtake the dominant power. If this challenger emerges from the ranks of the dissatisfied, the probability of war rises sharply. Such wars are likely to be both severe and long, but they are rare events. If the challenger emerges victorious, the international system is altered to its benefit.

Tammen et al 2000

AND GPC CONSEQUENCES ANTICIPATED

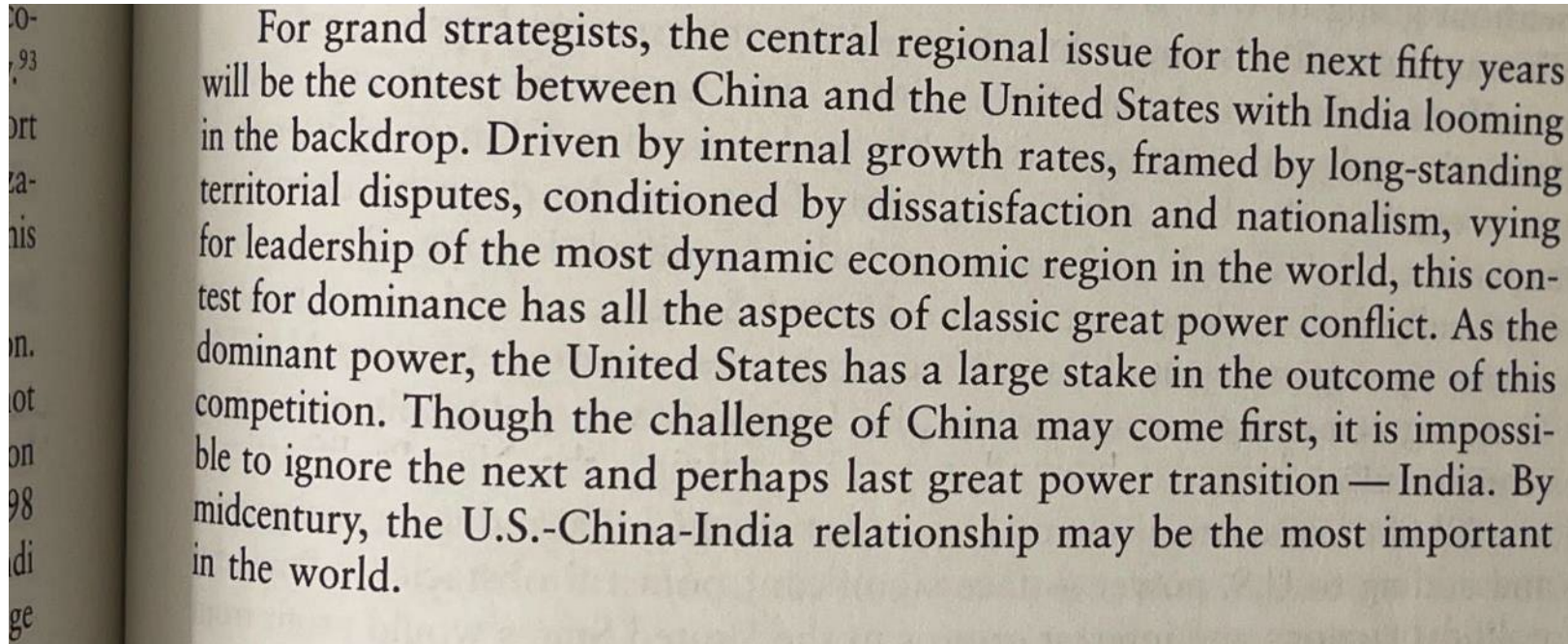
Dynamics drive necessary but not always sufficient conditions for peace and conflict



Tammen et al 2000

THE CHINA CHALLENGE

Political, economic, technological and demographic change drives GPC on the distribution of scarce resources globally

A photograph of an open book with a highlighted text block. The text is in a serif font and discusses the competition between China, the United States, and India for global dominance.

For grand strategists, the central regional issue for the next fifty years will be the contest between China and the United States with India looming in the backdrop. Driven by internal growth rates, framed by long-standing territorial disputes, conditioned by dissatisfaction and nationalism, vying for leadership of the most dynamic economic region in the world, this contest for dominance has all the aspects of classic great power conflict. As the dominant power, the United States has a large stake in the outcome of this competition. Though the challenge of China may come first, it is impossible to ignore the next and perhaps last great power transition — India. By midcentury, the U.S.-China-India relationship may be the most important in the world.

Tammen et al 2000

US STRATEGIC PARTNER POLICY OPTIONS

Looking ahead at strategic partners and alliances to manage CH economic ascendancy

If the effort to bring China into the current international system fails, the only other option available to head off a Chinese challenge is to strengthen the U.S. alliance system. That can be done by creating a superbloc of U.S.-led nations to include a unified Europe, Russia, and eventually India. Concurrently, the United States can add to its pool of power by expanding multilateral economic associations such as NAFTA. These agreements tie countries to the United States politically as well as economically.

Tammen et al 2000

A US-INDIAN STRATEGY

Politically and economically empowering IND as an alternative to counter CH

The United States has leverage on this situation, particularly during the early period of rapid growth. It can take action to help India obtain positive economic benefits in the international system and to wean it away from its peculiar form of political isolation. It can address the Indian need for international recognition. It can slowly bring India into new forms of political and military cooperation so that over time India sheds its status as a dissatisfied nation and moves comfortably into the U.S.-led international system. Specifically, the United States must give recognition to the important power disparities in South Asia by treating India collegially with dignity and respect, and by designing a strategy that anticipates long-term benefits from an Indo-U.S. alliance. In the case of India, perceptions, language, and status may be of equal importance to specific actions.

Tammen et al 2000

NATO OPPORTUNITY LOST?

Strengthening our partners and pre-empting a RU-CH alliance against us

From a Power Transition theory perspective, current plans for limited NATO expansion ignore the biggest future security problem for the West, which is not Russia itself, but the long-run possibility of a U.S.-China power transition sometime in this century. In this geostrategic scenario, Russia matters because of the potential power of a Russian-Chinese alliance. The need to prevent any such alignment should be central to all thinking about the future of NATO. In the short run, the problem of securing Russian respect for the boundaries of its neighbors in Eastern Europe is best managed within the context of NATO's proven capacity for reducing and resolving conflicts among its members, of whom Russia should be one.

Tammen et al 2000

WHAT CAN WE DO ABOUT TAIWAN?

Options are limited and time dependent

Every effort must be made to avoid making Taiwan a flashpoint that could disrupt the long-term U.S. strategy toward China. A declaration of independence by Taiwan could trigger actions by China and the United States that would destroy the chances of China becoming a responsible, satisfied member of the international community. The United States can defend Taiwan at the present stage in the power relationship, but once China's power approaches that of the United States, it will be impossible to do so without going to war. If a war occurs at that time, it will not just be over Taiwan, but will also include control of the international system.

Tammen et al 2000

SO HOW DID WE GET HERE + WHERE WE ARE GOING?

GPC trajectories 1950 - 2100

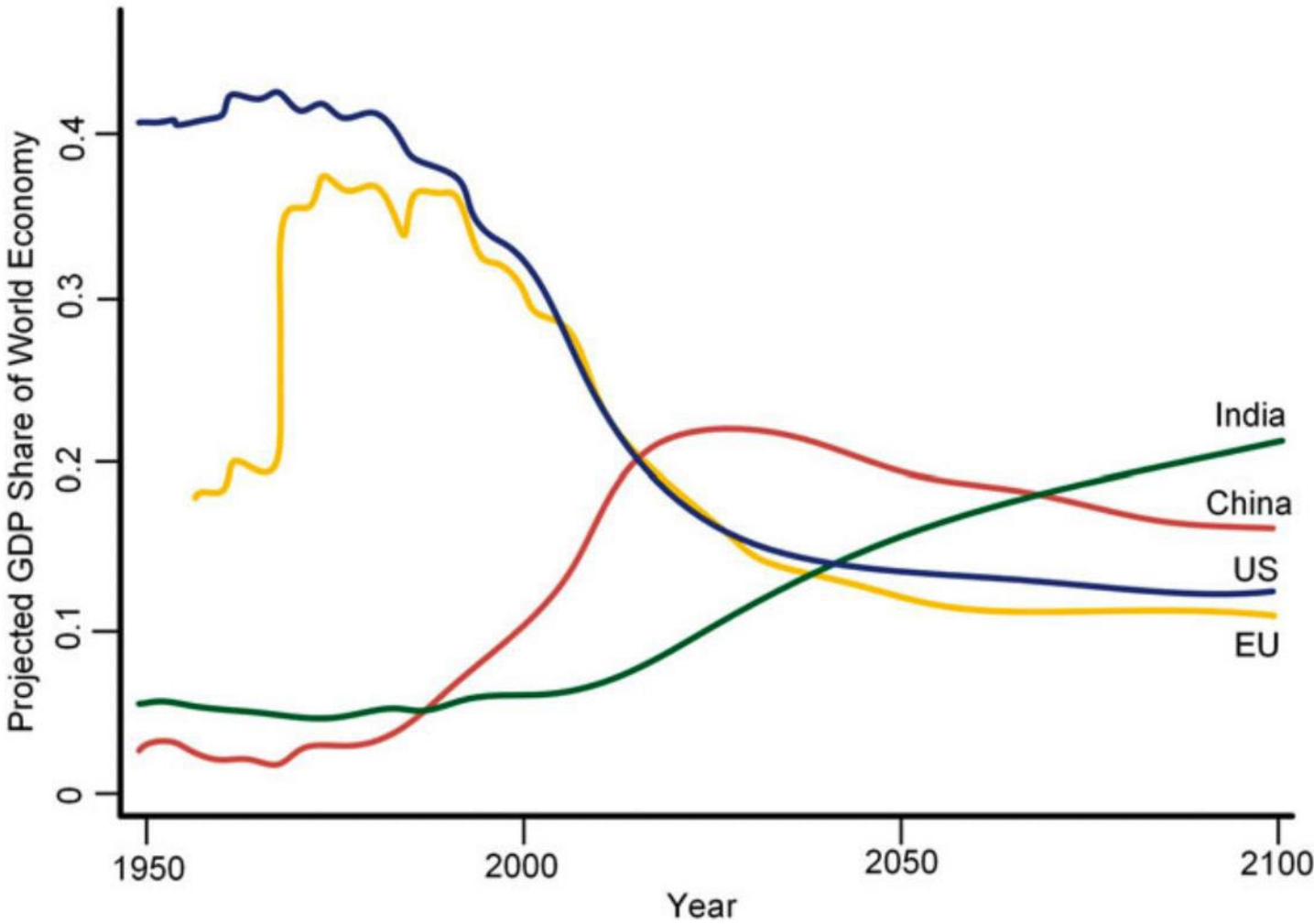


Fig. 4 GDP (PPP) Projections 1950–2100

Zeng, Kugler, and Tammen 2023

DEVELOPMENT DYNAMICS

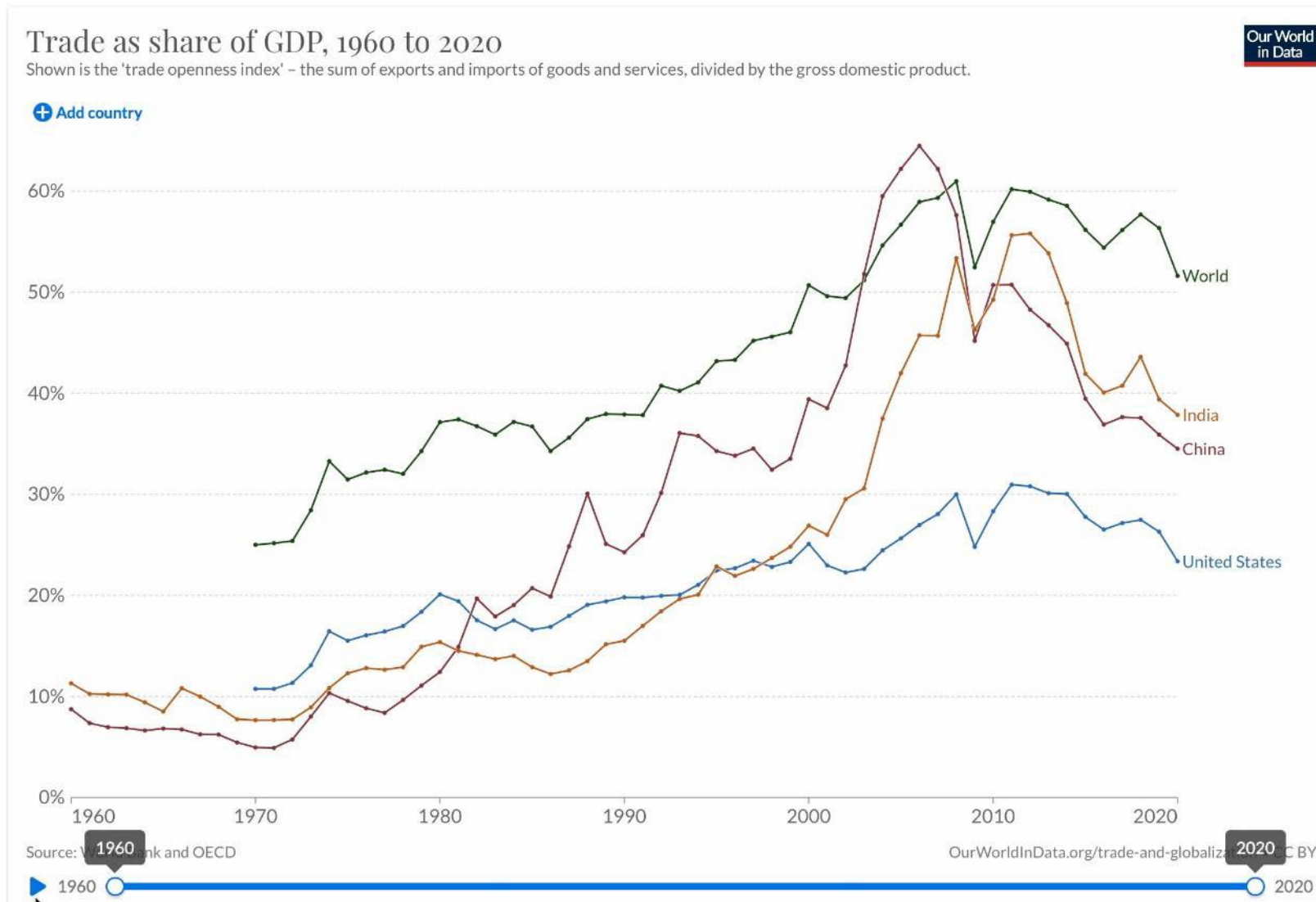
The same demographic, economic and political engines of growth for the US, UK, FRA, GER and JAP are driving CH and IND growth



Gapminder.org

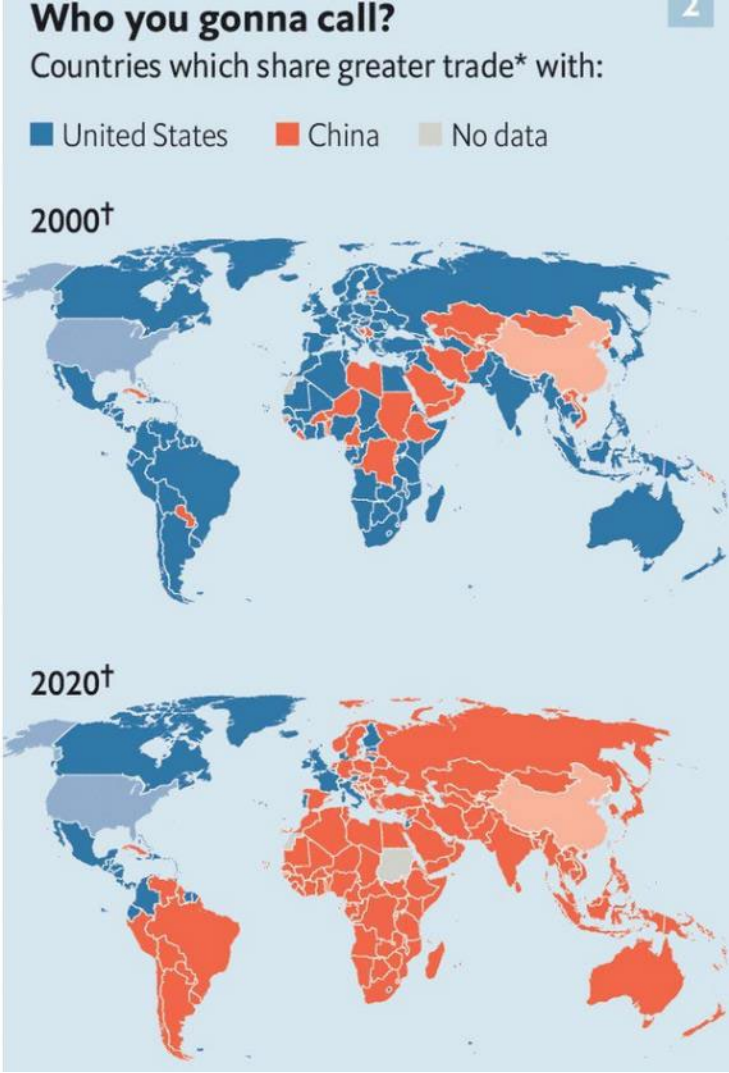
EXPORT ORIENTED & IMPORT SUBSTITUTION INDUSTRIALIZATION

The same engines of growth for the US, UK, FRA, GER and JAP are driving CH and IND growth



ERODING STATUS QUO V NEW NORMALS

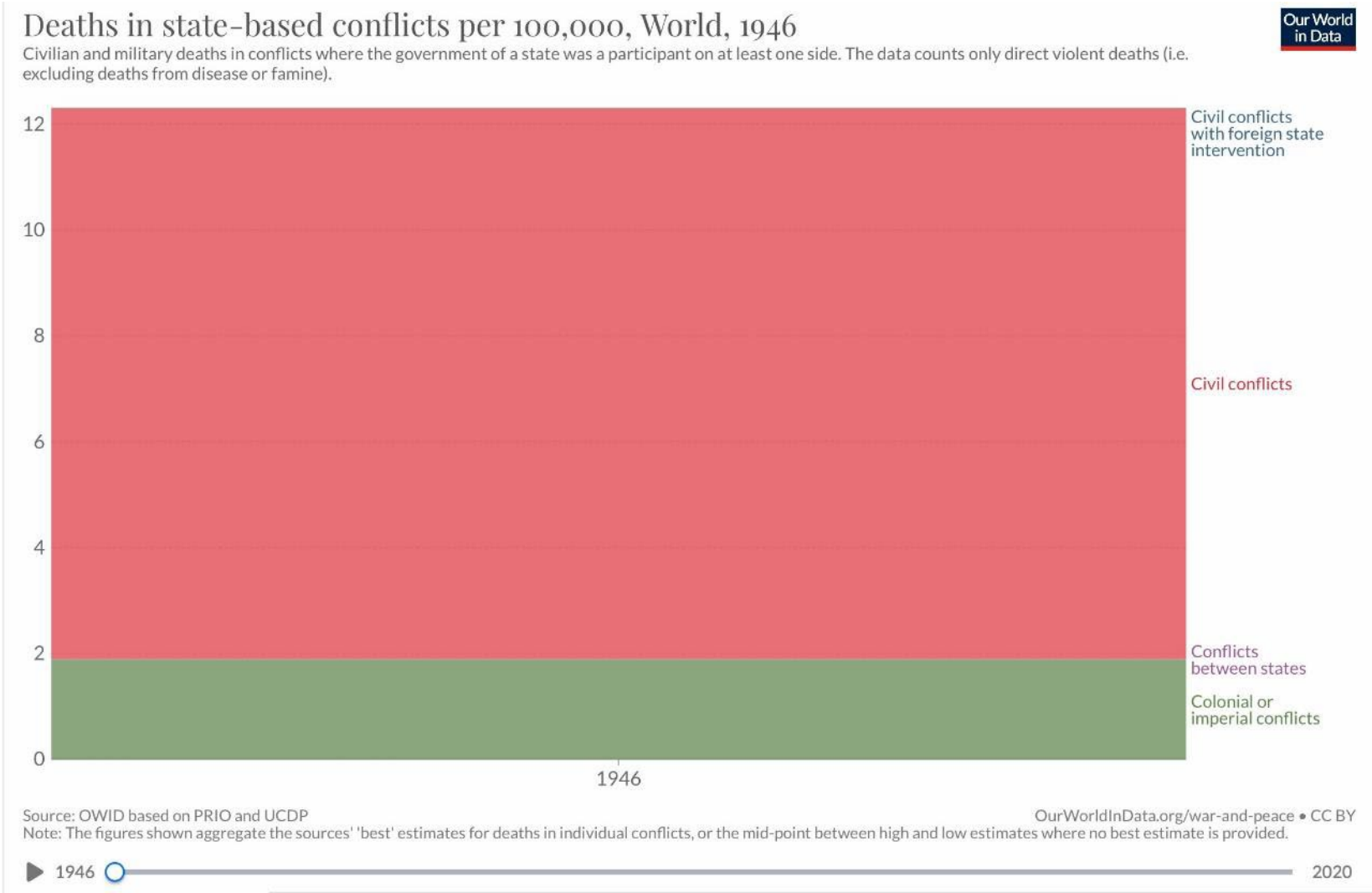
As trade changes, partners will continue to balance US security and values political alliances with CH economic growth



The Economist

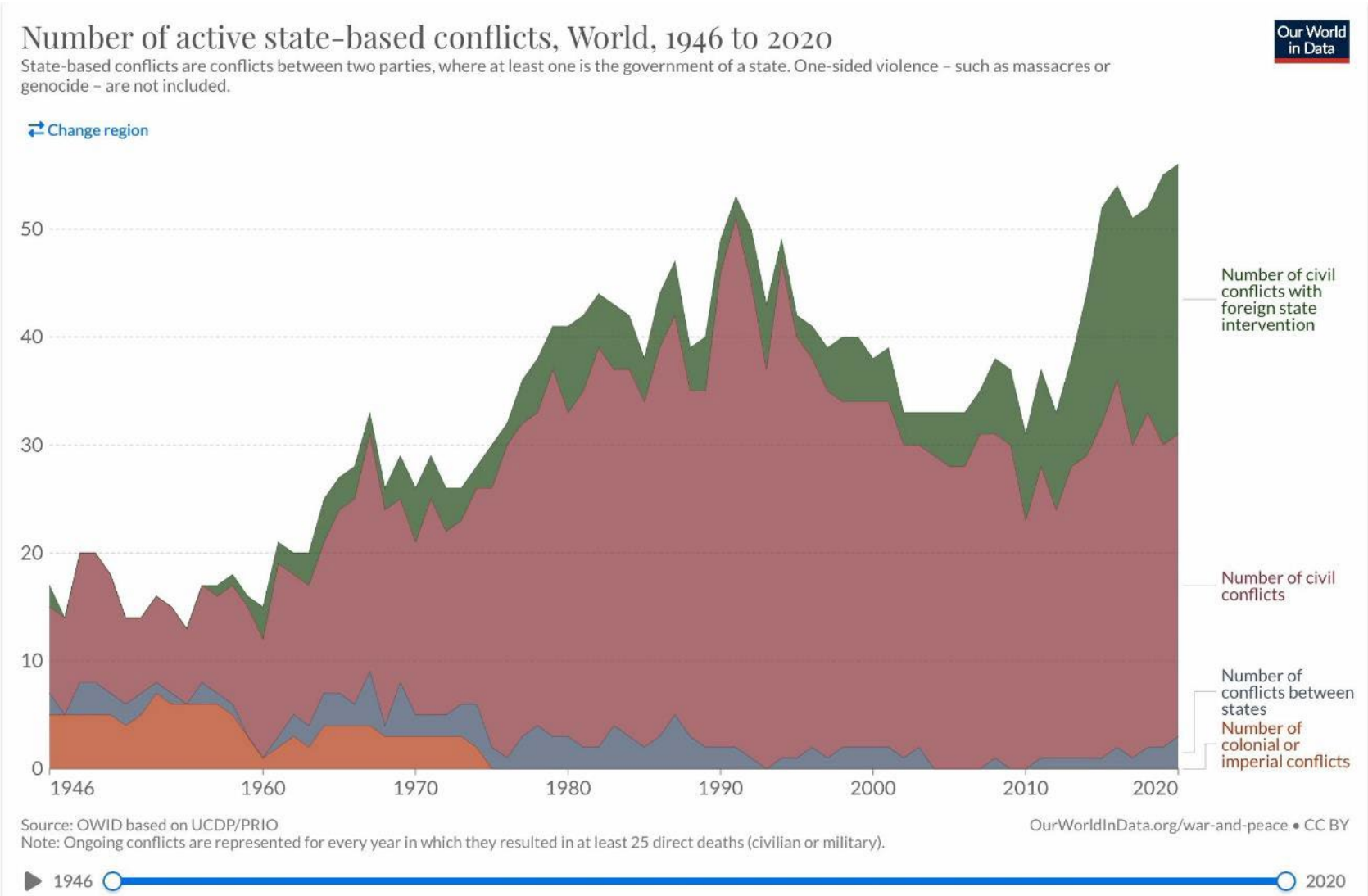
STATE BASED CONFLICT DEATHS DECREASE DRAMATICALLY

US security leadership guaranteed peace and subsequently prosperity for some



WHILE THE NUMBER OF CONFLICTS MORE THAN DOUBLED

Global economic growth and multilateralism has not guaranteed prosperity for all



UNDERLYING CURRENTS OF CURRENT EVENTS

Pulling context into focus

- China's economic ascendancy moved up the value chain from low cost labor, to competitive manufacturing to now attractive capital given it's mobilization of its vast population potential.
- China's "dual circulation" policy is now relying more on domestic consumption and supply chains.
- While the US "buy American" and industrial policy efforts are trying reduce reliance on the Chinese economy ... at the potential cost of middle and lower income Americans who benefit from cheap consumer goods.
- Given increasing connectivity, complexity and thus uncertainty from Geotech proliferation, new technologies allow for surveillance and data exploitation by both governments and private sectors globally, not just great powers.
- Now GPC is back, but in reality it never left, with allies and adversaries assessing the benefits of US led security and values compared to CH led economic growth.

PART 2: US-CHINA INTERACTIONS + SIMULATIONS



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In Search of Structure: The Nonlinear Dynamics of Power Transitions

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Power Transitions (PT) anticipates interstate conflict or cooperation by examining dynamic changes in the distribution of power across the international system, as well as each nation's (or politically "relevant" nation's) satisfaction with the current international status quo. Using a system of symmetric, coupled nonlinear differential equations, we formalize and test a dynamic PT model to identify to what extent and degree policy makers can maintain stability in rival dyads, such as the US-China case currently. Our formalized dynamic PT model explores some of the structural conditions of how conflict or cooperation affects growth and transition from the PT literature. These formal results are consistent both with theoretical expectations and empirical results. Our results not only suggest specific, strategic policy prescriptions for dyads in hopes of avoiding war, but more importantly highlight the nonlinear and non-monotonic effects of foreign policy actions.

KEYWORDS *power transitions theory, nonlinear system dynamics, differential equations, power parity, foreign policy stance, speed of convergence*

Among contending theories of international conflict and cooperation, the Power Transitions research program (Organski, 1958; Organski and Kugler, 1980) stands out as one of the more robust theoretical and empirical explanations of war and peace (Lemke and Werner, 1996; Kim, 1991, 1992, 1996; Tammen et al., 2000). Power Transitions (PT) anticipates interstate conflict or cooperation

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Abdollahian and Kang 2008

DATA + EVIDENCE + SIMULATIONS

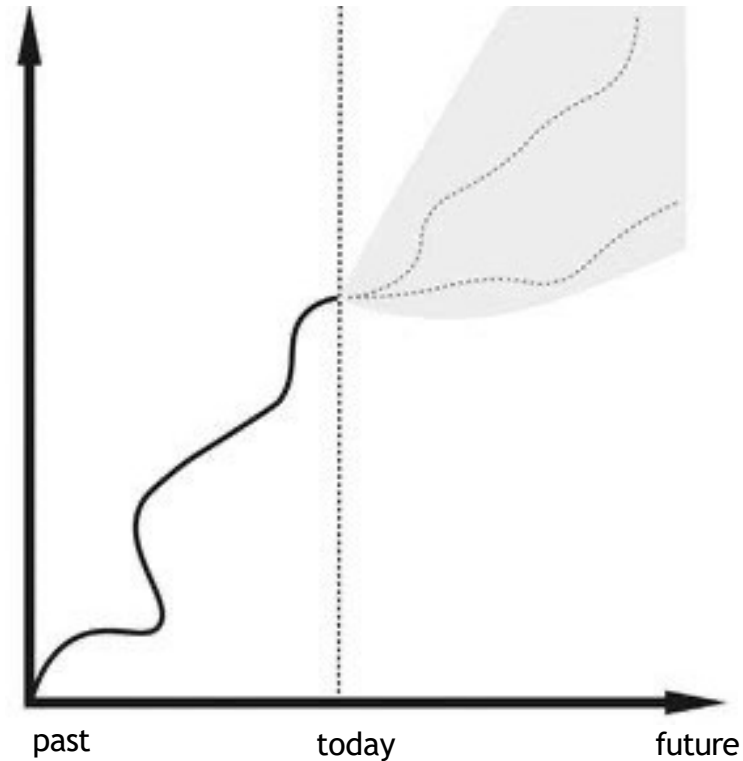
Leveraging the history of the long view, with political economy macro system dynamics modeling

Given underlying power dynamics, what are US-CH alternative policy futures?

How do these change across the conflict-competition-cooperation spectrum?

How do we bend the arc of change via policy to our advantage?

What is the US' strategic best response to such alternative futures?



PUTTING IT ALL TOGETHER FOR GRAND STRATEGY

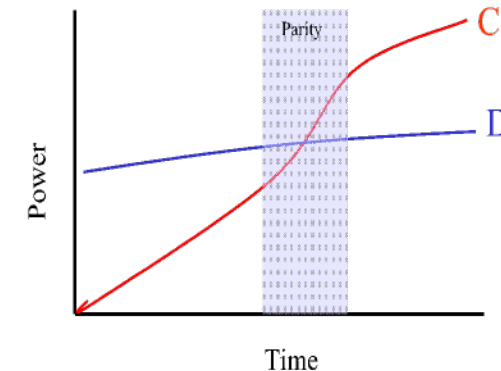
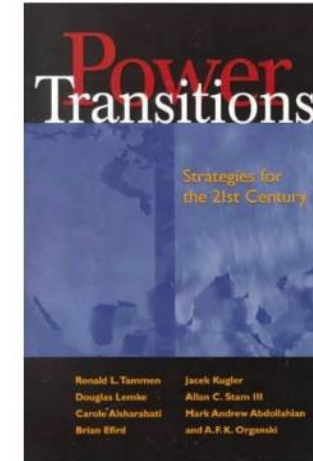
Fundamental tenets of power transitions from theory and GPC evidence

PT asserts a hierarchical structure of the international system where nations maximize relative gains contrary to balancing notions of an anarchical environment in which nations maximize absolute gains.

Power parity focuses on symmetric capability conditions between two nation states - dominant & challenger - that could lead to conflict or cooperation depending on satisfaction and gains from the current international status quo.

Power preponderance can help maintain stability before or during a transition while parity can lead to conflict IFF combined with dissatisfaction.

Relative rates of economic growth, given population sizes, productivity and development, drive the parity condition while both conflict-competition-cooperation policy stance and satisfaction with the political and economic international order drives the likelihood of conflict.



SYSTEM DYNAMICS FOR STRATEGIC GPC

Abdollahian 1994, 1996 and 2008

Equations

- Power of d US Dominant
- Power of c CH Challenger
- Conflict of d US Dominant
- Conflict of c CH Challenger

$$\frac{dP_d}{dt} = b_d P_d (1 - (P_d + P_c)) - h_d C_c$$

$$\frac{dC_d}{dt} = -s_d P_d C_c \frac{1}{\sqrt{2\nu\alpha}} \exp\left(-\frac{1}{2} \left(\frac{P_d - 1}{\alpha} \right)^2\right) \frac{1}{2.50599}$$

Variables

- P systemic power
- C conflict-competition-cooperation targeted from

$$\frac{dP_c}{dt} = b_c P_c (1 - (P_d + P_c)) - h_c C_d$$

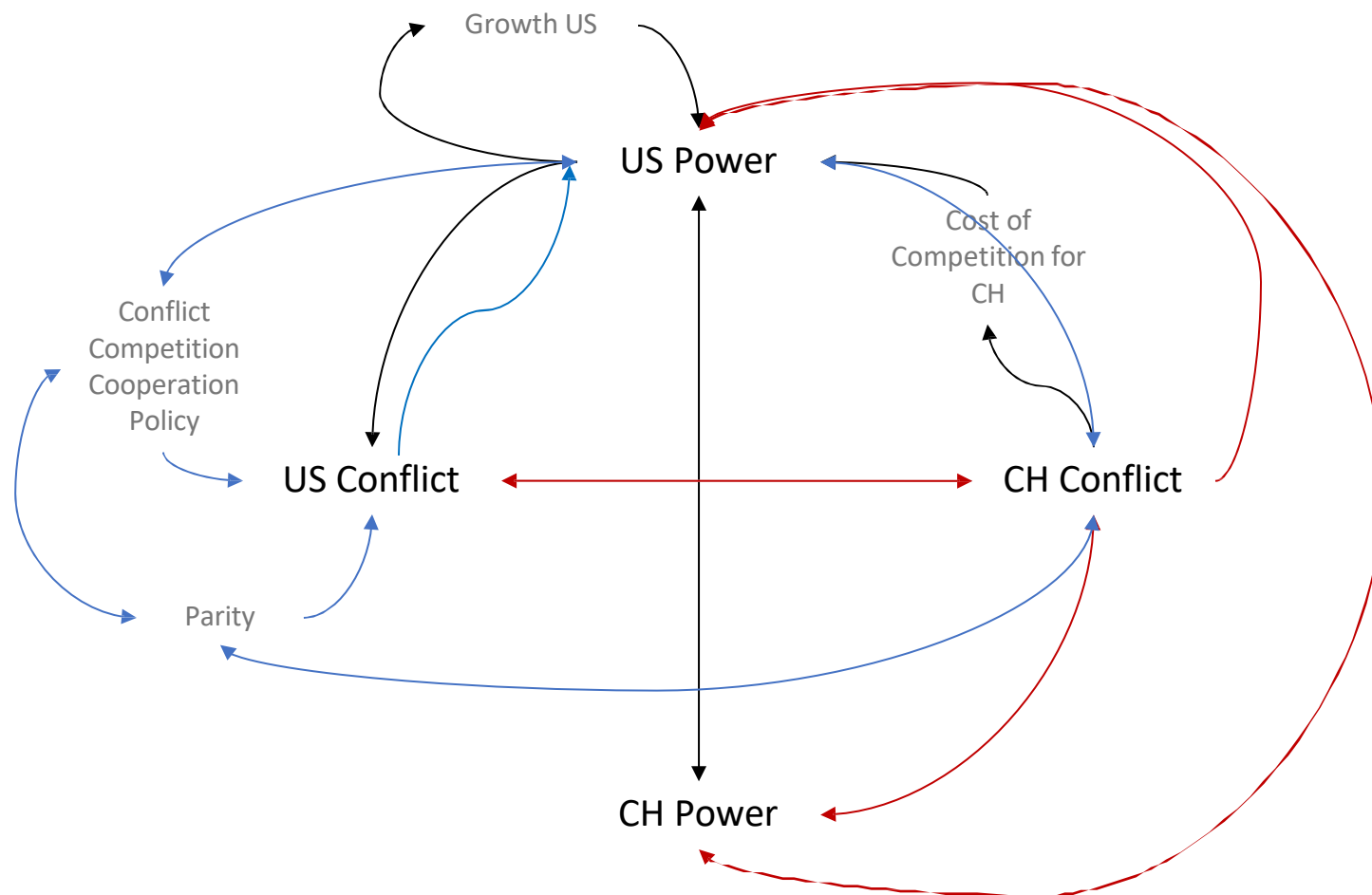
$$\frac{dC_c}{dt} = -s_c P_c C_d \frac{1}{\sqrt{2\rho\mu}} \exp\left(-\frac{1}{2} \left(\frac{P_c - 1}{\mu} \right)^2\right) \frac{1}{2.50599}$$

Parameters

- b national growth rate
- h cost for competition
- s policy stance across conflict-competition-cooperation spectrum
- σ parity variance

GPC DYNAMICS + FEEDBACKS

Abdollahian 1994, 1996 and 2008



Variables

P systemic power

C conflict targeted from

Parameters

b national growth rate

h cost for competition

s foreign policy stance

σ parity variance

Power Relations

CCC

Feedbacks

EMPIRICALLY VERIFIED WITH DATA

Abdollahian and Kang 2008

TABLE 1 Seemingly Unrelated Regression Results of Power and Conflict Relationship from 1817 to 1993

<i>Dependent Variable (Main Equation)</i>	Conflict-Integration (ContInf t)	<i>Dependent Variable (Auxiliary Equations)</i>	Capability of Country i (Capability it)	Capability of Country j (Capability jt)
<i>Independent Variable (Main Equation)</i>		<i>Independent Variable (Auxiliary Equations)</i>		
Lagged Conflict-Integration (ContInf t-1)	.606*** (.004)	Lagged Capability of Country i (Capabilityit-1)	.738*** (.004)	
Parity (parity t)	.458*** (.063)	Lagged Capability of Country j (Capabilityjt-1)		.669*** (.008)
Foreign Policy Stance (FPolicy t)	.096*** (.016)	Lagged Conflict- Integration (ContInf t-1)	.002*** (.0001)	-.0009*** (.0003)
ConvergingRate(convergingratet)	-.002*** (.0003)	Lagged System Resource (System Resource t-1)	-.198*** (.002)	-.083*** (.007)
Parity × Foreign Policy Stance (parity × FPolicy t)	.523*** (.074)	Constant	.014*** (.001)	.103*** (.007)
Constant	1.185*** (.017)	Observations	36326	36326
Observations	36326	R-squared	.621	.573
R-squared	.370	Prob>Chi ²	.000	.000
Prob>Chi ²	.000			
Breusch-Pagan Test	Chi ² (3)=191.23***			

*** $p < 0.01$ for two-tailed significant test.

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US-China Dyad

Strong CH Cooperation $S_c = +.9$

US Competition

US continued growth

US conflict no Δ from initial

CH continued growth

CH conflict steady \downarrow from initial

Smooth peaceful transition similar to US-UK with joint international cooperation & growth

US \uparrow Conflict

US power maintains initial growth

CH power continued growth

US conflict \downarrow from initial then small \uparrow

CH Conflict \downarrow from initial, \uparrow response, then \downarrow

Minor disputes possible as China passes but mostly continued growth

US \uparrow Cooperation

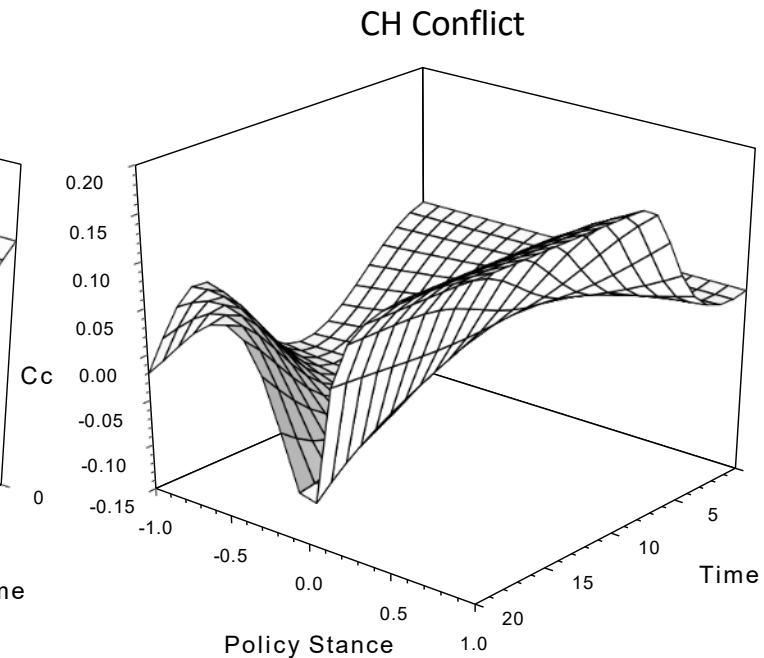
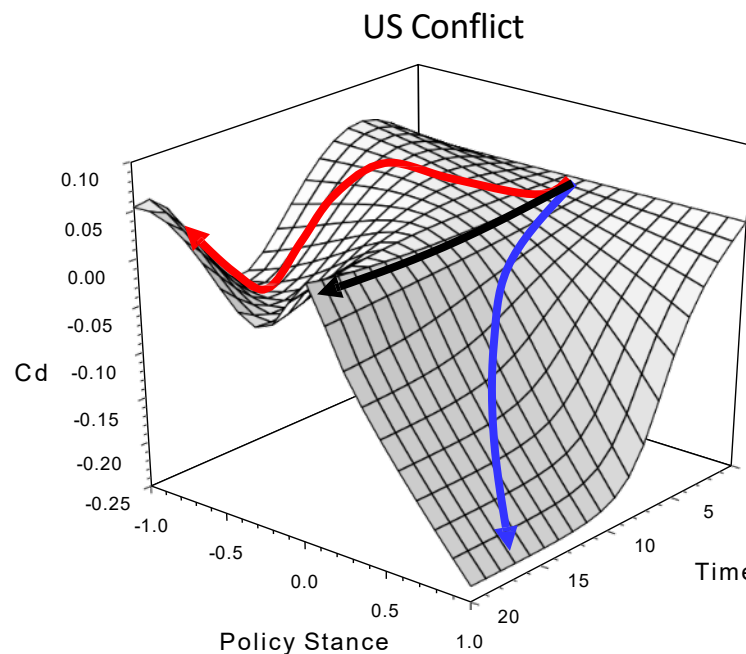
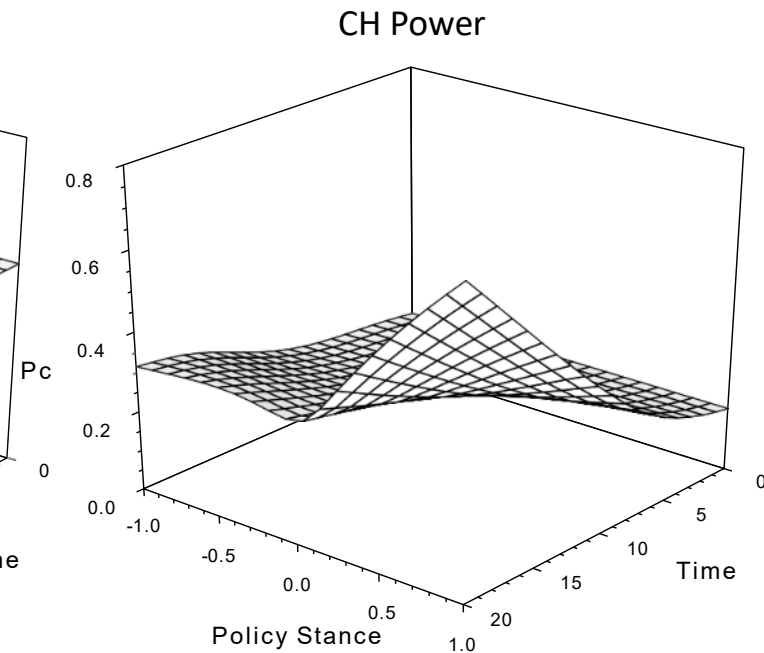
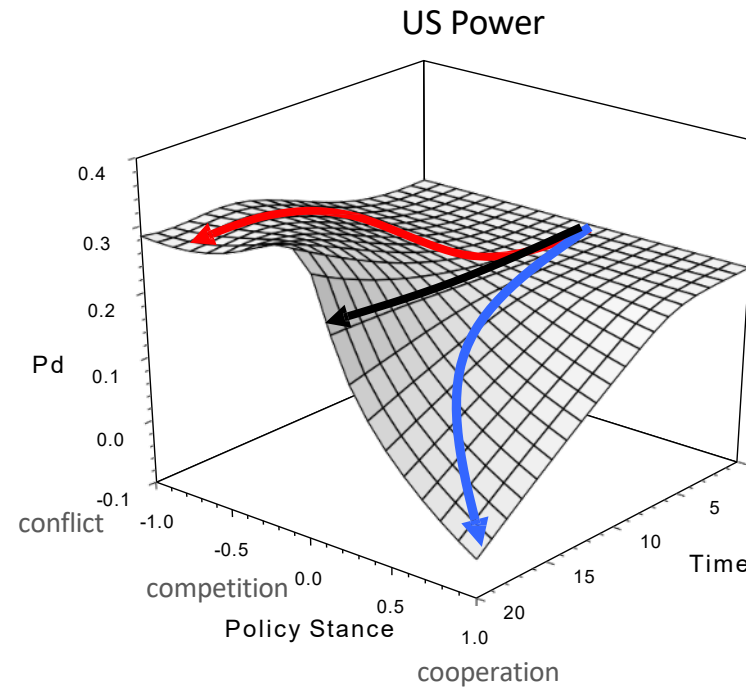
$P_d \uparrow$ relative decline due to \downarrow competition

P_c faster relative gains due to \downarrow competition

C_c preemptive limited conflict to speed transition

C_d capitulates

US retains minor power status under Chinese ascendancy



US-China Dyad

Slight CH Competition $Sc = +.1$

US Competition

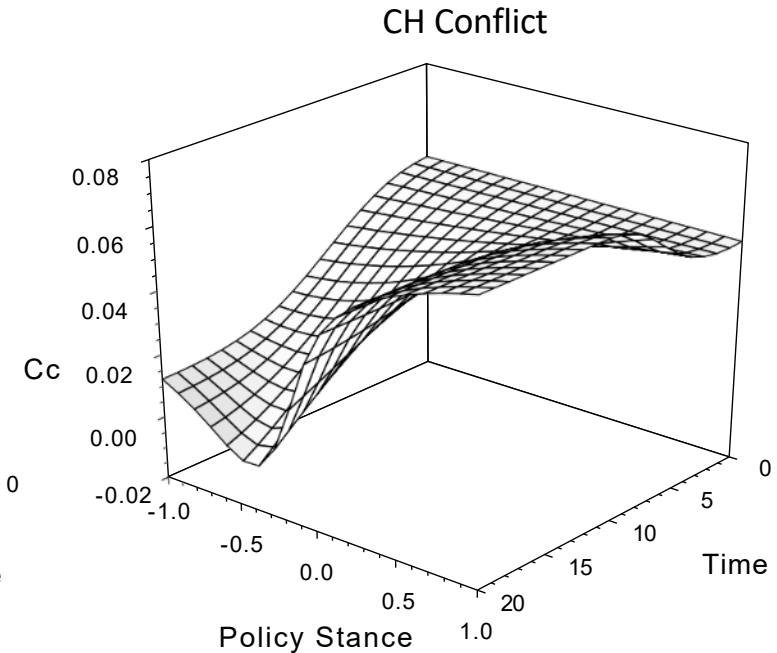
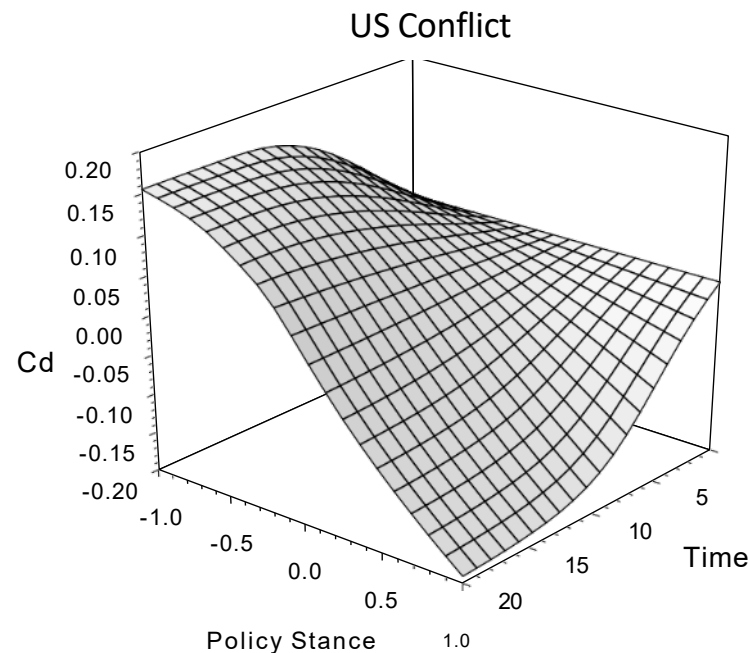
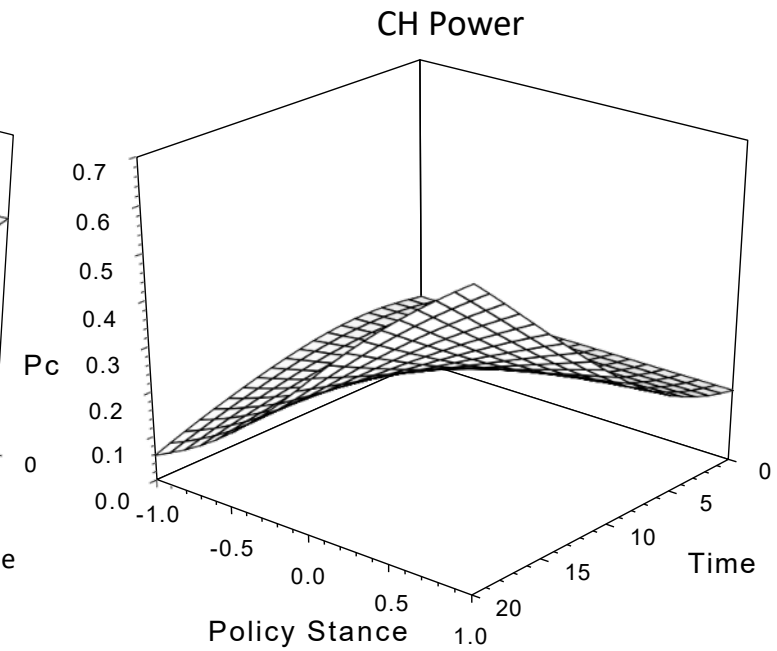
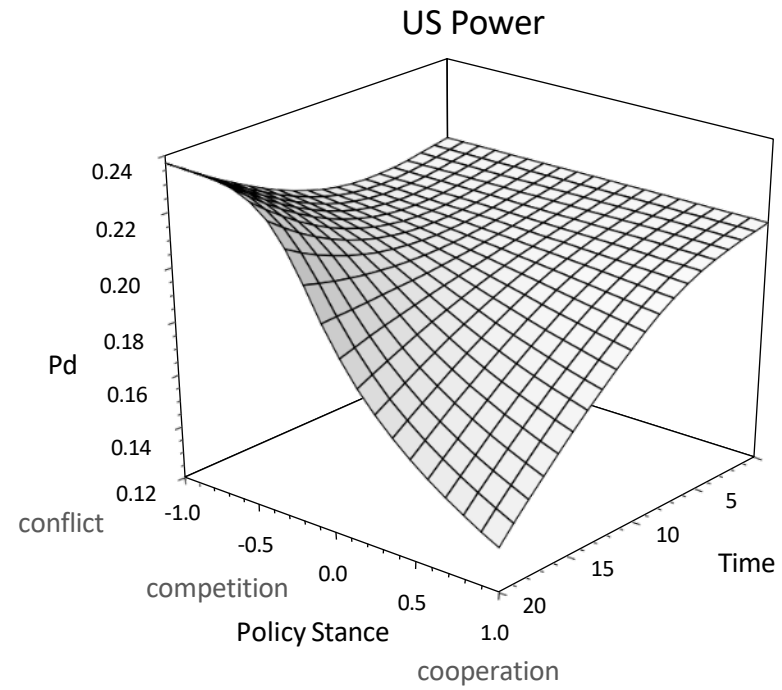
US ↓ growth
CH conflict no Δ from initial
CH ↑ growth
CH conflict ↓ from initial then ↑
US contraction as China continues leadership ascension

US Conflict

US growth
US conflict ↓ levels due to competition
US steady preemptive force posturing
CH conflict slow acquiescence
US staves off transition through steady & preemptive conflict

US Cooperation

Pd US ↑ relative decline
CH power slower gains due to ↓ competition
CH conflict minor ↑
US conflict retrenches & capitulates
Acquiescent & a quiescent US decline to Chinese hegemony



US-China Dyad

Chinese Competition $S_c = 0.0$

US Competition

US sharp power ↓

US conflict no Δ from initial

P_c ↑ growth

C_c no Δ from initial

*US limited relative decline & peaceful
Chinese ascension*

US Conflict

US power ↓

CH power ↓ levels due to competition

US conflict escalatory preemptive

CH conflict no Δ from initial

*Sustained US mobilization to fend off
peaceful Chinese challenge at the cost of
both nation's growth*

US Cooperation

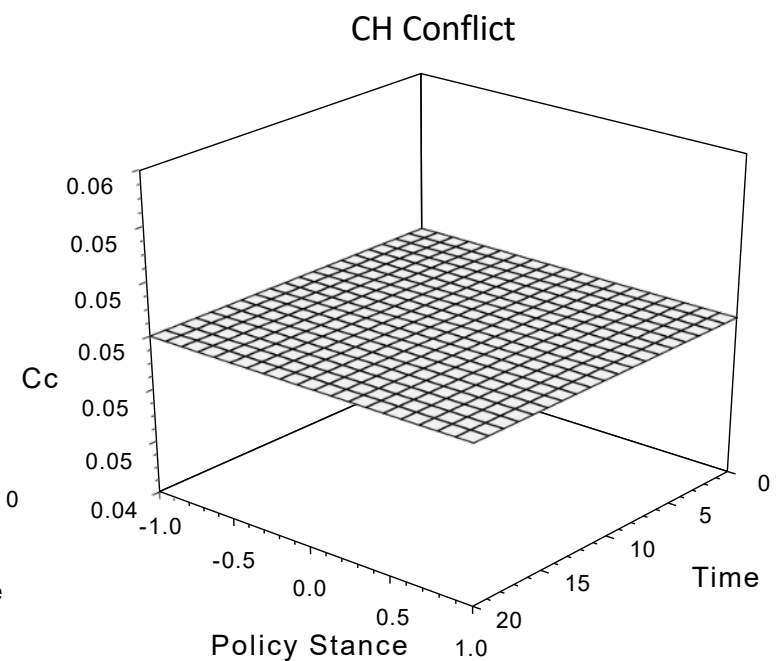
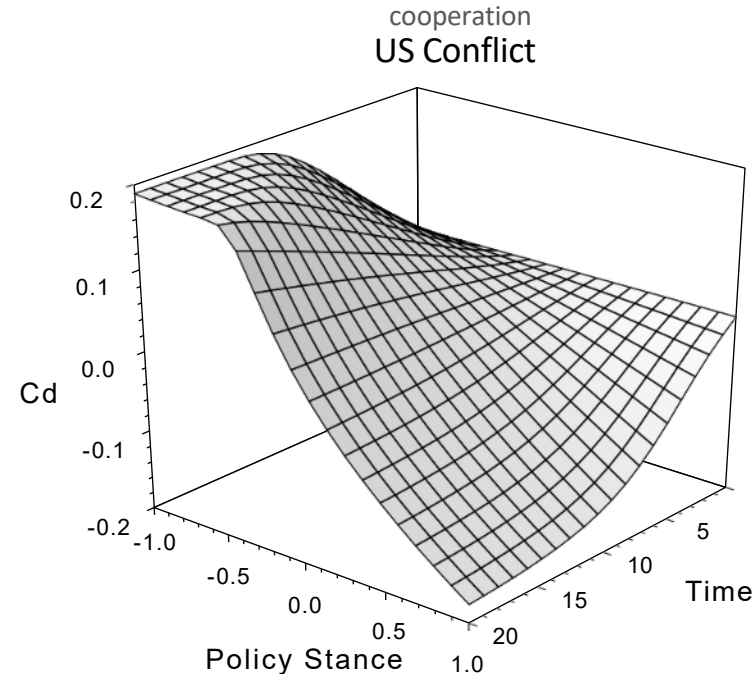
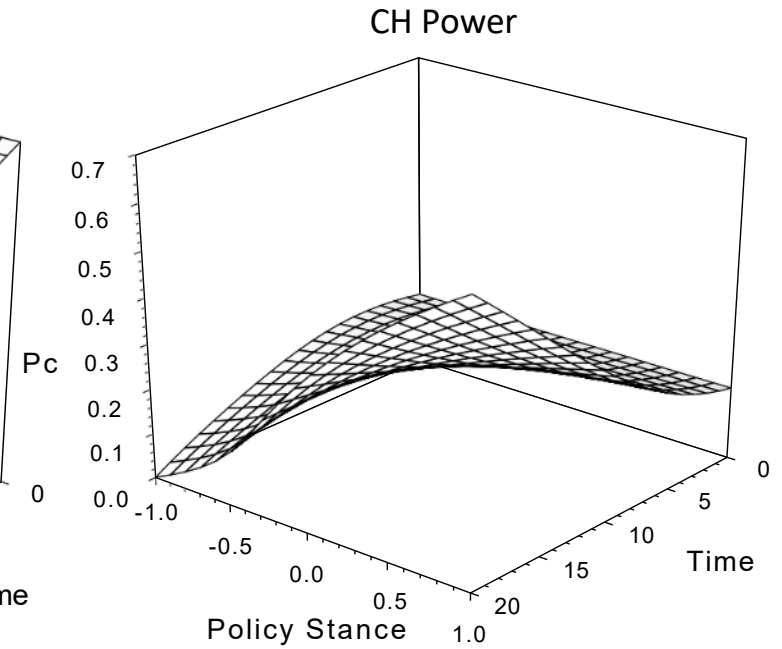
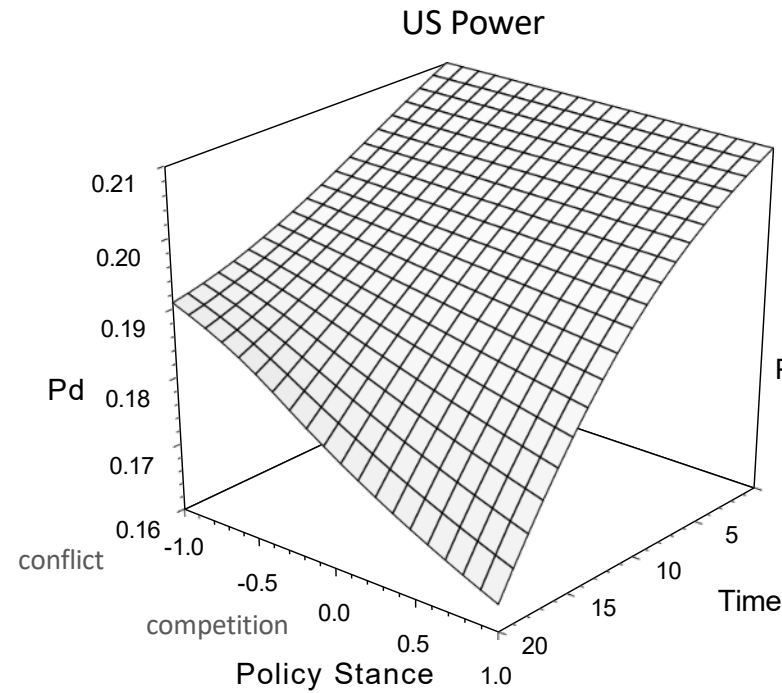
US power accelerating ↓

CH power ↑ gains due to ↓
competition

CH conflict no Δ from initial

US retrenches & capitulates

*Slow US decline but still major
power*



US-China Dyad

Mild CH Conflict Sc = -.4

US Competition

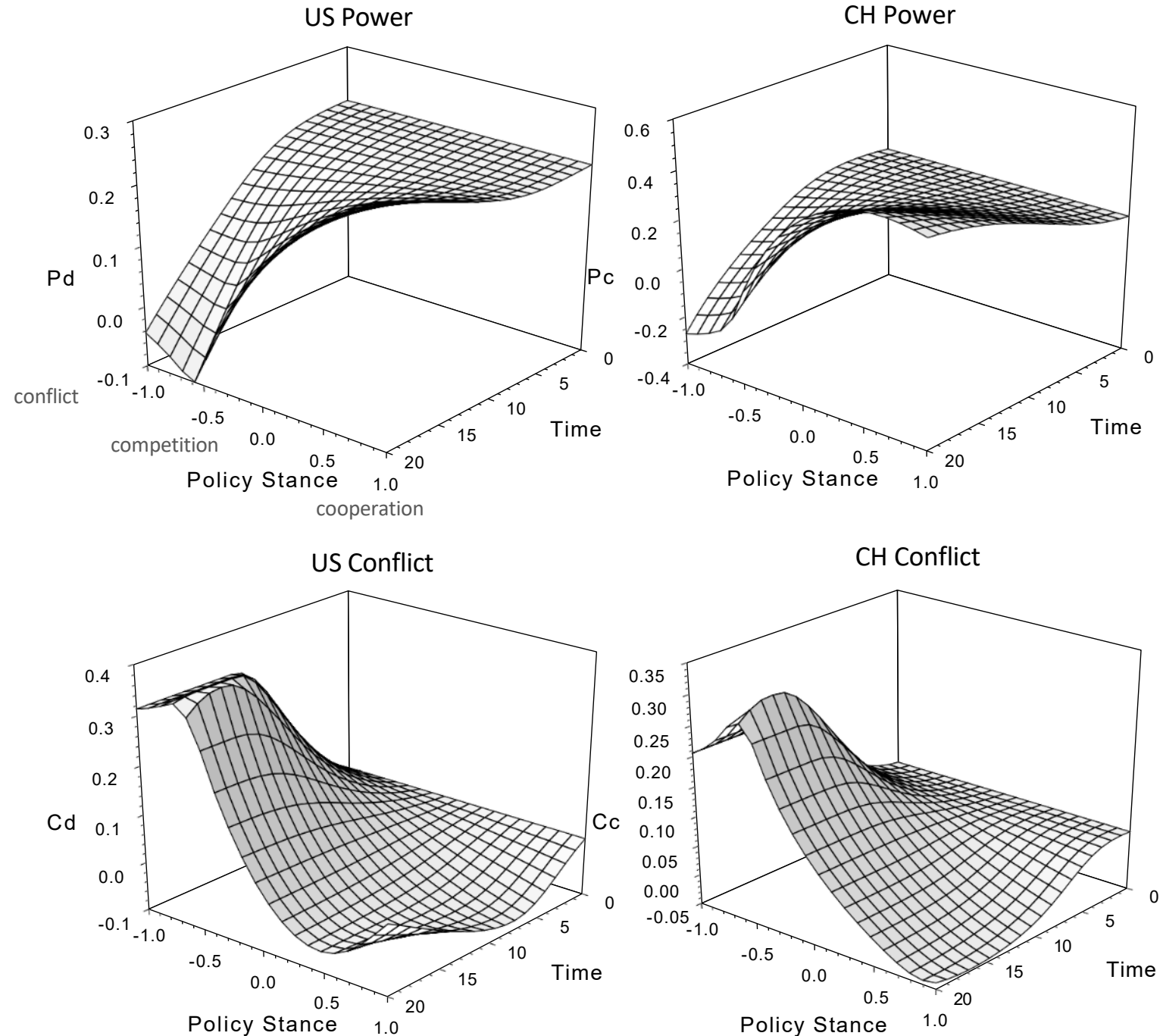
US slower power ↓
US conflict no Δ from initial
CH power slower ↑ growth
CH conflict no Δ from initial
US relative decline with low international cooperation

US Conflict

US accelerating power ↓
CH power ↓ levels due to ↑ competition
US conflict escalatory & sustained
CH conflict escalatory reactive
Major systemic conflict

US Cooperation

US continued growth
CH ↑ gains due to ↓ competition
CH conflict ↓ from initial
US conflict
Peaceful Chinese rise given US intl norms & continued US prosperity

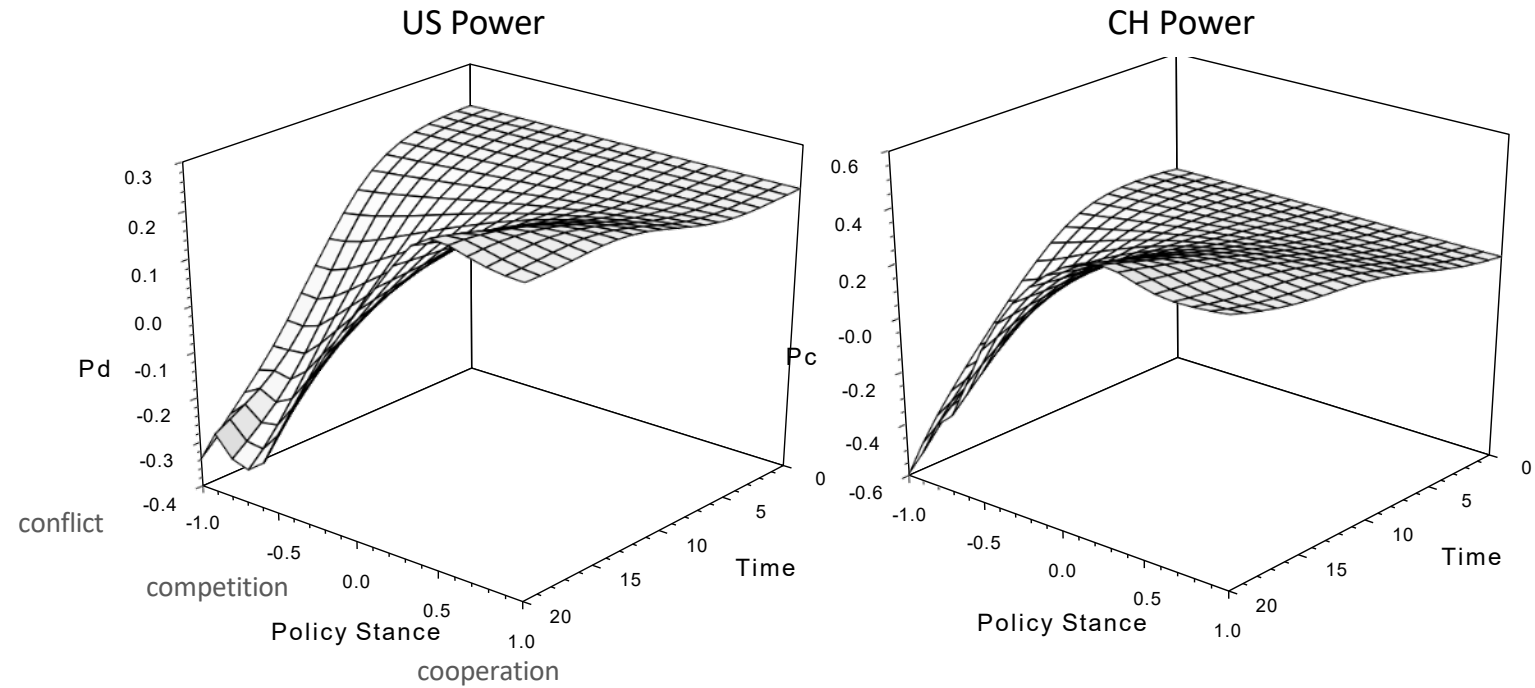


US-China Dyad

Major CH Conflict $Sc = -.9$

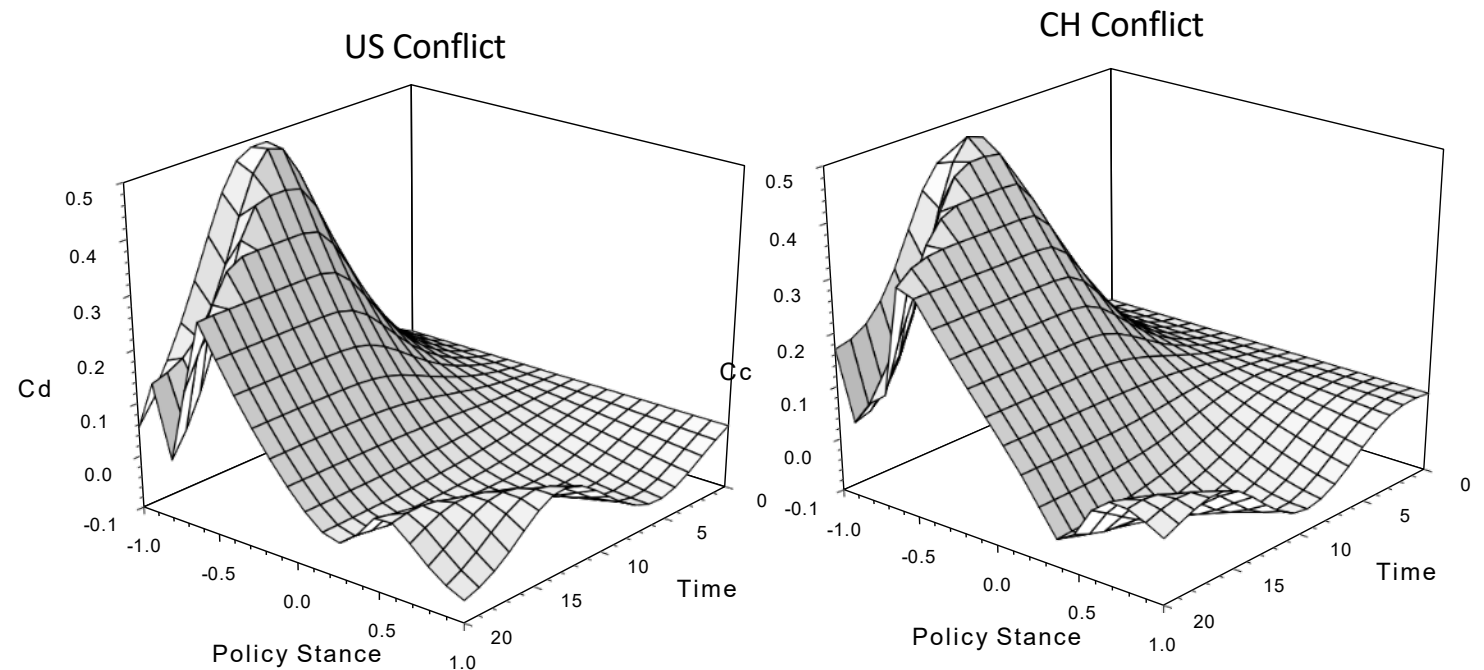
US Competition

US power ↓
 US conflict no Δ from initial
 CH power continued growth
 CH conflict no Δ from initial
US relative decline with low international cooperation



US Conflict

US accelerating power ↓
 CH power ↓ levels due to ↑ conflict
 US conflict escalatory sustained
 CH conflict escalatory reactive
Major system war – advantage China

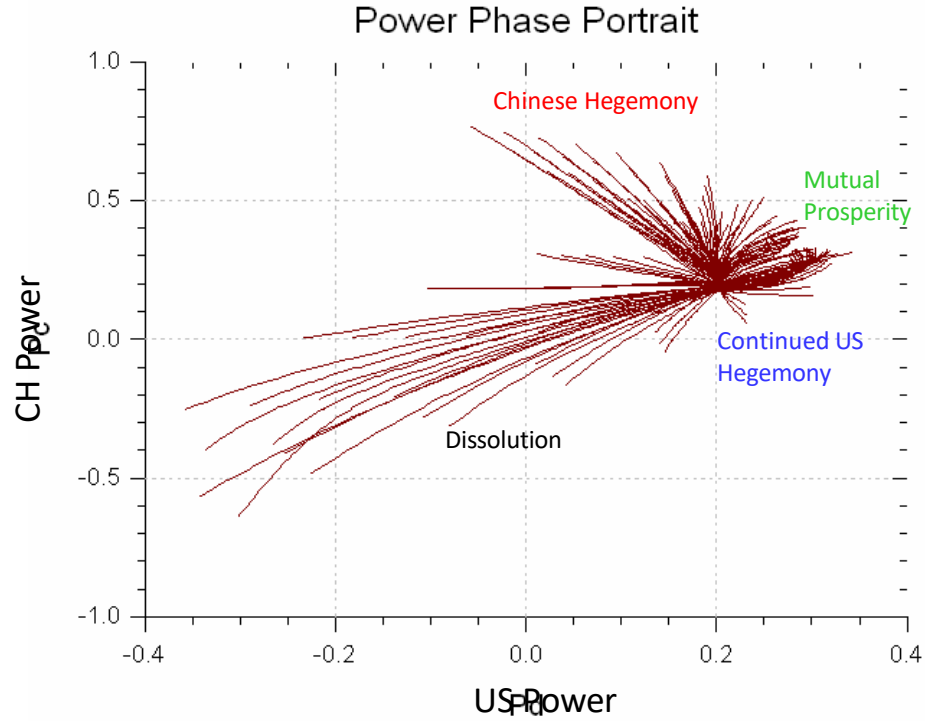


US Cooperation

US continued growth
 CH power ↑ gains due to ↓ competition
 CH conflict ↓ from initial
 US capitulates
Peaceful Chinese rise but global norms change as US disengages for domestic retrenchment

PARTLY SUNNY WITH A CHANCE OF GLOBAL CONFLICT?

Summing up potential alternative simulation futures and general equilibrium behavior - $\Delta US \Delta CH$ policy simultaneously for 20 year time horizons



	Sc +	Sc -
Sd +	stable repellor	unstable attractor
Sd -	unstable attractor	stable repellor

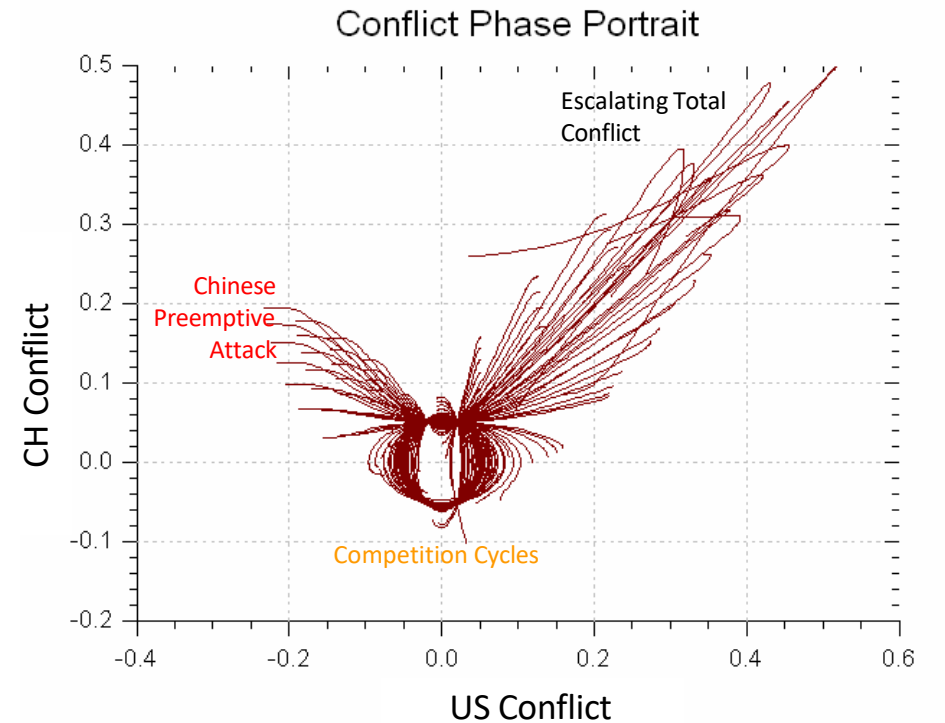
Power Trajectory Tally

5% Continued US Hegemony

40% Mutual Prosperity

30% Chinese Hegemony

25% Dissolution



Cusp catastrophe in conflict – jumps & hysteresis

	Sc +	Sc -
Sd +	stable attractor	unstable limit cycle
Sd -	unstable limit cycle	unstable attractor

US STRATEGIC POLICY RESPONSES

Given likely emerging futures, what are our policy choices to bend the arc of change to our advantage?

US Policy Response Matrix (PRM) measures relative power gains given the price of conflict. $PRs_{t \otimes t+n} = [(P_{t+n} - P_{t0}) - (C_{t+n} - C_{t0})]$

US Policy	China Sc	Cooperation			Competition		Conflict		
	+0.9	+0.6	+0.4	+0.1	0	-0.1	-0.4	-0.6	-0.9
Cooperation									
Competition									
Conflict									

Either remain competitive or take open advantage of Chinese cooperation, then pursue a policy of competition until Chinese satisfaction or dissatisfaction with US led int'l norms emerges, where you have to retrench or be prepared for major system conflict.

Conversely, a PRM also exists for China by varying US policy now, leading to asymmetric dynamics due to different initial conditions or parameters and subsequently different PR scores.

China Policy	US Sd	Cooperation			Competition		Conflict		
	+0.9	+0.6	+0.4	+0.1	0	-0.1	-0.4	-0.6	-0.9
Cooperation									
Competition									
Conflict									

Let your economic growth overpower the US under both cooperation & conflict, but actively fight US competition to lure them into costly conflict.

Combining US and China PRMs, we can then create a Best Policy Response Matrix (BPRM) for exploring pure and mixed strategy equilibria using game theory, but that's a topic for another day ...

PART 3: GLOBAL ALTERNATIVE POLICY FUTURES

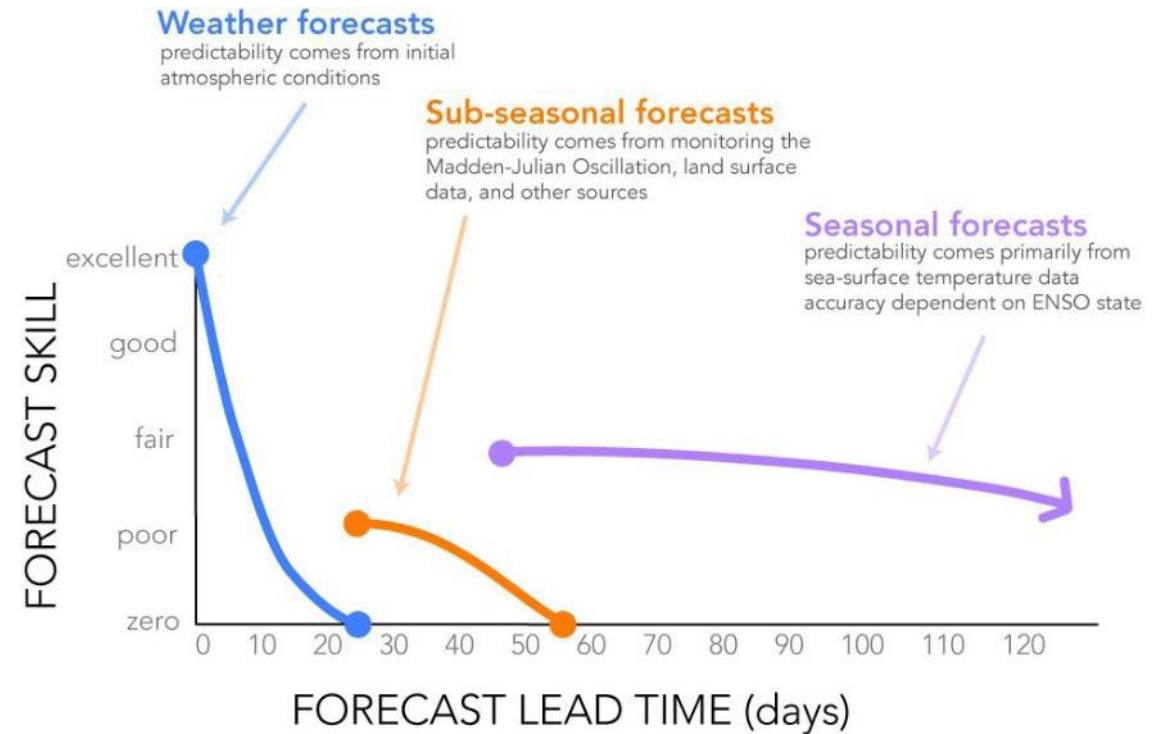
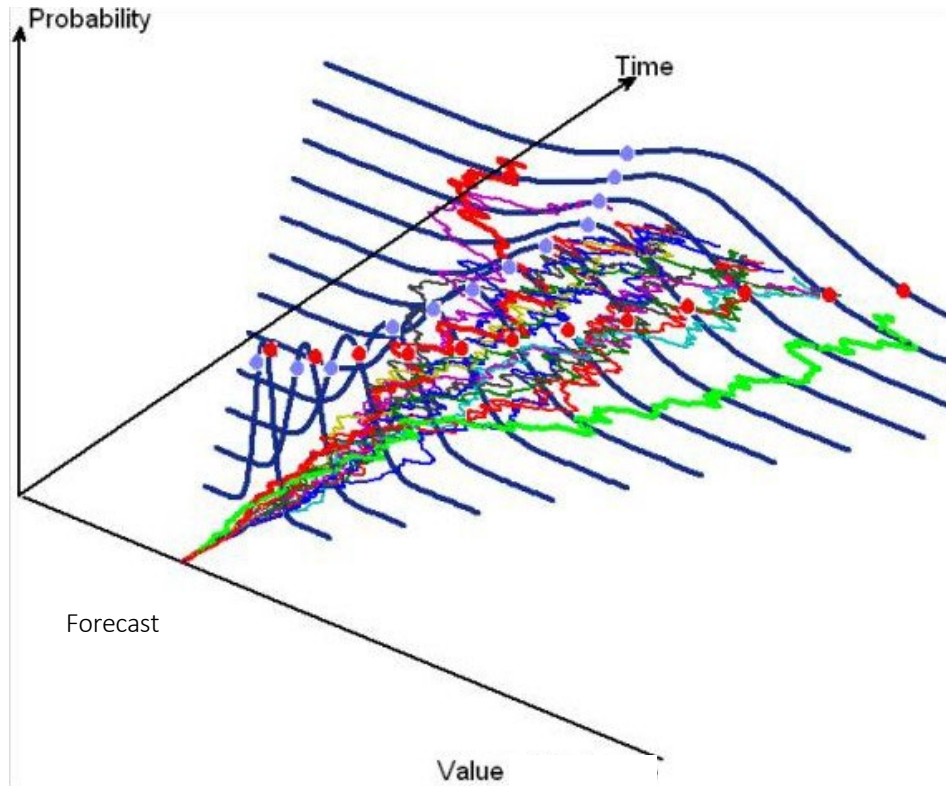


UNCERTAINTY
IS AN
UNCOMFORTABLE
POSITION. BUT
CERTAINTY IS AN
ABSURD ONE

VOLTAIRE

THE LIMITS OF PREDICTABILITY

Understanding what we can and cannot do, how far we can see and with what degree of likelihood and confidence



SCENARIO ANALYSIS AT THE LIMITS

Driving forces, critical uncertainties and plausible futures lead to implications for GPC strategic planning today

Identify Driving Forces



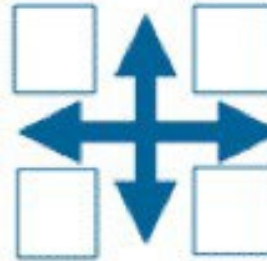
Political
Military
Economic
Social
Information
Infrastructure
Technology
Environment
Etc.

Identify Critical Uncertainties



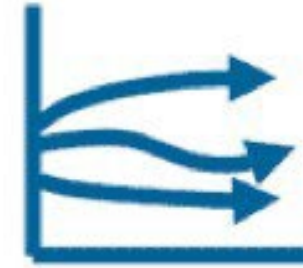
Given the ascendancy of CH and the relative decline of US, what will be the *policy focus* versus *conflict-competition-cooperation strategies*?

Develop Plausible Scenarios



What does each alternative future look like?

Discuss Implications & Paths



How can we as individuals, companies, markets and nations best respond?

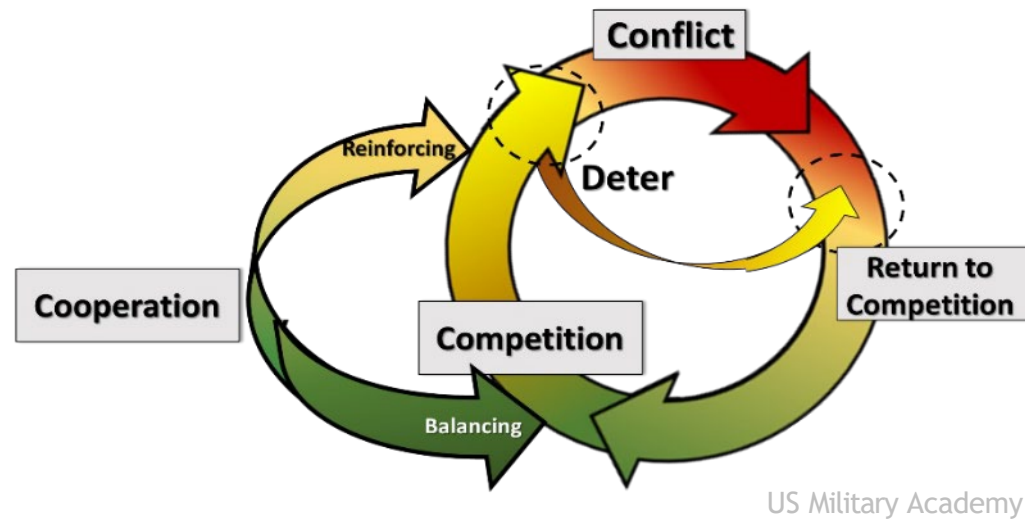
DEFINING THE SPECTRUM

Behavior, actions and policy across the conflict-competition-cooperation continuum in the past as well as today

Conflict strategies are usually zero sum with relative gains and based upon non-cooperative game theory – ‘us versus them’ – national security issues, access to energy, Taiwan, South China Seas, Freedom of Navigation.

Cooperation strategies are non-zero sum with absolute gains and based on cooperative game theory – synergistic ‘we’ upside gains - climate change, terrorism, pandemic response, trade and business environments, and political stability in MENA, joint research and student/cultural exchanges.

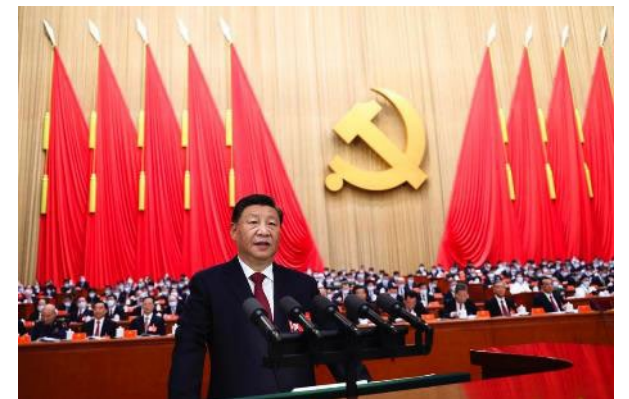
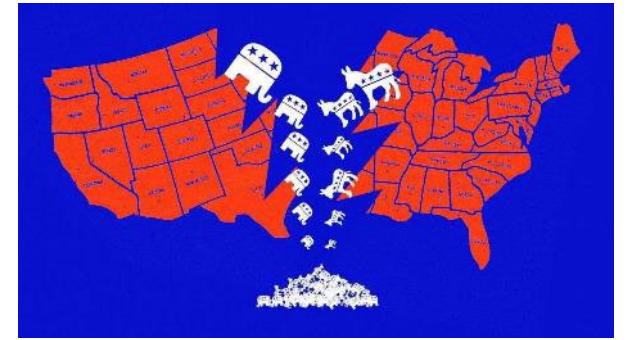
In between, **competition strategies** employ mixed strategies but usually agree on the established norms, rules, and frameworks for behavior, actions and policy outcomes - economic growth, international trade and investment, technological innovation, and domestic political stability with direct interdependence: CH exposure to US debt; imports/exports, and corporate investment.



POLICY OUTLOOK

Will leaders retrench domestically, maintain regional engagements or continue global outlooks?

- How will national leaders *navigate the tradeoff between domestic demand for political, social, and cultural security* balanced against a global knowledge economy's *supply of sustainable growth*?
- 'Sustainable growth' was birthed as a key buzzword for leaders and politicians worldwide. If organizations and governments can deliver on the promise of things always getting better with expanding upside opportunities, *who would want to change that vision of the status quo*?
- And as we witness a refocusing of past US global leadership to more domestic priorities coupled with stagflationary pressures, *what is the future multilateralism and our alliances*?
- With the rise of China marching ahead on the growth curve, globally dominating both inbound and outbound FDI flows for the first time in history (Statista 2021), *what will be the future global economy in the 21st century*?



GPC ALTERNATIVE FUTURES

Defined by key policy uncertainties of national focus versus strategic engagement across the spectrum

Policy	globalism	bifurcation f7	spheres f8	multilateralism f9
	regionalism	decoupling f4	hedging f5	blocs f6
	nationalism	unilateralism f1	rivalry f2	bilateralism f3
		conflict	competition	cooperation
		Strategy		Abdollahian and Yang 2022



Research Report

TIMOTHY R. HEATH, KRISTEN GUNNESS, TRISTAN FINAZZO

The Return of Great Power War

Scenarios of Systemic Conflict Between the United States and China

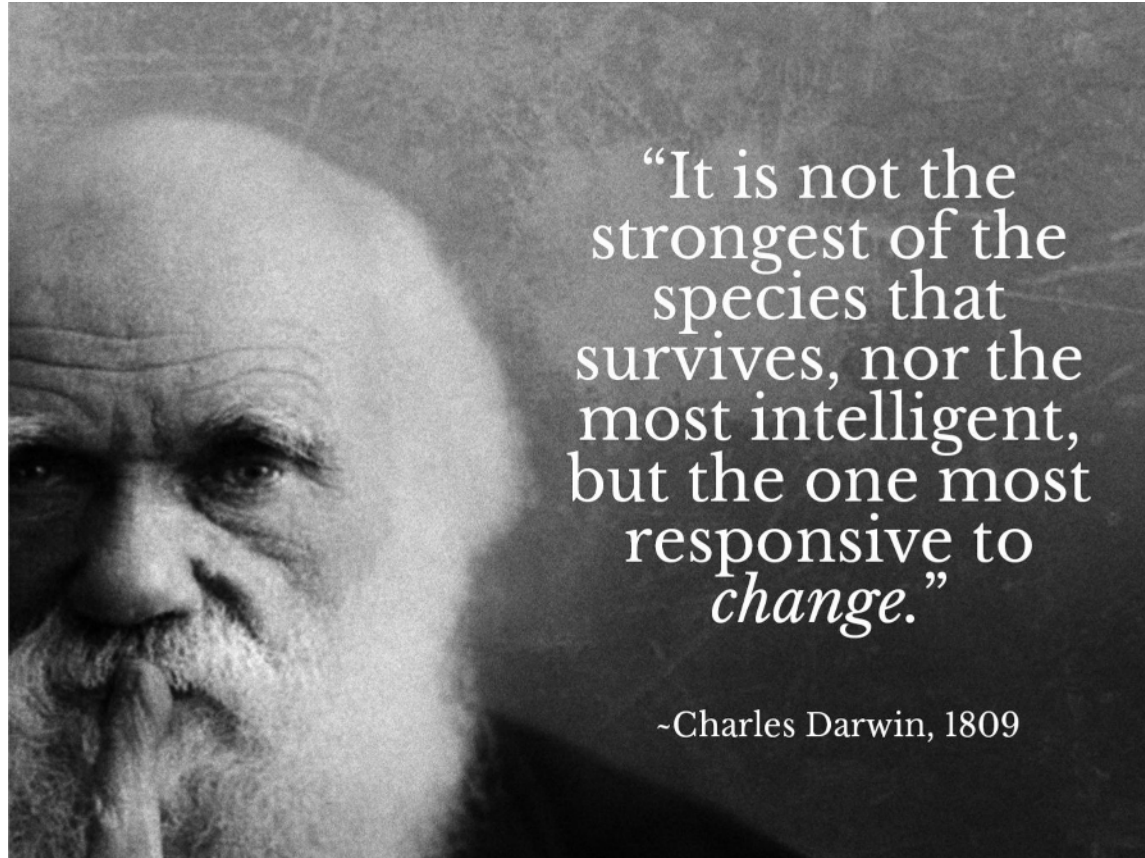


What are implications for GPC strategy, policy and whole of government initiatives?

What are implications for differing AOR strategy, operations and tactics with allies and adversaries?

SPACES OF AMERICAN POSSIBILITIES

Today's GPC dynamics are at a tipping point for future generations



As individuals, firms, and national leaders we must lean ahead and **reconsider new paths and directions.**

We cannot settle on retrospective lenses built on an **eroding status quo** to navigate future new normals.

We cannot be risk averse on upside challenges, focusing solely on downside losses, when **competitors and adversaries** are risk acceptant on **both.**

Achieving a **broader** consideration of GPC dynamics, a **deeper** understanding of its complexity, a **smarter** understanding of others' cognitive bias as well as our own and **sharper** operating environment capabilities **can** **outmaneuver** **adversaries.**

Perhaps equally inspiring and terrifying, which alternative futures we end up in a new Anthropocene era is still our **very human choice.**

Abdollahian 2021

BIOGRAPHY

Dr. Mark Abdollahian is Chief Executive Officer of Senturion Forecasting and Acertas as well as Professor of Computational Analytics, Claremont Graduate University.

He focuses on designing and delivering next generation, decision intelligence with data, computational analytics and artificial intelligence. His global experience spans national policy, corporate strategy, economic development, finance, public-private partnerships, M&A and business process reengineering. He creates, architects and implements enterprise class data and strategy analytics used by the US Government, the World Bank, the African Union and the United Nations as well as private sector companies worldwide.

Since 1994, Dr. Abdollahian has advanced quantitative computational social science for the public and private sectors. Since 2000, he has advised the World Bank on country assistance strategies, loan conditionality and program design across Africa and Asia. Since 2003, he has been awarded multiple DARPA and US Government contracts on delivering next generation innovations on human, social, cultural, economic and behavioral data and modeling. In 2005, the US Government selected Dr. Abdollahian's software, Senturion, as the world's premier strategy capability.

Dr. Abdollahian is author of dozens of scientific articles and two books on decision intelligence across politics, economics and business, lecturing to audiences worldwide.

Dr. Abdollahian is also a cofounder of Sentia Group, Senturion Forecasting, Acertas, a board member for the Tallberg Foundation and Full Professor at the School of Politics and Economics, Claremont Graduate University.

In addition to Bachelors degrees from Case Western Reserve University in Political Science, History and French, Dr. Abdollahian holds a MA in Foreign and Defense Policy and a PhD in Political Economy and Mathematical Modeling from Claremont Graduate University.





BACK TO THE FUTURE

Trajectories, Simulations and Alternative Futures of Great Power Competition

Dr. Mark Abdollahian

12 JUL 23

