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A System Dynamics Exploration of Food Security, Climate Change, and Geopolitical Nexus

Vincent Amanor-Boadu

Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2023 Virtual Summer Symposium: Fields of Discord: Understanding the Intersection of Geopolitics and Agriculture, June 26, 2023.

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A System Dynamics Exploration of Food Security, Climate Change, and Geopolitical Nexus

Vincent Amanor-Boadu

Department of Agricultural Economics

June 26, 2023

Presentation at the IARTC Summer Symposium (2023)

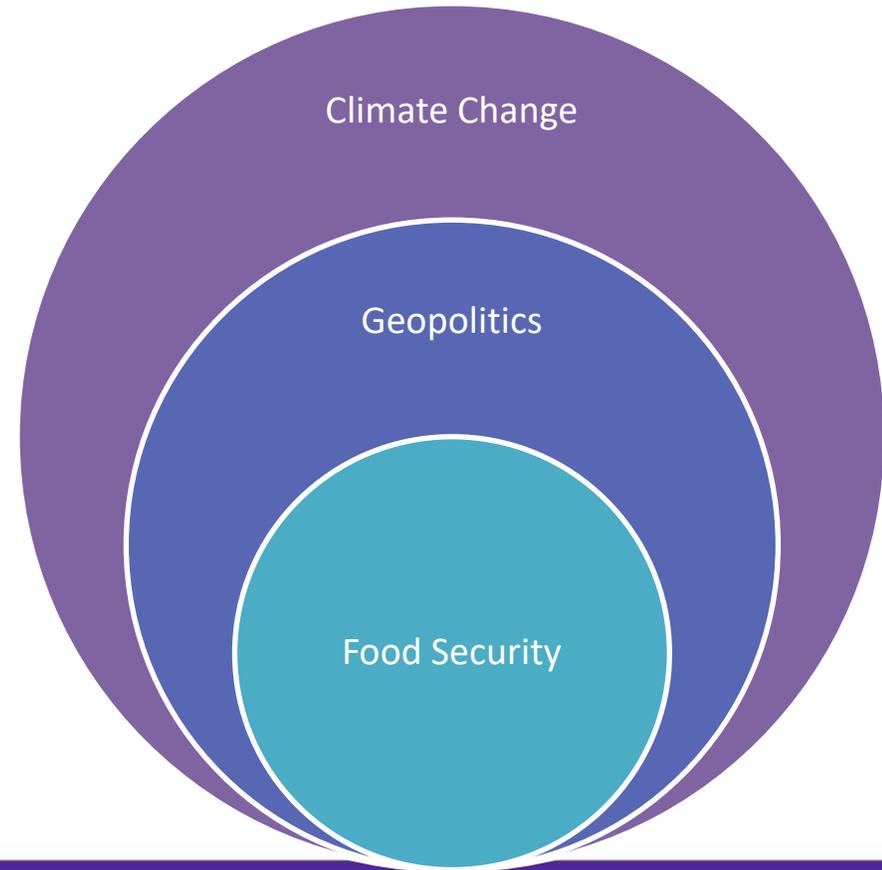
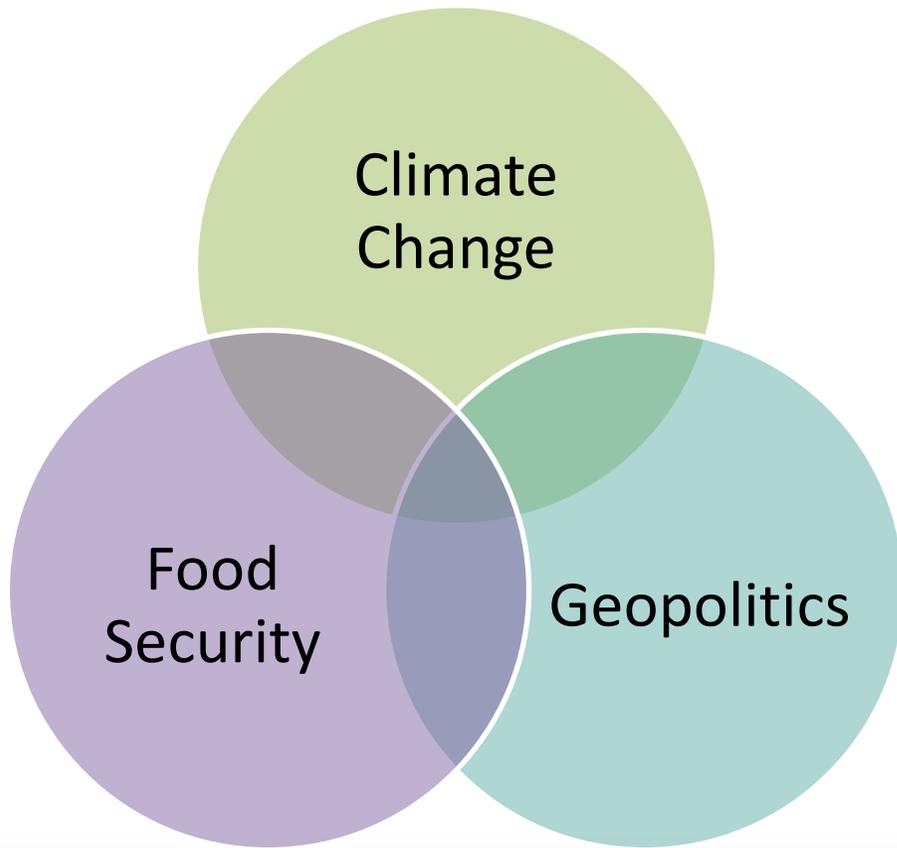
Fields of Discord: Understanding the Intersection of Geopolitics and Agriculture

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Conversation Outline

- Reframing the connections among food security, geopolitical environment, and climate change
- Focus on income opportunities through a consideration of Schumpeterian resource recombination opportunities for food security with climate change realities
- Explore the outcomes for two approaches to food security
 - Self-sufficiency approach, framed as exogenous non-inclusive initiatives
 - Procurement approach, framed as collaborative inclusive entrepreneurial efforts by policymakers and target populations

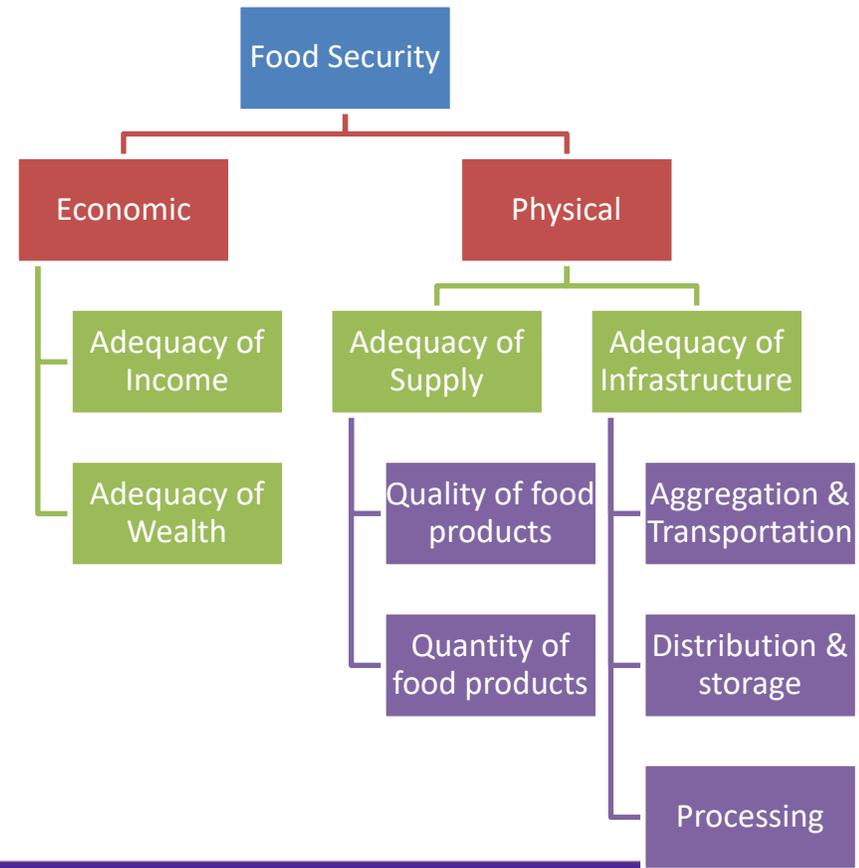
Rethinking the Relationships Among the Story's Characters





World Food Summit (1992) Food Security Definition

- People are food secure when they, “at all times, have *physical and economic access to sufficient safe and nutritious food* that meets their dietary needs and food preferences for an active and healthy life.”



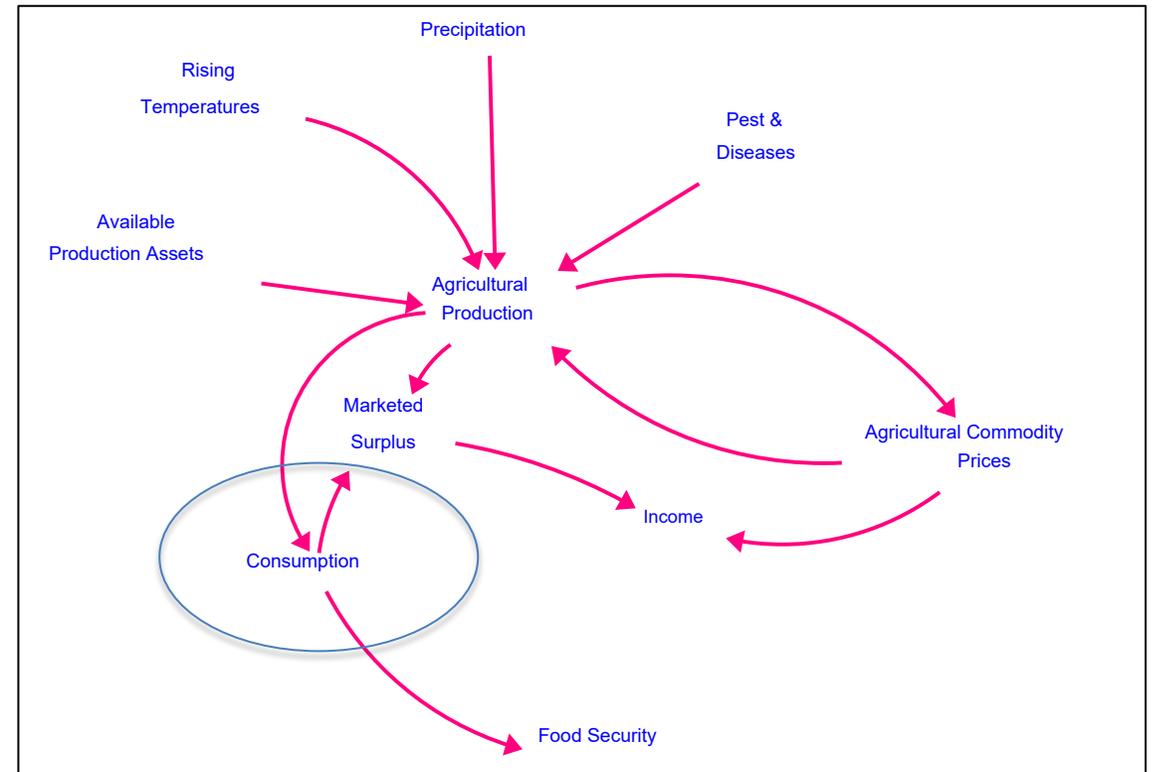
Solving Food Security: The Self-Sufficiency Argument

- Food security can only be solved by food self-sufficiency
- Production resources focus on producing only food that may be consumed by its producers
- Resources are, therefore, not directed to their highest and best use to generate the highest return to assets
- The assumption that farmers can do no better than produce food for themselves is so entrenched that it has become a truism, a fact, a reality

Solving Food Security: The Self-Sufficiency Argument

Disruptions to production (climate uncertainties) engender adequacy of food supply risks

Which creates food security challenges



Solving Food Security: The Procurement Argument

- Food security can only be solved through procurement of food
- Production resources focus on producing the most market competitive products possible for sale anywhere
- Resources are, therefore, directed to their highest and best use to generate the highest return to assets

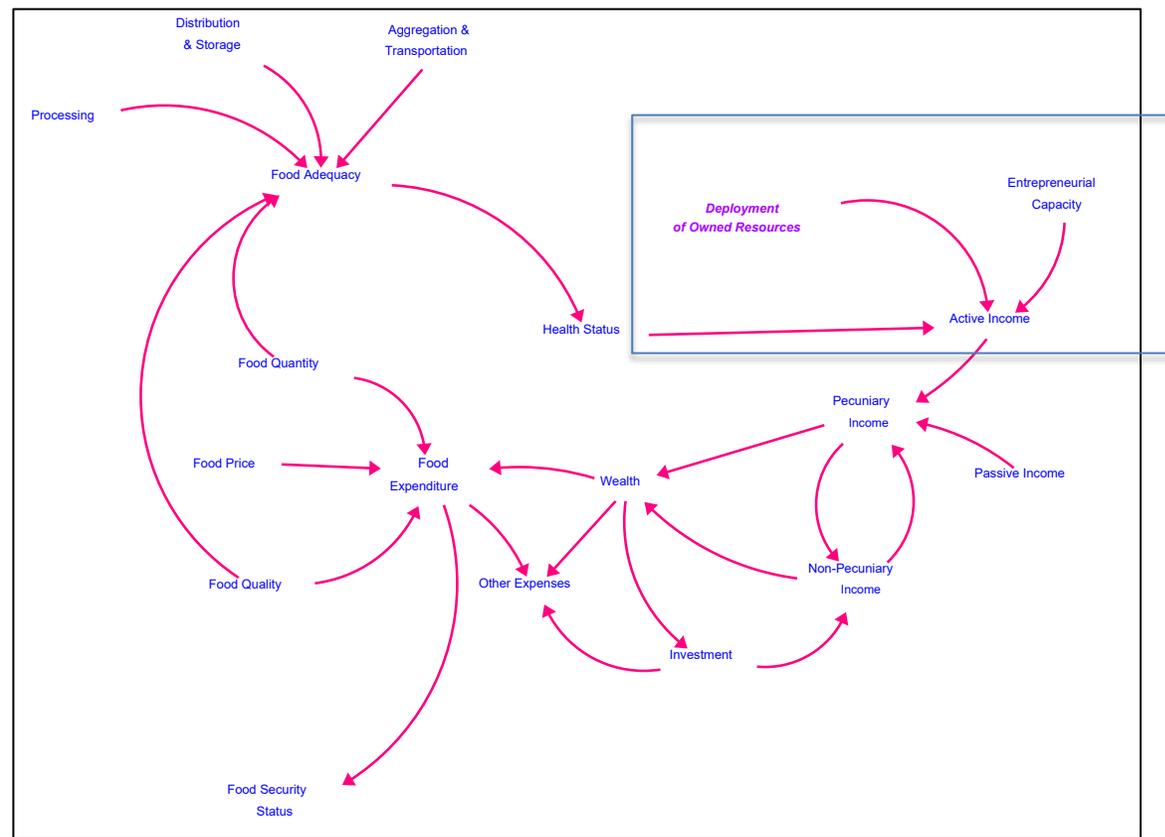
Solving Food Security: The Procurement Argument

- A radical assumption is that producers utilize their entrepreneurial capacity to produce in ways that generate surplus income or wealth accumulation
- The only direction to resource use is market drivers and entrepreneurial capacity
- Assumes also that all artificial trade barriers are non-existent
- Yields a superior sustainable food security outcome compared to the production approach

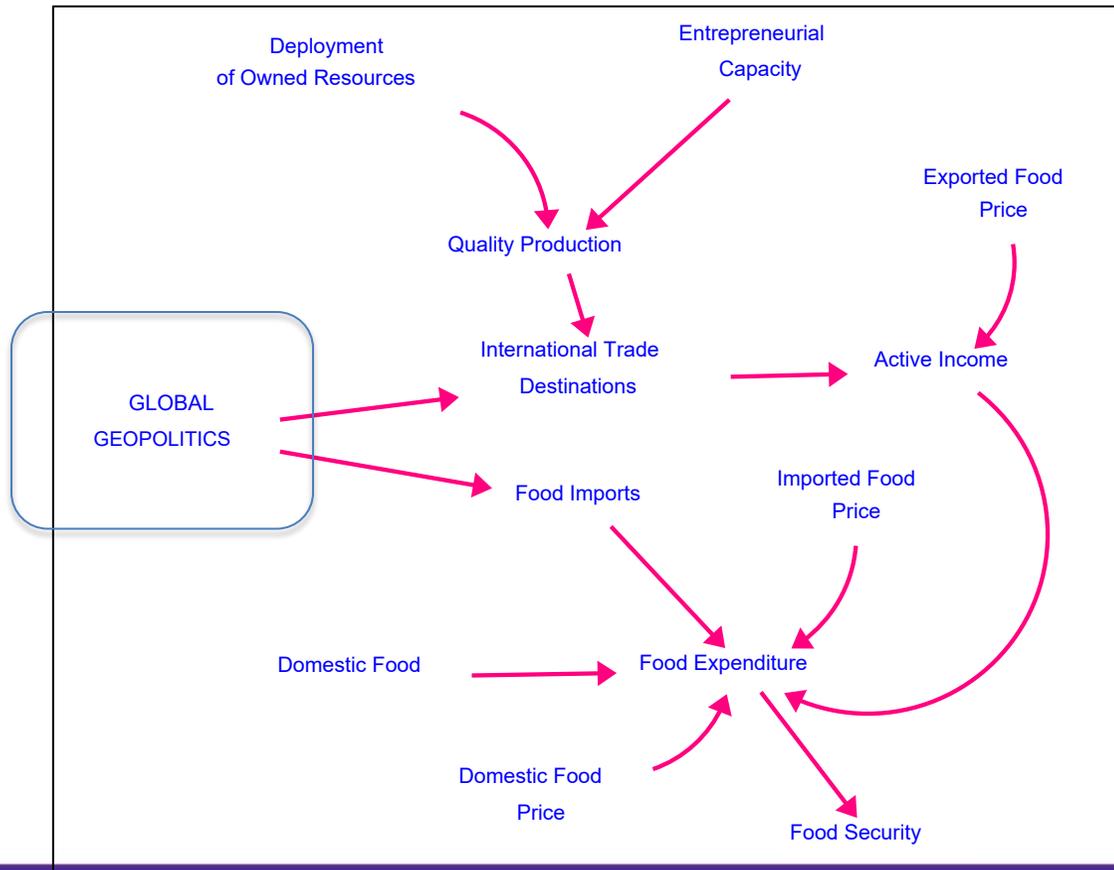
Solving Food Security: The Procurement Argument

Accumulated wealth is insurance against production disruptions

Which buffers producers against food security challenges



Solving Food Security: The Procurement Argument



- **Entrepreneurial capacity** and deployment of owned resources generate active income by producing quality goods – not necessarily food products – that are competitive in the international markets
- Such competitive goods will generate the desired active income to support food security objectives



Relative Risks of Self-Sufficiency vs Procurement

Arguments: When the Assumptions Don't Hold

- Trade risks may be classified as controllable and uncontrollable
- Controllable risks (human-induced risks)
 - War and conflicts
 - Financial and other sanctions as weapons
 - Trade as weapon in international political power (think tariffs and bans and NTBs)
- Uncontrollable risks
 - Contagion commodity crises (think energy crisis in 2003)
 - Contagion financial crises (think 2008 global financial meltdown)
 - Global health crises (think Covid-19 pandemic in 2020)

Dealing with the Controllable Assumptions

- Wars are not inevitable despite what Tolstoy believed about human nature
 - Geopolitical exchanges are always between individuals who use their influence to make their personal inadequacies into national problems
 - They are often triggered by erroneous historical interpretations which can be addressed with superior appreciation of benefit-cost assessment
 - Tools of geopolitical power include war and sanctions, and sanctions are part of the aggressive toolset
 - There are always superior solutions to welfare diminishing solutions
 - Evidence from global bilateral and multilateral experience and data confirm this possibility

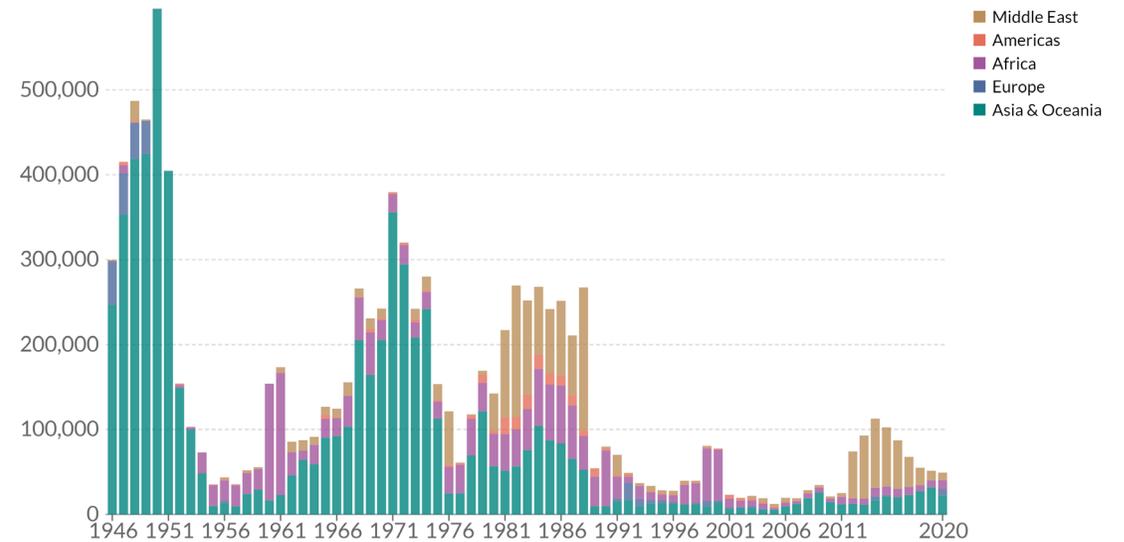
Dealing with the Controllable Assumptions

- Data show that the number of state-based conflicts and death from such conflicts have been on the decline
- Food security risks from geopolitics emanate from non-war trade constraining policies
- Which trigger unintended consequences of production behavior
- Demanding a need for a broader system dynamics perspective on problems and solutions

Deaths in state-based conflicts by world region

Direct deaths of both military personnel and civilians. Deaths from disease or famine are not included. The region does not always relate to where the fighting occurred - it sometimes refers to the region of the participants in the conflict.

Our World
in Data



Source: OWID based on PRIO and UCDP

Note: 'State-based' conflicts are between states, or a state and a non-state armed organised group. The 'best' estimates from the sources are used, or - if unavailable - the mid-point between high and low estimates.

OurWorldInData.org/war-and-peace • CC BY

Changing Perspectives

- Uneven distribution of power and the continuous search for dominance is a reality
- Trade embargoes and sanctions as well as tariff and non-tariff barriers have been popular tools in the search for dominance
- But the economic welfare implications from these policies are often casualties of the politics and the ambitions



Changing Perspectives

- But they are only because of the inadequacy of the net benefit calculus users of these instruments make
- Improvement in these calculations could help focus attention on the desired objective and its antecedents
- System dynamics thinking about geopolitical conversations could contribute to superior trade enhancing policies
- Simulations of alternative pathways to food security on a climate changing Earth could help improve the calculus and moderate the politics

Conclusion

- This research challenges the basic assumptions about food security, global politics, and climate
- It argued for a nested and interdependent perspective about these variables
- It challenged the absence of the targets of food security from research and solution development and argued for policymakers to use institutions and governance mechanisms that focus on the problem they are solving
- In completing the research, we test our approach simulating the two approaches and their impacts on food security for a diverse set of currently food insecure countries



Thank you

Conversations