



Citation: Pagliacci, F., Raimondi, V., & Salvatici, L. (2024). Guns, Germs and Climate: Food Security and Food Systems in a Risky World. *Bio-based and Applied Economics* 13(3): 219-223. doi: 10.36253/bae-16423

Received: August 5, 2024

Accepted: August 6, 2024

Published: October 16, 2024

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

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Editorial. Guns, Germs and Climate: Food Security and Food Systems in a Risky World

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The 2023 AIEAA Conference in Milano emphasized markets' long-term and recent evolution, especially food, fertilizers and energy. Out of the 90 papers presented at the Conference, 7 were submitted to be included in this Special Issue.

Food inflation reached critical levels in recent years, with double-digit rates recorded in most of the world. Though food prices have since fallen from their peaks, the crisis persists and has resulted in expanding numbers of people affected by hunger and malnutrition, especially the poorest, who spend over 60% of their income on food. The number of undernourished people has risen to more than 800 million globally (FAO, IFAD, UNICEF, WFP and WHO, 2022). Russia's February 2022 invasion of Ukraine is often cited as the triggering event for these soaring figures, but the truth is that the situation was already dire before the war began. A legacy of high agricultural input costs (i.e., fertilizers, energy, fuel), years of insufficient yield growth, and weather shocks led to low stocks of several vital commodities. It raised international prices, leaving markets susceptible to shocks. The war triggered new disruptions on the supply side, pushing prices further up. In a way, it was just the most recent in a series of crises – conflict, climate change, COVID-19, etc. – highlighting the structural drivers underlying the current situation (Global Network against Food Crises, 2024).

Recurrent shocks, enhancing price volatility, are driving up acute food insecurity. Food crises around the world are the result of interconnected, mutually reinforcing drivers: conflict and insecurity, economic shocks, and weather extremes. These key drivers were associated with the lingering socio-economic impacts of COVID-19, the knock-on effects of the war in Ukraine, and repeated droughts and other weather extremes.

In this issue, the article by Yalaw et al. (2024) (*The implications of the Russia-Ukraine war for African economies: A CGE analysis for Ethiopia*) examines the impact of the 2022 world market price increases for wheat, fuels, and fertilizers on Ethiopia's economy. Using a computable general equilibrium (CGE) model, the study shows that GDP, wage rates, and house-

hold' consumption in the country decline. The effects of fertilizer and petroleum price changes are particularly notable and unequal across production sectors. Crop growing activities tend to substitute inorganic fertilizers with animal manure. The overall effects on urban households are relatively severe compared to the impact on rural households. Increasing fertilizer prices tighten the competition for using animal manure as fertilizer (in crop cultivation) and as fuel (by households).

To have a proper assessment of the shock impacts, it is essential to take into account the whole value chain. The article by Gattone (2024) (*Participation of Farmers in Market Value Chains: A Tailored Antràs and Chor Positioning Indicator*) goes in this direction and presents a micro-level indicator of farmers' positioning in the market chain based on the conceptual framework outlined by Antràs and Chor (2013, 2018). The indicator considers the selling location of a farming household and its crop buyers. Using panel data from the World Bank's 'Living Standards Measurement Study: Integrated Surveys on Agriculture' for Ethiopia and Nigeria, the article empirically applies the proposed indicator and showcases its superior performance compared to the micro-level alternatives. Furthermore, by analyzing the dynamics of farmers' food and total consumption over time and controlling for various household and production characteristics, as well as potential confounding factors, it shows that moving towards a downstream position in the market chain has a positive impact on farmers' food and total consumption levels.

Most of the shocks that affect and will affect the agri-food sector are related to climate change, as one of the main environmental problems of the 21st century. Consequently, there is an increasing call for efforts directed at detecting best practices of climate change adaptation in agriculture and understanding the factors behind producers' willingness to implement such adaptation strategies. The article by Pagliacci and Salpina (2024) (*Producer, farm, production or perception? What really drives adaptation to climate change in the case of producers of Geographical Indications?*) focuses on the agri-food sector certified productions. It analyses the results of a questionnaire-based online survey administered to 137 producers of agri-food Geographical Indications in the Veneto Region (in north-eastern Italy) in 2022. Using a multinomial logit model, the study highlights the factors explaining adaptation strategies distinguishing three different cases: (i) farmers who have already implemented adaptation strategies; (ii) farmers who are willing to implement them in the future; (iii) farmers who neither have implemented them in the past nor are willing to do so in the future. Significant factors revolve around socio-demo-

graphic characteristics, farm management and networks, production type, and direct climate change perception.

Governance mechanisms along the agri-food supply chains are also increasingly important, especially in ecological transition. Under the conceptual and analytical lens of Neo Institutional Economics, the article by Ciliberti et al. (2024) (*Exploring preferences for contractual terms in a scenario of ecological transition for the agri-food sector: a latent class approach*) explores farmers' preferences towards a variety of clauses usually adopted in production contracts. To this purpose, a discrete choice experiment was conducted among 190 durum wheat producers in Italy. Results from a latent class model show that producers were mainly interested in fixed price formulas and joining shared production rules but revealed little or no interest in compelling sustainable cultivation techniques and providing technical assistance. However, these preferences are heterogeneous across farmers and vary depending on their level of education and previous use of contractual arrangements, with relevant implications for contract design and management.

In recent years, agricultural policies have also largely changed in both low-income and high-income countries, being transformed by the demands of a new economy. Coupled and decoupled subsidies and trade policies remain centre-stage in many global government initiatives. But digitalization, the green transition, and geopolitical imperatives have multiplied the objectives that agricultural policy is tasked with. This creates inevitable tensions and some trade-offs among economic agents. For example, focusing on products at zero distance to spur local economic development makes the green transition more costly. Multiple goals require multiple instruments – a lesson that many governments have yet to internalize (Juhász et al., 2023). They also require thinking of agricultural policies in somewhat different ways from what economists are accustomed to.

The image that economists have of agricultural policy goes something like this: a group of bureaucrats (a) design some incentives that favored products are to receive (e.g., export subsidies, import protection, etc.), and (b) select the products that are to be incentivized in this fashion. They may then formulate additional rules regarding what kind of farms qualify for the incentives, the specific farm actions or performance criteria on which the incentives are conditioned, and the consequences (or penalties) for non-performance. Ideally, the bureaucrats keep lobbies at arms' length throughout the process and thereafter to provide them with insulation against political manipulation and rent-seeking (Juhász et al., 2023).

However, this description of the hard, insulated state does not quite do justice to the reality of economic policy. As Juhász et al. (2023) have argued, successful governments combine autonomy from private interest groups with “embeddedness” in social ties that provide “institutionalized channels for the continual negotiation and re-negotiation of goals and policies.” Economists might worry that such close relationships with private firms could have made the government more prone to capture. But Juhasz et al. (2023) also argue that these links are essential to ensure governments have access to the information needed to design workable policies, adjust to changing circumstances, and prod firms along new technological trajectories in the most effective ways possible.

Policies aimed at enhancing agricultural productivity growth, such as investments in R&D, strengthening economic incentives for farmers, infrastructure, and rural education and extension, have been found to narrow the yield gap effectively. However, it is also crucial to consider food security, sustainability, and agrifood system resilience as critical elements in productivity growth. In the same vein, access to land is one of the key factors of farm growth, while at the same time, related research is characterised by important gaps, particularly facing the change over time in the nature and role of drivers of the land market. The research in this area can support policymakers in designing policies to promote the survival and growth of farms and facilitate land investment by reducing barriers to land acquisition. In a forthcoming issue, the article by Russo et al. (2024) (*Farm characteristics and exogenous factors influencing the choice to buy land in Italy*) aims to identify the endogenous and exogenous factors that affect the decision to purchase land in Italy between 2013 and 2020. Probit models are implemented to understand the role of different determinants in land investment decisions. The results show that factors related to capital in machinery and equipment, energy production, the inflation rate and the presence of a successor positively influence the purchase decision, while the cost of capital, the ratio of rented land to utilised agricultural area and of family work units to total work units play the opposite role. The role of Utilised Agricultural Area and Gross Saleable Production per hectare varies depending on the specialisation considered.

It is natural, in times of crisis, to respond with some emergency measures, but we should not lose sight of the long term. Single, one-off policies will not provide a way out of the current predicament. There is no simple or standard solution to such a complex situation. Safeguarding food security and making the food system

work will take a whole-system approach. Interventions should target the food system, the economic environment, governance, and other key elements in this crisis’s broader, longer-term dimensions. These challenges are complex, but their urgency should not be underestimated; systemic actions should be taken sooner rather than later; otherwise, problems will continue to compound, and the costs of inaction will inevitably increase. Recognizing the multi-dimensionality of this crisis and responding to it is imperative to building resilient food systems and future global food security.

Another important way to mitigate future shocks and promote food security is to step up the fight against climate change and biodiversity loss, both of which featured prominently in discussions for global action, highlighting the critical climate-biodiversity-food nexus. European soils and their status are a matter of concern that has entered the policy arena. A common regulatory framework is currently discussed in the Soil Monitoring Law but has not yet been developed. The soil health narrative has been lately adopted as part of the European Union agenda; however, how far such a concept is integrated into current policy instruments is under investigation. The article by Winkler et al. (2024) (*Soils and ecosystem services: policy narratives and instruments for soil health in the EU*) is based on content analysis and scoping review and aims to evidence which soil ecosystem services are currently targeted or neglected by the available policy instruments, both regulatory and incentive-based. While primary productivity, nutrient cycles and carbon storage were frequently found, services such as biodiversity, habitat preservation, human well-being, and cultural heritage still appear underrepresented in European soil-related policies.

Finally, the article by Sogari et al. (2024) (*Intention and behavior toward eating whole grain pasta on a college dining campus: Theory of Planned Behavior and message framing*) contributes to individuate gaps and provide relevant information for upcoming policy needs. The consumption of whole grains has several health benefits. However, most US consumers – including young adults – do not meet the recommended intake. A survey based on the Theory of Planned Behavior (TPB) was developed and administered to US college students to understand the underlying factors affecting the intention and consumption of whole-grain pasta. The effects of message interventions on the TPB measures and other variables are examined. 325 participants received different messages on the health benefits of whole grain in the forms of gain- (treatment 1) or loss-framed (treatment 2) for four weeks or did not receive any message (control). The authors evaluate variables at two-time points: Time

1 (when the first message was received, week 0) and Time 2 (one month after the intervention, week 4). The results suggest that attitude, subjective norm, and perceived behavioral control are positively associated with intention, and intention can accurately predict young adults' behavior. On the other hand, the framing does not affect the TPB variables.

The crises we have faced have roots in multiple shocks or long-term pressures – in this case, the slow recovery from the global pandemic, conflicts, and climate-related disasters – and are becoming increasingly common, especially as climate change advances, and more and more intertwined. These crises overlap and amplify disruptive impacts on food production and markets, at different territorial scales. Such complex situations will likely drive rising numbers of food-insecure and malnourished people, disrupt farmers' livelihoods and leave long-lasting implications for well-being. For example, the links between drought, war, and food insecurity are evident in several places.

Our experience with the current food price crisis offers several key policy lessons. Foremost among them is the critical role of trade in ensuring food security. Keeping markets open for food and fertilizers – and expanding the number of producers and markets – can reduce price volatility and help ensure the delivery of food where it is needed. Grain and vegetable oil supplies can also be increased in the short term by suspending biofuel mandates and avoiding taking land out of food and feed production. When managed well, trade can help improve and strengthen opportunities and choices for producers and consumers, providing alternative sources to secure food supplies and thus stabilizing prices.

While trade is essential, it only works well with varied sources of food, feed, and agricultural inputs, both regarding the diversity of products and of producing and exporting countries. Yet the war has highlighted an apparent lack of such diversity due to the world's dependence on imports from Ukraine and Russia, as grain and fertilizer prices have risen to their highest levels since 2008.

Putting all your eggs in one basket is never a smart strategy, but neither is shifting all the eggs from one basket to another. Providing more options can help to avert such problems when the next shock hits. We need more flexibility in where and how food, feed, and agricultural inputs are produced and consumed. Improved diversity, in turn, will increase the resilience of local, national, regional, and global food systems. However, expanding flexibility will require significantly growing public and private investment in research and development to sustainably and rationally expand production, as well as promoting trade

strategies that support the diversification of import sources (both in terms of countries and companies) and reducing food loss and waste along supply chains.

Finally, humanitarian assistance for those most in need and well-targeted social protection, through food or cash transfers, can prevent hunger and malnutrition and deter the devastating long-term impacts of a global food crisis. Still, these should not detract from efforts to meet long-term development goals and build resilience to future shocks. In the medium term, countries can invest in increasing sustainable food production. As more countries develop resilient and competitive agricultural systems, importing countries will have access to more trade partners and be able to diversify their sources of imports.

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