Food Price Stabilization in an Age of Overlapping Emergencies: The case for multilevel buffer stocks

For G20 Food Security Task Force

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Abstract

Food price volatility is increasingly affected by overlapping emergencies including climate change, armed conflicts and trade wars. Buffer stocks can stabilize food prices and contribute towards long-term goals such as food sovereignty and sustainable farming. We propose a regional African food reserve comprising regionally grown and imported grain, to stabilize prices over time and across locations as well as to incentivize more sustainable food cultivation in the region. Additionally, we propose global virtual and physical reserves to stabilize the prices of globally traded commodities and support regional reserves.

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Executive Summary

The world is in an age of overlapping emergencies such as extreme weather events due to intensifying climate change, increased armed conflicts and an uncertain trade environment. This increases the risk of food price volatility in both global and domestic food commodity markets. Vulnerable regions like sub-Saharan Africa and South Asia are already facing food insecurity due to more uncertain local production and rising local food prices.

Agricultural production involves a time lag between sowing and harvesting, making it difficult for private producers to coordinate their supply responses in the face of such emergencies. This can lead to commodity prices significantly over- or under-shooting their long-run equilibrium levels. Because primary commodity prices tend to be volatile while the prices of other goods and services may be more sticky, retail food prices in many developing countries rise rapidly in tandem with primary commodity prices, but are slow to fall when commodity prices decrease. With greater global integration of food markets, the problem can be accentuated by currency devaluations in food-importing countries. This can unleash sellers' food inflation in oligopolistic markets as food companies protect or even increase their profit margins by passing on increase in commodity prices to consumers.

Buffer stocks have long been used as a price stabilization tool at the national level and have been repeatedly considered on the international level. They stabilize staple food prices by purchasing commodities on the open market from surplus regions or during periods of low prices and releasing them to deficit regions or during periods of higher prices. In principle, private actors could play a similar role in price stabilization by buying when prices are low and selling prices are high. However, structural challenges such as limited access to reliable information, inadequate availability of affordable financing, and coordination failures undermine the effectiveness of private storage. Competitive agricultural commodity and commodity futures markets can sometimes help to stabilize food commodity price volatility, but they are prone to speculative bubble-like behavior. Price stabilization strategies are an important plank of adaptation and resilience strategies for an age of overlapping emergencies.

Price stabilization techniques can take indirect and direct forms. Indirect techniques include tariffs and quotas; specific trading arrangements; competition policies; commodity trading regulations; administered purchase and sale prices; and intervention in foreign exchange markets. These are aimed at enhancing supply resilience, addressing market concentration and improving market integration, reducing the effect of supply shocks and managing the responsiveness of markets to supply-demand imbalances. Direct price stabilization techniques include variable (countercyclical) tariffs and quotas; physical and virtual buffer stocks, including emergency reserves; and temporary or emergency price caps. Such tools are needed to correct short-term market imbalances and, in emergencies, mitigate distortions; but stockholding (and the associated procurement and distribution) can also be effective in addressing medium term concerns such as food sovereignty and sustainable cultivation.

Direct price stabilization instruments such as buffer stocks complement long-run goals of food sovereignty and sustainable farming. Public programs can strengthen producers' bargaining position against private traders by providing a floor price for market operations, supporting warehouse receipt systems or farmer cooperatives in building storage. The state can curb market concentration by acting as a buyer itself. Through procurement—whether at minimum support prices or at prevailing market rates—the state can provide stable demand for targeted groups, while also promoting crop diversification and sustainable practices. Any cost-benefit assessment of policies must consider their contribution to short-term price stabilization as well as long-term policy objectives such as improving commodity market functioning, improving food access and increasing the diversity and resilience of the food system.

We propose a multi-level mechanism comprising a regional public stock holding system for Africa, complemented by a global stockholding initiative. The regional system, which we call the African Grain Management Facility (AGMF), would be an autonomous public agency led by the African Union. Importantly, it would not be an emergency reserve as in the case of ECOWAS but would entail continuous procurement and offtake, with the size of stockholdings determined by estimates of reasonable demand from member countries. It would have two main components: (i) A stockholding system for trade within Africa, consisting of crops such as sorghum, cassava and millets, which are predominantly produced and consumed within Africa. The AGMF would prioritize local procurement and stipulate a minimum support price based on production costs plus a sufficient mark-up. Supplies would be made available for deficit countries to sell in their local markets during shortages or price spikes at the procurement price plus carrying costs. (ii) A stockholding system for crops for which Africa is net import-dependent, such as rice and wheat. The AGMF would have more bargaining power than individual countries and would be able to secure cheaper and more stable supplies, if managed effectively. Ideally, the AGMF would canalize all imports in the specific crops and would be supported by a system of variable tariffs to prevent the re-export of private stocks during global price spikes. For extreme emergencies, a price cap for imported crops modeled on the EU gas price cap could be considered.

The regional system would be supported by a global system as globally traded grains are important drivers of local prices due to second-order effects. The purpose of this system would be to prevent price bubbles in global food markets, prevent price spillovers to less traded crops, support regional stabilization schemes by stabilizing global prices and ensure orderly functioning of markets even in times of crisis. The global system would comprise a virtual reserve to intervene in commodity derivatives markets funded by high-income economies and major grain-exporting countries, as recommended by von Braun and Torero (2009) and Torero (2016). It would include a physical reserve to make the threat of intervention credible and allow for the possibility of physical delivery if futures contracts are not closed before maturity. The reserve would be administered by two independent bodies consisting of technical experts to monitor and forecast prices and to make decisions on interventions, respectively.

Recognizing that comprehensive food security strategies require a mix of complementary direct and indirect policies, we propose a roadmap for action to guide policymakers. The first step is to identify the key food staple crops and the factors driving food volatility. These include structural and institutional constraints such as power imbalances in markets and shortcomings of storage systems. This would enable the identification of policy objectives, which would in turn allow for a holistic evaluation of the short- and long-run impacts of direct and indirect price stabilization techniques, their feasibility and costs. The next step is to align incentives across producer and consumer countries and secure sustainable financing arrangements that reflect both the strategic mandate and the broader developmental benefits of the intervention. Finally, effective monitoring and evaluation are essential to ensure accountability and improve performance.

1. Introduction

As the world enters an age of overlapping emergencies, food supply shocks are becoming more frequent. Extreme weather events occur with greater frequency and intensity and are more likely to affect multiple regions at once (Kornhuber *et al.*, 2023; EM-DAT, 2024). Intensifying climate change is projected to have far-reaching consequences, including more frequent crop losses, reduced food supply, and disruptions to transportation and energy systems (IPCC, 2022). In particularly vulnerable regions like much of Africa, climate change impacts are already adding to food insecurity through reduced local supply and rising local food prices (Birkmann *et al.*, 2022). Concurrently, the number and intensity of armed conflicts have increased significantly over the last decade, further destabilizing agricultural markets. Compounding these risks, an increasingly uncertain trade environment reduces the ability of countries to rely on global markets to smoothen domestic supply shocks, and generates acute risks for food-import-dependent countries (OECD-FAO, 2024). All of this increases the risk of food price volatility in both global and domestic food markets.

When markets respond to such exogenous supply shocks, the dynamic interactions between participants in commodity markets can create additional endogenous price volatility. Agricultural production necessarily involves a time lag between sowing decisions and final harvesting (Kaldor, 1980; Gouel and Legrand, 2022). This time lag can create a protracted, inefficient over- and undershooting of prices and quantities in a so-called cobweb dynamic, around what would be the long-run market equilibrium (Ezekiel, 1938; Gouel, 2012). Crucially, this dynamic is not the result of market imperfections but rather stems from the inability of producers to coordinate their supply responses in competitive markets. Buffer stocks are a stabilization tool with a long history to address this endogenous price volatility and have been repeatedly considered on the international level (Weber, 2021; Weber and Schulken, 2024).

Endogenous volatility can also stem from the interaction between the commodity producing sector and the rest of the economy. Commodity prices are volatile, moving up and down flexibly, while prices of differentiated goods tend to be sticky. This asymmetry gives rise to the well-known rockets and feathers phenomenon: food commodity prices and retail food prices move up together like rockets, but when commodity prices fall, retail prices only drift down like feathers (Lloyd, 2017). In most developing countries this can take the form of a ratchet effect where retail prices are flexible upwards and sticky downwards, particularly when there are other concomitant pressures like exchange rate depreciation. These pricing dynamics imply that food commodity price spikes can unleash sellers' inflation in food. If firms protect their profit margins against such cost shocks and increase prices, inflation can percolate through the food value chain down to retail prices (Weber *et al.*, 2025). If central banks respond to inflation with monetary contraction, economic output slows down, which tends to induce falling commodity prices. Although farmers at first glance appear to benefit from the initial price spike, their real incomes often end up being squeezed between falling commodity prices and still-elevated farm input and consumer goods prices (Kaldor, 1976). Historically, following a price spike, commodity producers' terms-of-trade have in most cases deteriorated relative to the pre-spike level (Cashin, McDermott and Scott, 2002).

Private actors, such as agricultural traders and processors, can in principle play a stabilizing role in commodity markets by purchasing surplus production during periods of low prices and selling during periods of scarcity, thereby mitigating the effects of exogenous supply shocks. However, especially in many developing countries, structural challenges—including limited access to reliable information, inadequate availability of affordable financing, and coordination failures—undermine the effectiveness of private storage (Barrett and Mutambatsere, 2016). At the global level, initiatives to enhance transparency regarding grain inventory levels still do not cover stocks held by private firms and some countries, limiting the information available to traders (AGRI, 2024). Therefore, market imperfections cause the private sector to undersupply storage (World Bank, FAO and WFP, 2025).

Even in an ideal setting characterized by perfect competition, information, rational expectations, and complete asset markets, private markets systematically undersupply storage relative to the socially optimal level. Since Keynes (1938), we know that when processors and manufacturers are able to pass through sector-wide commodity cost shocks to consumers, they face limited incentives to maintain stocks. The societal costs from macroeconomic instability and inflation resulting from insufficient stocks are just negative externalities from the perspective of the individual firm and are thus not internalized in their investment and stockholding decisions. Furthermore, market-based allocation mechanisms reflect purchasing power rather than human need. Markets operate on the principle of 'one dollar, one vote,' not 'one life, one vote.' This means that the needs of the most vulnerable populations who may be too poor to express effective demand are invisible to private storage providers and thus excluded from profit-based decision-making (Wright, 2012).

Competitive agricultural commodity and commodity futures markets can sometimes help to stabilize food commodity price volatility, but are no panacea, and markets can fail as effective tools for price discovery—especially during periods of high volatility and crisis moments. In times of radical uncertainty and crisis, futures markets are prone to speculative bubble-like behavior, frequently over- and undershooting equilibrium levels, and the supply of storage remains below the optimal level. While certain market imperfections—such as limited access to information or finance—might over time be reduced through policy, market failures that result in chronically suboptimal levels of storage and destabilizing market behavior during crises require continuing policy attention.

Price stabilization strategies represent an important building block in adaptation and resilience strategies for an age of overlapping emergencies. Techniques can take indirect and direct forms (see columns in Table 1). Structural and institutional factors condition long-run price stability. Enhancing supply resilience, addressing market concentration and improving market integration can indirectly reduce price volatility in the long run by reducing the effect of supply shocks and increasing the responsiveness of markets to supply-demand imbalances. Due to the endogenous nature of price fluctuations and potentially very large supply shocks, direct price stabilization techniques are also necessary to address acute short-run market imbalances and in extreme situations can potentially correct price distortions.

Table 1: Direct and indirect commodity price stabilization techniques – A taxonomy

	Indirect commodity price stabilization techniques (to address structural and institutional factors that condition price stability)	Direct commodity price stabilization techniques (to address market imbalances and correct price distortions)
Market design and regulation	• Tariffs and quotas for agricultural development • Regional trade agreements • Transparency rules • Regulation of position limits • Competition policies • Standard setting and subsidies for climate resilient agricultural	• Countercyclical tariffs, export and import subsidies and quotas to stabilize short run domestic supply

	production and food distribution networks • Capital and exchange rate market design	
Public market participation	• Minimum purchase price in public procurement • Guaranteed markets to steer production towards climate resilience • Regional grain facilities to enhance market integration • Public options to add competition • Infrastructure development for shock resilient storage and distribution networks	• Buffer stocks • Emergency reserves • Virtual buffer stocks • Foreign exchange market participation
Price intervention		• Temporary emergency price caps

Market design and regulation:

Market design and regulation can be used to reduce long-run price volatility and manage short-run volatility. Trade measures such as tariffs and quotas can affect market integration, which in turn determines the pass-through from international to domestic prices and the pace of market adjustments. They can also serve as measures furthering domestic agrarian development, by reducing food import dependence and enabling crop diversification for better climate resilience. Transparency-enhancing rules on international commodity and financial markets can address information asymmetries. Regulation of position limits on such markets can limit destabilizing speculation. National anti-trust policies can address regional and international market concentration to prevent a small number of players from dominating across markets. Regulation of cultivation processes through specified standards and subsidies for climate resilient agricultural production and food distribution networks can limit vulnerability to shocks. Capital flow management and exchange rate market design and regulation can limit exchange rate volatility, which affects food prices especially in countries involved in cross-border food trading. Tariffs, subsidies, and quotas can also be used as tools for direct price stabilization, for example by limiting the transmission of price volatility on international markets to domestic prices. They can also operate countercyclically to smoothen domestic price volatility, by regulating domestic supply through temporary import or export incentives or restrictions.

Public market participation:

Public entities ,such as those holding grain reserves, can participate in markets and create and expand market structures. Such techniques can be used both to steer market structures that impact long-run price volatility as well as to address short-run market imbalances. Buffer stocks are a specific form of public stockholding system that aims to stabilize prices, even while they can remain neutral on price trends. This requires participation in the market by buying when prices fall significantly below trend prices and by selling when they rise significantly above. Buffer stocks can be “virtual” when market participation is limited to futures and derivative markets. Holders of emergency reserves also participate in grain markets but typically do not have a price mandate. They release grain in response to acute market shortages, which can have price stabilizing effects, but the focus is usually on ensuring physical availability in response to disasters. In contrast, public stockholding systems that pursue a minimum purchase price to support farmers’ incomes aim to protect a price floor that can be above the trend in market prices and are therefore often combined with specific distribution strategies such as school meal programs, to release surplus stocks and address nutritional needs. Any form of public procurement, including for various grain reserves, can be used to shift market incentives in favor of desired forms of production (e.g. climate resilience, crop diversification) and certain producer groups (e.g. smallholders). Grain management facilities and regional reserve systems can engage in grain imports and exports and can be used to advance market integration. Public infrastructure investments in distribution and storage can also enhance market integration and supply resilience. Market participation of public entities can add competition where market concentration presents a challenge for price stability.

Beyond sectoral initiatives, central banks’ participation in foreign exchange markets aims to stabilize exchange rates, which can limit feedback effects from commodity price shocks and prevent excessive increases in domestic retail prices due to currency depreciation.

Price intervention:

Major market shocks can result in endogenous price uncertainty and price overshooting. To correct such acute price distortions, direct price interventions can be a suitable emergency tool in certain contexts. This was demonstrated during the global 2022 energy crisis, with potential lessons for food commodity markets. The implementation of supranational price caps is obviously more effective when there is regional monopsony power (e.g. the EU gas price cap) and access to ocean shipping insurance (e.g. cap on Russian oil prices).

We recognize the important role played by other policies, including introducing greater transparency and tracking of activities of market participants, regulation of commodity derivatives markets and so on. These in turn raise issues such as financialization and concentration in global food markets, which affect long-run stability. However, in this study we focus more specifically on public market participation and how this can address the various issues and policy objectives outlined above. In particular, we emphasize how buffer stocks (which necessarily are also associated with public procurement and distribution to some degree) can directly foster price stability while simultaneously supporting long-run objectives such as market integration, resilience and more sustainable patterns of cultivation.

2. Complementarities between direct price stabilization measures and long-run policy objectives

One of the long-standing goals of buffer stock systems has been to limit the scope for speculation on grain markets. Buffer stocks held by public entities are not held for the purpose of profit maximization; rather, they typically have price stability as their primary goal. When speculative hikes occur during times of uncertainty, "animal spirits" can lead private investors to bet on higher prices by withholding supplies. In contrast, buffer stocks aim to break speculative hikes and ensure supply. If the buffer stock is sufficiently large and the interventions are credible, this can constrain the behavior of private actors. When private stockholders expect prices to soften, they are more likely to sell stored grain to the market in hope of fetching the maximum price. In this way, buffer stocks can crowd in private supply and limit speculation. For example, Malawi's buffer stock system lists alleviating speculative conduct in the grain market as one of its goals (Government of Malawi, 2020). The Ethiopian experience demonstrates that transparent and competitive grain procurement processes enhance the credibility and efficiency of buffer stock systems (Rashid and Lemma, 2011; IATP, 2023). Such trust in the market participation of a buffer stock facility can aid the effectiveness of anti-speculative interventions. Buffer stock systems also rely on monitoring tools and early warning systems that, if well managed, can enhance market transparency for private actors—both producers and consumers.

Public market participation can reduce market concentration and increase overall market efficiency. Global food systems are highly concentrated, and the adverse consequences for the fair remuneration of farmers, and the availability of affordable, nutritious and sustainably produced food have been extensively documented (Lamm, 1981; Wallinga, 2009; Barrientos *et al.*, 2011; Clapp, 2023). Public support programs can improve producers' bargaining power vis-à-vis private grain traders by supporting decentralized warehouse receipt systems or supporting farmers' cooperatives to set up storage (Danau, Flament and van der Steen, 2011; ECOWAS, 2021). The state can also reduce market concentration by directly competing with private merchants as a buyer (Nehring, Miranda and Howe, 2017).

Another operating principle of buffer stocks is to protect producers against price collapses in times of gluts. For example, Ghana's National Food Buffer Stock Company (NAFCO) functions mostly as an purchaser of surplus output (MofA, 2022; NAFCO, 2023). Many countries and regions (including the EU and the US) maintain direct price stabilization strategies, such as intervention stocks and temporary production quotas to bridge a price collapse, preserve productive capacity, secure livelihoods, and prevent farmers having to sell in temporarily highly asymmetric markets (European Commission, 2018). Direct price stabilization strategies which have a price floor can also support agricultural investment and market modernization (Galtier and Vindel, 2013) by reducing the price instability risk that producers and traders face. For instance, Brazil's Food Acquisition Program (PAA) provides smallholder farmers with guaranteed demand at a price in line with regional prices (European Commission, 2018).

Crucially, public market interventions must be predictable and must allow sufficient price fluctuations not to crowd out private trading. Indeed, it is necessary to dispel the misconception that buffer stocks militate against private trading. Rather, by providing stability and a benchmark for prices, they enable more market participants, especially smallholder cultivators and less well-off consumers, to benefit from market integration. A well-designed program also has the added advantage of making commodity futures markets focus on their original intent of facilitating hedging, rather than being overly influenced by speculative motivations.

Public procurement of food for consumption by vulnerable groups and for public stocks can support the market integration of smallholder farmers, for example through targeted public procurement strategies (Nehring, Miranda and Howe, 2017). Purchase programs can contribute to lasting market integration by connecting producer organizations to traders and processors and providing farmers with demand certainty, thereby encouraging them to make investments in increasing productivity. The World Food Program in 2024 purchased up to 59% of its food locally through traders and traditional suppliers, supporting farmers while integrating them into procurement programs (World Bank, FAO and WFP, 2025). A study completed in 2007 and cited in an IPC and WFP report assessing Brazil's above-mentioned PAA showed that one-third of participating smallholder farmers increased their cultivated area and two-thirds increased the level of technology in crop production, supporting market integration (IPC - IG, 2013).

Regional strategies for direct price stabilization and agricultural development can help implement trade integration. Regional trade integration may prove challenging if agricultural production costs differ within a region and policymakers fear undermining rural livelihoods through trade liberalization. A common regional system of procurement along with regional buffer stocks could be used as a market-creating tool to strengthen horizontal trade links outside the North-South trade pattern. This is already a mechanism that is used in large federal countries with different patterns of food production, consumption and prices across constituent regions. For instance, the Politica de Garantia de Preços Minimos (PGPM) is an instrument for the Brazilian government to stabilize producer prices and facilitate trade of agricultural products from surplus to deficit regions at prices that are competitive for the producers (Arias and Caballero, 2015). Similarly, in India, the Food Corporation of India acts as a national-level purchaser of specified food grain, with a view to procuring from “surplus” states and distribution to “deficit” states, as well as ensuring supplies for a public food distribution system aimed at those defined as below a specified income threshold. In China, SinoGrain is in charge of the Central Grain Reserves which serve to equilibrate national supply and demand across major producing and consuming regions. It thereby complements the Regional Grain Reserves, which run buffer stocks to stabilize provincial markets. With a combined storage capacity of approximately 700 million tons—roughly equivalent to China’s annual grain output—this dual-tier reserve system underwrites market balance at both national and local levels (National Food and Strategic Reserves Administration, 2024).

While these are national programs, it is possible to consider regional initiatives that follow along similar lines, specifically for crops that are critical for food security in the region as a whole. This would require expanded trade of specified food commodities within the region, based on stable prices, with a view to incentivizing more regional production, ensuring secure livelihoods for food producers and enabling stable consumption especially in otherwise deficit regions and among the poor across the region. The Regional Food Security Reserve (RFSR) of ECOWAS, which is an emergency reserve, already relies on systematic international tendering procedures for procurement with an explicit preference for regional purchases and purchases from producer organizations which aggregate crops from smallholder farmers. A 2021 assessment of the performance of the RFSR found that procurement has successfully supported regional producers with only 13 per cent of all purchases being imported, thereby fostering market integration within the region (ECOWAS Commission, 2021).

Countries have used a variety of strategies to support domestic agricultural development and reduce food import dependence. These have included policies like land reform, subsidizing the adoption of more efficient farming practices, strengthening farmers’ cooperatives, investing in rural public infrastructure, improving the terms for domestic food exporters vis-à-vis foreign trading partners, and others. Strategies for domestic agricultural development also tend to involve subsidizing domestic farming through input-price and output-price subsidies and protecting them through tariffs or import quotas, sometimes implemented through state trading companies. Most successful agrarian revolutions have involved state intervention to stabilize staple food prices. In China, buffer stock systems have contributed to food sovereignty since ancient times (Weber, 2021). The development of agriculture in England in the 18th century was supported by tariffs and public purchases of food for the navy. The Green Revolutions in North America in the interwar and immediate postwar period, the European Union in the 1950s and 60s, and until recently in many Asian countries were safeguarded by public stockholding schemes designed to stabilize grain prices on the domestic market (Galtier and Vindel, 2013). Timmer (1997) argues that in Indonesia stabilizing rice prices through BULOG’s targeted floor and ceiling interventions created predictable returns that encouraged farmers to adopt high-yield varieties and invest in inputs—essential for the Green Revolution. This price stability reduced uncertainty, helping to support real wages in urban areas and fostering broader investment both agriculturally and industrially. Dorin and Landy (2004) make the same argument for India. Previously discussed aspects like strengthening the market position of domestic producers, market modernization and improving regional market integration also support domestic food production.

Buffer stock systems can also be utilized to increase national production of fertilizers and reduce import dependence. China provides an important example. Trade adjustments for fertilizers date back to the Opening-Up period that started in 1978. To reduce dependence on fertilizer imports, China has maintained a fertilizer import quota system since 1994 (State Council, 1994; Ministry of Commerce, 2002). For exports, China applied seasonal tariff adjustments: Under the 2011 fertilizer export tariff plan, the export tariff for urea during the off-season was as low as 7%, while during the peak season, it reached as high as 110% (State Council, 2010). With the rapid expansion of domestic fertilizer production, restrictions on fertilizer exports were gradually relaxed (State Council, 2019). The National Fertilizer Commercial Reserve ensures domestic supply by contracting storage with private companies, where the state has priority purchase rights.

Fostering diversity in the global food system is important for food security in an age of overlapping emergencies. Following the High-Level Panel of Experts on Food Security and Nutrition (HLPE-FSN, 2020), food security is defined as a situation when all people, at all times – that is in the short term (stability) and long term (sustainability) –, have physical, social and economic access to sufficient (availability), safe and nutritious food that meets their dietary needs (utilization) and food preferences (agency) for an active and healthy life. The reliance of the global industrial food system on a small number of crop varieties, exported by a small number of countries, and traded by a small number of companies has been identified as a source of vulnerability, especially in the face of climate change (Clapp *et al.*, 2022). Supply resilience that ensures food security hence requires access to a diverse set of nutritious foods in sufficient quantity at prices that are affordable, and which is produced sustainably with regard to both the ecosystems and livelihoods involved.

Public procurement can utilize price incentives to increase the production of nutritious and sustainable crops while supporting smallholder farmers. Public procurement can support specific producer groups by purchasing from them at minimum support prices or by offering a predictable source of demand while buying at market prices. It can also encourage the diversification of crops and sustainable forms of agriculture. Brazil's National School Feeding Plan (PNAE) has an explicit mandate to source a minimum of 30 per cent of the food products for school meals from small family farms. In Brazil's Food Acquisition Program (PAA), farmers are explicitly provided incentives to grow sustainable crops, with procurement prices for organically certified and agroecological produce set at 30% above the regional price (European Commission, 2018). As a result of this targeted procurement strategy, PAA has reignited the production of many crops that were no longer produced in many regions of Brazil. Products purchased by PAA are highly diversified, increasing both resilience and sustainability (IPC - IG, 2013). However, such crop diversification and local sourcing strategies have to be systematically pursued in public procurement. Malawi's buffer stock system for example has an urgent need for crop diversification within the strategic reserves, as dependence exclusively on maize constrains both nutritional results and economic prospects for smallholder farmers (Smith, Banda and Phiri, 2023).

Public procurement may also be institutionally integrated with direct price stabilization. India incentivizes domestic production of pulses and millet through minimum support prices to reduce dependence on imports and to encourage farmers to diversify away from rice and wheat monocultures (Kumar and Raju, 2018). Pulses are widely consumed as a cheap source of protein, while they also improve the fertility and physical structure of the soil and require minimal resources compared to rice and wheat (Niti Aayog, 2017). Between 2012 and 2018, the Indian government increased the minimum support prices of different varieties of pulses by 45 to 60%, thereby further increasing production incentives (Kumar and Raju, 2018). Because pulses and millet are not globally traded in the same way as rice and wheat and no derivative market exists to benchmark prices, these crops are well suited for direct price stabilization schemes. Ethiopia's buffer stock system covers a range of staple cereals, including maize, wheat, and sorghum, which are essential components of the Ethiopian diet and are essential for ensuring food security during times of crisis. To ensure timely replenishment and support domestic agriculture, these cereals are increasingly sourced from local markets (Rashid and Lemma, 2011; World Food Programme, 2023). The reserve system's adaptability to different crop types enables continuous rotation and turnover, which contributes to the preservation of stock quality and the reduction of deterioration. Additionally, the increasing dependence on domestic grain procurement has enhanced national food sovereignty by supporting local producers and reducing reliance on imports (Ethiopian Business Review, 2024).

Public stockholding systems can build up domestic storage infrastructure, which in turn enhances food sovereignty. Domestic storage facilities reduce vulnerability to global supply and price fluctuations. China is an extreme case with the world's largest grain reserves that buffer its domestic supply and prices against world market trends. But smaller developing countries like Ethiopia have also undertaken major efforts in domestic storage infrastructure development. The Ethiopian Business Review (2024) reports that the government has implemented substantial capital investments in the domestic market, such as the allocation of ETB 514 million during the 2014–15 fiscal year for the purpose of expanding warehouse infrastructure. Seven main warehouses are strategically situated throughout the country. These facilities are sustained by ongoing technical assistance and capacity-building initiatives, which have maintained post-harvest losses at or below 1% annually - a sign of operational efficiency and effective storage management.

3. **Addressing short-run volatility: Direct commodity price stabilization techniques and access**

Addressing market concentration, improving food commodity market transparency, integration and regulation and enhancing supply resilience and food sovereignty can reduce long-run food price volatility and vulnerabilities to price spikes. Nevertheless, as noted above, in an age of overlapping emergencies major food price shocks, for example induced by climate disasters and extreme weather events together with endogenous price volatility in commodity markets require direct price stabilization techniques to ensure food security. The effectiveness of such techniques depends on how they are implemented and the market conditions they face. This section first provides an overview of direct price stabilization techniques and discusses their applicability to different contexts while highlighting complementarities across various tools. These include physical buffer stocks, virtual buffer stocks, variable tariffs, and emergency price caps. The following section introduces a proposal for a multi-level public stockholding system. A possible physical buffer stock system for the regional level is illustrated based on the case for an African Grain Management Facility (AGMF). Complementary measures on the global level are proposed in the last part.

3.1. Physical buffer stocks and related forms of public stockholding

Buffer stocks are public reserves used to stabilize staple food prices by purchasing commodities on the open market during periods of surplus and low prices and releasing them during shortages and price spikes. Managed by a public agency, these mechanisms usually target a price band around the market trend, allowing normal price movements within the band. This means “buying low and selling high” to keep market prices within the targeted band. The price band must be updated periodically to avoid an accumulation or depletion of stocks. Stocks are held in decentralized storage facilities which are often publicly managed but can also be run by private operators as long as the buffer stock authority controls purchase and release decisions. Buffer stocks stabilize prices by increasing storage levels above the socially sub-optimal level provided by private actors and by assuring sufficient supply during crises when market prices detach from fundamentals (see introduction). The size of the buffer stock depends on the tightness of the price band, the amplitude of price volatility to be combatted, and how public reserves interact with private storage incentives.

Implementing buffer stocks at regional or global levels reduces the required stock size as trade integration smooths some of the price spikes otherwise absorbed by national stocks. Regional joint purchasing mechanisms such as the AggregateEU for gas can canalize demand, thereby leveraging buyers’ power to reduce import price volatility (European Commission, 2025). Buffer stocks should be managed by an independent agency (FAO, 2021) and serve a clear mandate (World Bank, FAO and WFP, 2025). Public procurement for purposes other than price stabilization (e.g. as discussed in the next paragraph) can be conducted by the same public stockholding agency, but mandates and budgets should be clearly defined.

Public stockholding infrastructure can serve a variety of purposes. It is important to distinguish buffer stocks for price stabilization from related forms of stockholding. For example, buffer stocks must be distinguished from the practice of “buying high and selling low” to permanently subsidize producers and consumers. For this policy to work, surplus stocks must be released, for example by benefiting vulnerable consumers and through school meal programs. In countries where improving food sovereignty is a policy priority, the median price trend around which a public stockholding facility stabilizes prices may in this way and/or by using tariffs be set above the median world market price. Meanwhile, In many countries, including high income countries, intervention stocks are used besides temporary production quotas to prevent price collapses below a defined threshold in the face of overproduction (European Commission, 2024; USDA, 2024). Strategic grain reserves are designed for use by import-dependent countries and aim to bridge temporary trade and supply-chain disruptions, stabilizing the domestic price in line with the domestic price of major trading partners (World Bank, FAO and WFP, 2025). Finally, emergency reserves do not have a price stabilization mandate and are used to support targeted vulnerable populations with food aid during crises (World Bank, 2012).

Current experience with regional public stockholding is constrained to regional emergency reserves. These face challenges in part because the countries who most frequently rely on the reserve to mitigate domestic food crises are least able to replenish their national or regional stocks, turning regional reserves into a de facto one-way solidarity mechanism instead. A regional buffer stock would not face the same challenges since it functions as a price stabilization mechanism that benefits all member states (see our proposal in the following section).

Many of the practical challenges faced by public stockholding programs today can be ameliorated by capacity building for effective implementation. The high demands for but also high potential positive spill-over from the capacity building required to operate a buffer stock effectively make this policy area an apt target for international technical support and technology- and knowledge-transfers. To reduce the costs associated with stock rotation, buffer stocks should be linked to regular trade inventories (see our proposal in the next section) or inventories for school lunches and other forms of public consumption (ECOWAS Commission, 2021). Public stockholding systems should invest in using modern grain storage technology to avoid spoilage and post-harvest losses (Manduna, 2024; World Bank, FAO and WFP, 2025) and might benefit from block chain technologies in the future. Procurement and release should occur at decentralized warehouse locations, which are managed efficiently, and are connected by transport networks to make sure that farmers can reach warehouses and don’t have to engage in distress sales if warehouses are full (Gupta *et al.*, 2017). Procurement and release interventions must be predictable and market-sensitive such as not to crowd out private storers and traders (Rashid and Lemma, 2011; World Food Programme, 2023). Strong, integrated information systems are essential here (IFPRI, 2024).

Key benefits of physical buffer stocks compared to other price stabilizing instruments discussed in this section include that they ensure the *physical* availability of supplies and can create co-benefits with a variety of stockholding mandates. Many least developed countries suffer from high domestic price volatility caused by an underdeveloped private trading and storage industry and low regional trade integration. Public stockholding can here play an important role not only in stabilizing prices but in critical infrastructure development and emergency preparedness (Galtier and Vindel, 2013 see our discussion in the previous section). A rising number of import dependent countries are taking measures to protect themselves from imported price instability (FAO, 2021). As the recent World Bank report on strategic grain reserves highlights, besides the increased risk of price spikes on international markets, in the age of overlapping emergencies there is an elevated risk of temporary disruptions to trade routes. Stocks located in import dependent countries ensure physical availability when trade is temporarily cut off (World Bank, FAO and WFP, 2025).

The question of how best to finance public stockholding needs to reflect the mandate. The cost of a buffer stock can be divided into the initial build-up of stocks (ideally while prices are low) and the expenses associated with operating the reserve over time. Buffer stocks with a simple price stabilization mandate can in principle be self-financing for ongoing operational costs, if they buy low and sell high within the price band. It is important to distinguish the cost of broader mandates such as subsidies for producers and vulnerable consumers from the cost of price stabilization. The fiscal cost of such subsidies should be separated out on the balance sheet of the buffer stock agency and assessed in comparison to other tools that pursue the same goals that go beyond price stabilization. By mixing the cost of subsidies with the cost of buffer stocks, some policy reports unduly overstate the costs of price stabilization (FAO, 2021; World Bank, FAO and WFP, 2025). Finally, states must carefully consider how to finance the build-up of the buffer stock and the required infrastructure to avoid paying excessively high interest rates (World Bank, FAO and WFP, 2025). The cost of the infrastructure development for public stockholding facilities should be assessed by accounting for a multitude of co-benefits for economic development. (Re-)financing through national and international development banks should be considered wherever feasible. At the regional and global level the issuance of a commodity currency is an option long favored by buffer stock proponents (Weber and Schulken, 2024).

China is running the world's largest and most sophisticated public stockholding system. Assessments of public stockholding systems have been predominantly skeptical until recently, often based on the evaluation of country cases with limited management capacities. However, the country that made the largest contribution to the eradication of extreme poverty globally, China, has relied on such a system. China's public participation in grain market date back to the "Ever-Normal Granary" system established during the Han dynasty (202 BC) and was revived in the reform and opening period. Despite repeated attempts to abolish grain buffer stocks, they were time and again assessed as essential for development and food security (Weber, 2021). Today China maintains buffer stocks for rice, maize, and wheat (Huang and Yang, 2017). Each year, a group of governmental and administrative bodies jointly announces minimum procurement prices prior to each sowing season (The Economic Daily, 2024). If market prices drop below these minimum prices, a procurement program purchases grain from producers at the guaranteed rate and stores it with local grain enterprises or in facilities overseen by the state-owned company Sinograin. During periods of acute price spikes, stocks are released via online national grain auctions at a price below market levels thereby dampening price surges (State Council, 2010). Any resultant fiscal gains or shortfalls accrue to the central government's budget. Thanks to its buffer stocks, China has been able to maintain stable grain prices during the 2022 global price spikes (NBS, 2025). The cumulative median food price increase across G20 countries from Q4 2020 to Q4 2023 was 23 percent. In contrast, in China food prices fell slightly (1 percent) in the same period (Baffes, 2024). China also offers output price subsidies for several other crops for which food self-sufficiency is a policy priority (Huang and Yang, 2017) and stabilizes the price of pork through a system of frozen pork and live pig reserves within a price band that is tied to the price of corn (NDRC, 2021).

3.2. Virtual Buffer Stocks

Prices at commodity derivative markets directly impact food prices globally. Globally traded staple food commodities, such as wheat and corn, are traded on commodity derivative markets. Where these derivative markets exist, physical trade (especially cross-border trade) is commonly referenced against the derivative market price plus costs for freight, insurance, and an agreed profit margin (van Huellen *et al.*, 2024). The 2007–08 international food price crisis, which largely originated in the synchronized price increase of staple food commodities traded at derivative markets, revived an old debate about the role of these markets in food price instability and crises (Ghosh, Heintz and Pollin, 2012). Second-order effects through consumption switching, export bans and panic buying resulted in price peaks being replicated in many non-derivative traded foods such as rice, further aggravating the first-order price impact (Headey, 2011).

A combination of virtual and physical food reserves was suggested as a mechanism to smooth price peaks in the aftermath of the 2007-08 crisis. Recognizing the key role of commodity derivative markets in pricing and the fact that commodity derivative markets are prone to overshooting and frequent price corrections, von Braun and Torero (2009) and Torero (2016) suggested intervening in food derivative markets if and when prices deviate from market fundamentals. The idea of virtual buffer stocks was inspired by interventions in the foreign exchange markets by central banks of countries that manage their exchange rate by "leaning against the wind" in times of over and undershooting of the exchange rate (Levin, 1985; Obstfeld and Rogoff, 2000; Torero, 2016). Sandri (2023) demonstrates that "leaning against the wind" can be profitable, taking the experience of the Brazilian central bank as an example. As in the case of exchange rates, the exact determination of the "fundamental price" of a food commodity is challenging, both because of theoretical contestations and because of scattered, incomplete and lagged data.

For the virtual buffer stock envisioned by von Braun and Torero (2009) to be successful in determining a fundamental price, it must have access to superior market intelligence and achieve a consensus on an agreed-upon formula to determine the fundamental price. While the latter might be achievable, the data gap is more difficult to close. The Agricultural Market Information System (AMIS) created by the G20 in 2011 has been a way forward, but remains incomplete as private storage is not recorded, and information is made available with a delay. A "leaning against the wind" strategy with incomplete information can be costly for the intervening agency and distort desired market signals. However, if the information gap can be closed, such strategy has the potential to both improve the functioning of markets and be profitable. Indeed, it could re-instate confidence in derivative markets in times when this confidence is eroded and when liquidity is low, making markets more prone to erratic price swings. Clearing houses and exchanges might hence be an unexpected ally in the stabilization scheme. They are also necessary collaborators as intervention might require permission to exceed position limits.

3.3. Variable Tariffs

Tariffs, quotas, and import subsidies can be used to stabilize prices by regulating the level of product available on the domestic market. Especially for small countries, the international market is akin to a limitless stock, making price stabilization through trade regulation an effective and cost-efficient alternative or complement to domestic stocks. Similar to a buffer stock, policymakers can adjust tariffs, quotas, and import subsidies to keep domestic prices bound within a stable band comprised of the export parity price at the lower bound and the import parity price at the upper bound. In practice it is difficult to maintain a precise price band through trade measures alone as the WTO prohibits price-indexed tariffs (Galtier, 2011). Nevertheless, countries can use import subsidies, export quotas, and the Special Safeguard Mechanism's provisions for imposing temporary import tariffs to adjust domestic volumes during price spikes or collapses. Such variable tariffs can be an important complement for buffer stock stabilization efforts on the national and regional level.

Regulating price stability through trade regulation comes with benefits and challenges. The main benefit compared to other stabilization tools is that price regulation via trade is cheaper from the perspective of an individual country than holding a very large buffer stock. If the country in question is small or if the price instability is caused by idiosyncratic, domestic supply shocks, this policy does not destabilize the global market. However, if the country in question is large (i.e., if changes in its trade levels affect the global market price of a product), adjusting trade measures can exacerbate global price instability – especially if the instability in question originated from the international market. For smaller countries, this can become a concern when trying to stabilize the price of a crop that is only traded regionally. For countries that are import constrained due to limited foreign exchange reserve, whose exchange rate fluctuates strongly, or who may be affected by temporary trade disruptions, reliance on the international market alone to stabilize prices is risky (World Bank, FAO and WFP, 2025). As with buffer stock interventions, avoiding abrupt drastic interventions is important to prevent destabilizing producer incomes and crowding out private sector trading and storage (Gulati *et al.*, 2023). To effectively complement each other, trade- and storage policies must be coordinated (Gouel, 2012).

3.4. Regional and international emergency commodity price caps

The 2022 global energy price crisis has put emergency price caps in commodity markets back on the policy agenda. EU member states imposed a range of measures to mute the increase in energy prices. Researchers at the IMF find that these unconventional fiscal policies significantly lowered inflation (Dao *et al.*, 2023). On the regional level, the EU agreed in December 2022 to a temporary market correction mechanism (commonly known as gas price cap) to address shocks in gas prices. The price cap aims to leverage the EU's power in global markets (monopsony power). It is designed to be activated in times of emergencies, to prevent extreme price spikes and not to cap prices permanently. The rational is that in times of major shocks endogenous price uncertainty prevails leading to distorted price signals (Krebs and Weber, 2024). The price cap was never triggered since gas price did not exceed the set threshold. The effectiveness of the measure is hence hard to assess. Nevertheless, the State of the Energy Union Report (European Commission, 2023, p. 10) suggests that the presence of a gas price cap even without being triggered limited price increases. An example on the international level is the oil price cap imposed by the EU, G7, and Australia on Russian oil. It uses a service-provider model, in which western insurers, shippers, and financers are prohibited from servicing Russian oil shipments unless the sale price is below the cap. The effectiveness is difficult to assess due to the sanctions context. The US Treasury holds that it was effective in lowering Russian gas prices (U.S. Department of the Treasury, 2025).

The operating principles of the price caps implemented in international energy commodity prices could also be applied to food commodity markets as an emergency measure of last resort. Preparedness measures like buffer stocks directly address acute imbalances in commodity markets by adding supply or demand and are as such preferable to price caps that aim to correct price distortions in the wake of major shocks. However, where preparedness measures are lacking or insufficient, emergency price caps can be a last resort in price stabilization. Such price caps require sufficient buyer power which can be achieved by regional or multilateral coordination. For example, Africa has imported around 25% of global wheat imports in recent years (FAO, 2025). This is comparable to the buyer power the EU had in LNG in 2022 with a share of around 24 percent of global imports (International Gas Union, 2025). In principle, the African Union could implement an emergency wheat import price cap modeled on the European market correction mechanism that would be triggered when wheat prices spike above a certain threshold for a defined period of time. The service provider model used for the Russian oil price cap could be replicated for a global emergency grain price cap implemented by a country club like the G20 to prevent prices from spiking in extreme ways in response to major shocks. Criteria for what qualifies as a major global emergency would need to be defined, and a trigger threshold assessed periodically.

4. A regional multi-level public stockholding system for essential food grains: The case for an African Grain Management Facility (AGMF)

This study has considered various food grain price stabilization measures across national and international levels, noting that there are both direct and indirect means of public intervention. It has also pointed to the possibility of regional and global initiatives that could be introduced. This section outlines one possible regional public stockholding system, illustrated based on the case of Africa. It also discusses how such a regional system could be complemented by a global initiative towards a multi-level stabilization scheme. The proposed multi-level approach is designed to create synergies and apply stabilization techniques at the levels at which they can operate most effectively. Africa and South Asia are the global regions with the greatest incidence of hunger and African countries in particular face extreme vulnerabilities in global food markets. However, while this proposal refers to Africa to demonstrate its potential, the essential elements can also be incorporated into strategies for other regions.

The African region, and particularly some countries, face continuous and sometimes severe problems of food insecurity. Food importers in particular face both macroeconomic and distributional concerns when global food prices rise, while food exporters can also be affected adversely by global price volatility. It is also the case that, due to limited progress on intra-African trade integration, local price instability—independent from global market instability—is extremely high.

Among the various measures that should be considered, a regional public stockholding system managed through a grain management facility could combine both direct and indirect price stabilization techniques, so as to play an important role in price stabilization, as well as providing several other benefits eventually leading to greater food sovereignty and sustainable cultivation, that would be of great significance in Africa. This system would provide a basis for an overall strategy of food grain price stabilization, along with some other trade-related measures (specifically, a variable tariff regime to deal with very volatile global prices) and the possible support from a global stabilization scheme through virtual stock holdings.

Since it necessarily involves the public procurement and subsequent release/distribution of food grain stocks, it could have additional positive effects. Public acquisition, holding and distribution of food grain stocks can (i) provide price stability in domestic markets for both consumers and producers; (ii) facilitate access to essential food for the country as a whole; (iii) offer price support to cultivators, thereby ensuring basic livelihood for farmers and also encouraging greater domestic production of essential food grains; (iv) distribute essential food from surplus to deficit regions and countries; (v) provide essential affordable food items particular to economically weaker sections; (vi) enable shifts towards greater food sovereignty and regional food self-sufficiency, which has become even more important in the complex geopolitical and volatile economic environment of our times. The costs of holding stocks must be seen in relation to this broad range of benefits for food security, which extend far beyond simple price stabilization.

The proposal outlines a regional initiative specifically for the African continent. The African Grain Management Facility (henceforth AGMF) is envisioned to run as an autonomous public agency under the leadership of the African Union. The AGMF would purchase grain from within the African continent, focusing first on the crops that are dominantly produced and consumed in Africa but are not so significant in large global markets. Such crops include sorghum, cassava, and millets such as pearl millet, finger millet, and fonio. In addition, the AGMF would also purchase from the world market those food items that are produced domestically but also imported, such as rice, wheat and maize, all of which have displayed significant global price volatility in recent times.

It is critical to note that the AGMF is not meant to function only as an emergency reserve (as in the case of the ECOWAS program). Rather, the AGMF involves a strategy of continuous procurement and offtake, with stockholding of grains based on reasonable estimates of demand from member countries. It is designed to address concerns about seasonal price variations, global price volatility and access, as well as mitigate and manage exchange rate variations. It is also intended to incentivize regional production within Africa. It is important to note that as a region-level proposal, this is essentially about stabilizing prices and moving towards greater food self-sufficiency by providing predictability, markets and incentives to both producers and consumers.

Individual countries accessing grains through the AGMF may choose to have their own national strategies for ensuring that the grain reaches the more vulnerable sections, such as retail public distribution systems, or public programs like school meals, etc., but that decision would be made by national policy makers. The regional system would ensure that national governments would be able to access food grain at a predictable price. Beyond this, regional development of storage and distribution infrastructure and expertise in the efficient management of public stocks can benefit national attempts to improve or build up public stockholding systems.

4.1 Grain trading and price support and stabilization within Africa

The first feature of the AGMF's activities would be the creation of a public stockholding system for trade within Africa that aims to stabilize prices within a narrow band around the average regional market price. This combines both direct and indirect price stabilization techniques. It involves crops like sorghum, cassava and millets, as well as other crops with similar features of predominantly African production and consumption, which can also be stored easily for a relevant period.

These crops are not significant in global trade, although they are important nutrition sources for much of the African continent, typically more valuable nutritionally than wheat and rice. These are crops that need to be incentivized for more local production and regional trade, and for which the procurement price can play an important role. Here the potential of public stockholding systems to create markets and balance deficit and surplus regions discussed in section 2 based on the examples of Brazil, China and India is instructive. Making the distinction between locally produced sorghum, millets etc., compared to imported and globally traded wheat, maize and rice is important from an ecological perspective and a price perspective. Since these crops are not heavily traded internationally but of great importance to regional production and consumption, their prices are less directly dependent on global market dynamics and lend themselves to regional price stabilization. These crops are also generally more climate resilient and have been more adaptive to various ecological changes.

At present, data for the period 2014-2023 suggest that several African countries are net importers of sorghum (South Sudan, Somalia, Eritrea, Chad, Sudan, Niger, Botswana, Mauritania) while only South Africa is a (small) net exporter and Kenya and Senegal are largely self-sufficient. There is clearly scope for encouraging greater regional production through a minimum support price that would reduce import dependence over time (details in Appendix)

The AGMF can prioritize local procurement from member countries through a minimum support price with a sufficient mark-up to encourage farmers to grow such crops (this is WTO-compatible). This would provide cultivators with a stable price that is regionally determined. Since no global reference market for these crops exists, the AGMF would serve a market-creating role for these crops with price setting power. The procurement price would need to be determined by the estimated regional average cost of production as the base, with a reasonable mark-up. If the cultivation of such crops is sought to be encouraged, this requires open-ended purchase of such crops at the specified minimum support price. Depending on market conditions and other social goals, some of this supply may be used for specific public purposes beyond price stabilization such as providing grain directly to poor households, for school meal programs, and similar uses.

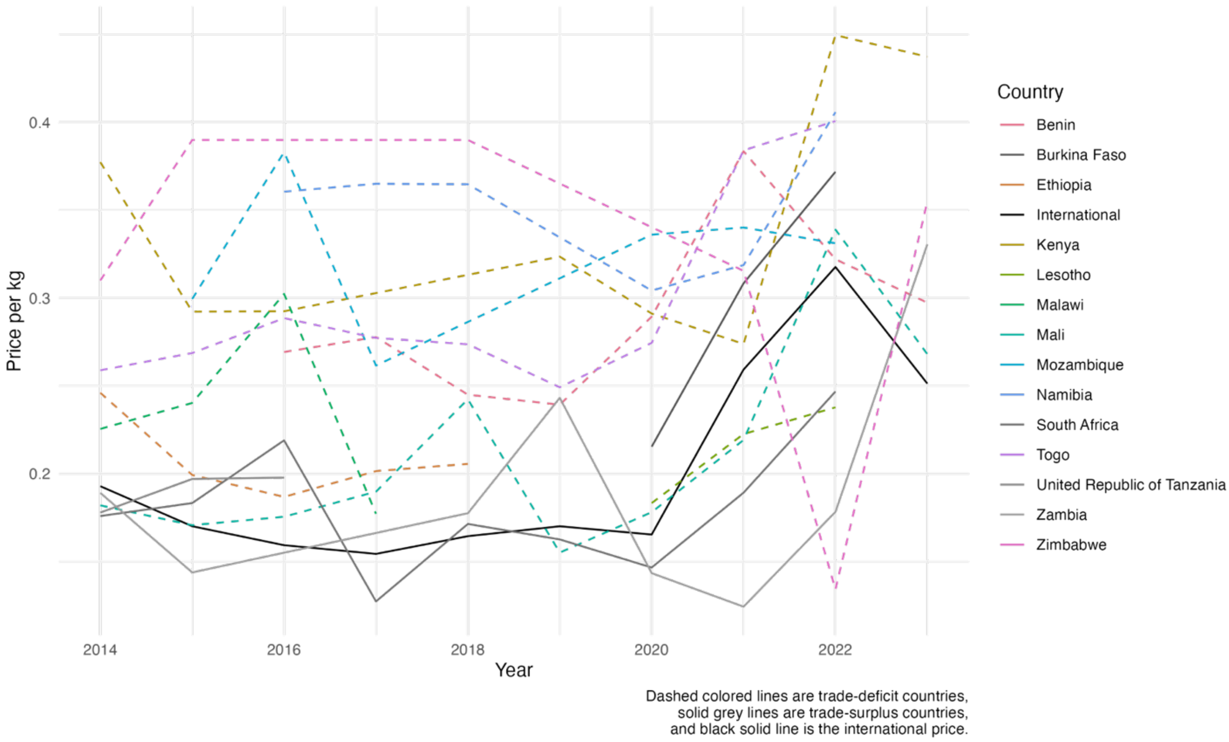
Ecological and environmental considerations, as well as local consumption preferences, need to be borne in mind. An average procurement price for the entire region could disincentivize the cultivation of certain crops if they involve excess costs in some areas and encourage new or more production in areas better suited to their cultivation. This is likely to be greatly preferable to exposure to global markets with their volatile prices and increasingly uncertain conditions, and in particular could provide small farmers with not only more price stability but also greater and more predictable market access. There is a clear advantage in ensuring effective price support for farmers in areas with future production potential for individual crops. Beyond the minimum purchase price benefitting producers, the AGMF could also open up new marketing channels, enhancing intra-African trade and incomes, and creating added benefits for regional price stability thanks to greater regional market integration.

Most countries in Africa are net importers of wheat and rice, even though several countries produce some amounts of both crops. Therefore, they are more correctly treated under the section below, which deals with public stockholding for grain imports. However, another crop which is grown and consumed in Africa but is also important in global markets is maize. Maize qualifies for special treatment because the continent contains both surplus and deficit countries and effective price stabilization could be achieved by the AGMF largely through purchases and sales within Africa – as is the case with the crops mentioned above. While many countries produce maize, it is often insufficient for local demand and so they are net importers, while by contrast South Africa is a large exporter of maize. This means that an effective procurement price and a guaranteed market could provide incentives for already existing exporters as well as for farmers in other parts of Africa to increase maize cultivation, while ensuring that the purchasers of maize across the continent have access to the crop at stable prices without facing global price volatility.

Over the period 2014-2023, 13 African countries were net importers of maize (Kenya, Zimbabwe, Nigeria, Mozambique, Eswatini, Namibia, Lesotho, Malawi, Angola, Ethiopia, Benin Togo and Mali, in descending order by volume of net imports). At the same time, over this period, 5 African countries were net exporters (South Africa, Uganda, Zambia, Tanzania and Burkina Faso in descending order of net exports). The net exports across all these countries amounted to 723,718 tons over this period, suggesting that expansion of intra-African trade along with direct price stabilization through a program like the AGMF would be feasible. This is particularly important given the high volatility in maize prices over this period, along with the fact that there appear to be counter-cyclical movements of prices across several countries, as indicated in Figure 1.

The grain thus purchased within Africa at a regional minimum purchasing price can be stored and distributed either to deficit regions/countries, over time to any countries that require it when the prices rise seasonally and in times of global price spikes when producing countries will be incentivized to sell for export into the global market. The price at which member countries can access the grain should be based on the procurement price along with carrying costs only. This reduces any financial commitment beyond the development of warehouses, transport and administrative costs. The amount of physical stockholding to be maintained will vary by crop and depend on the assessed requirements of consumption in different locations and over time.

Figure 1: Maize producer prices across African Deficit and Surplus Countries, 2014-2023



Source: FAOSTAT.

4.2. Stockholding of grain imports for price stabilization

The second feature of the AGMF relates to crops for which Africa is mostly import-dependent in global markets. This is especially important for rice and wheat, for which most African countries are net importers and thereby strongly affected by global price fluctuations and especially by price hikes. This is where the AGMF will have to be proactive in purchases from the global market in periods of relatively lower prices and store for future consumption. One advantage is that instead of individual countries approaching the global market, the AGMF as the bulk purchaser for the crop across the continent (effectively canalizing the import of these crops) could have greater market power and be able to achieve relatively cheaper and more stable supplies, especially if it is effectively managed. Once again, in this case, the price at which member states can purchase crops would be that of the intertemporally stabilized purchase price plus any external tariffs imposed by the AU, along with storage and transport costs.

There are two possibilities for dealing with such crops.

- In the first option, the AGMF would canalize all imports of predetermined crops across African member countries. It would also continuously provide the imported grain to African member states within a narrow band around the average (stabilized) world market price plus any external agreed upon African Union tariff. The level of inter-temporal stockholding would be designed to stabilize the world market price for Africa, with the volume of continuous throughput dependent on member states' import needs. In other words, member states would place their import orders to AGMF and receive the supplies accordingly, in a continuous process at relatively stable and predictable prices. This is the preferred option for effective price stabilization.

- In the second option, the AGMF would not canalize all food grain imports across all member states for the specified globally traded crops but determine the level of public stockholding from buffer stock requirements based on assessments of likely import demand from net importing countries. The supplies would ideally be purchased when world prices are low and stored in warehouses for distribution to member countries that are net importers when global prices rise. This is a more limited scheme mainly oriented towards dealing with more extreme situations of price volatility that threaten the accessibility of imports.

The difficulty with stabilizing the prices of imported food commodities is that if global prices spike, and the AGMF releases supply to bring down prices, there is a risk that private storage is exported where higher prices can be achieved or that less private imports occur since other destinations fetch higher prices. Therefore, the canalized option in combination with variable tariffs is to be preferred to avoid re-exports of stockholdings in times of price peaks. As a mechanism for extreme emergencies a price cap for imported crops modeled on the EU's gas price cap could be established that is triggered in the event of major global shocks when prices shoot above a high, periodically assessed threshold for a predefined period of time (see previous section).

Any stock holdings of globally traded crops by the AGMF could be combined with a market-based risk management strategy to ensure that if stock holdings are sold below the purchasing price, no loss is incurred. If the sales price is within a narrow band around the average (stabilized) world market price, then a swap agreement with a financial intermediary could be considered. It has been suggested by multiple authors that agencies that control or regulate imports at the national level engage in hedging (Faruqee, Coleman and Scott, 1997; Dana, Gilbert and Shim, 2006; Sarris, Conforti and Prakash, 2011). Derivative instruments are already used by multiple government marketing agencies to support floor prices for farmers (see Kang & Mahajan (2006) and World Bank (2005) for a comprehensive review of risk management tools and examples).

Given the significance of exchange rate fluctuations in many African countries, and the fact that different African currencies will be participating in this scheme, it is necessary to think of a mechanism to reduce the impact of possible exchange rate changes on the prices paid by food purchasers as much as possible. Net-food import dependent economies have been particularly vulnerable during the latest food price crisis due to a combined exposure to a spike in global food prices and a depreciation of their currency, resulting in a "double-burden" of food price inflation (UNCTAD, 2022). Amrouk (2023) shows that for net-food-import-dependent economies wheat prices in real local currency terms rose, on average, by as much as six percentage points more than the increase in world wheat prices expressed in United States dollars between June 2020 and May 2022. Moessner (2022) finds that a 10 per cent depreciation results in a two percentage points increase in food price inflation for OECD countries.

Exchange rate exposure could be managed through forward contracts in seasonal arrangements for regular procurement or exchange rate swaps with regional central banks. The purchases, once made, should ideally be denominated in terms of a benchmark currency or a weighted average of African currencies so that subsequent post-purchase currency fluctuations do not further impact on an individual member country's ability to purchase food. The depletion of reserve currency in times of a food crisis should also be avoided.

A major issue that must be prioritized relates to storage, transport and other logistics. New technologies have significantly reduced the cost and increased the potential storage time for many crops. Warehouses and silos would therefore have to be constructed or renovated with a view to reducing working capital costs and enhancing storability over the medium term, even if they involve higher upfront costs. Similarly, wastage and possible losses involved in storage and transport can be reduced sharply with periodic electronic weighing and other tracking devices that have been found to be effective elsewhere (as in some states in India) and crop-specific rollover periods for storage. Insofar as external aid is sought at all for this program, it should be for such initial investments rather than for the future continuous operations, which should be financed from within the African Union. The ideal would be for this facility to be initially financed through the African Development Bank.

Obviously, member countries would have the freedom to decide the internal distribution of the grain they purchase from the AGMF, whether through public distribution or open market sales, but both would assist in ensuring price stabilization. It is clear that in both of these cases, the AGMF procurement and distribution would have to be supplemented in individual countries (or in groups of countries with trade agreements) with a system of variable tariffs for both exports and imports, in order for price stabilization to be fully effective. The market creating role of the AGMF, especially for regionally produced crops, is most effective in combination with targeted investment in infrastructure, including road networks and storage capacity to reduce procurement costs at the stabilized price.

While the AGMF system is envisaged as an ongoing process of procurement and sales, it is important for the AGMF to be able to respond rapidly to temporary shortages and always keep in mind the need to focus on transfer of grain from surplus to deficit areas. In addition to ensuring that the volume of grain provided is adequate, the attempt should be to stabilize prices within a pre-decided narrow band.

The advantages of the AGMF stockholding system are:

1. It would provide an environment of reasonable predictability and stability for both producers and consumers of essential food for the region as a whole.

2. It would encourage more cultivation of ecologically sustainable crops in some regions because of the support price offered at procurement.
3. It would provide all member country governments with a guarantee against unduly high prices and short-term exchange rate changes impacting on the ability to access food.
4. It would reduce price shocks of essentials that affect the poor most but also impact on other prices and the general inflation level.
5. Consumers would not face sudden declines in availability or sudden trade impositions in conditions of shortage.
6. Private traders would also be allowed to function without the threat of arbitrary actions in response to shocks.
7. Farmers in surplus countries would not be badly affected by sudden or global declines in prices that affect their financial viability.
8. The medium-term goal of moving towards food sovereignty (self-sufficiency) in essential food items for Africa as a whole would be served.

4.3. The case for global price stabilization to complement regional public stockholding systems

The effectiveness of regional price stabilization schemes for globally traded crops can be supported and enhanced by global schemes towards a multi-level price stabilization system. In the aftermath of the 2007-08 crisis, a combination of virtual and physical food reserves was suggested as a mechanism to smooth price peaks for globally traded staple crops. Specifically, von Braun and Torero (2009) and Torero (2016) suggested intervening in food derivative markets if and when prices deviate from market fundamentals, thereby curbing incidences of sharp price peaks and bubbles. They outlined four major components of their virtual food reserve and intervention mechanism:

(1) The Club which is a group of high-income economies and major gain-exporting countries which commit funds for intervention; they suggested G8+5 plus some other major grain-exporting countries such as Argentina, Thailand, and Vietnam but this could be any combination of countries willing to commit the necessary funding and including major exporters.
(2) The Fund which is envisioned as a funding commitment rather than an actual fund. The committed funding can be drawn upon by a high-level technical commission when the need for intervention has been established; they estimate an approximate commitment of US$12–20 billion for the intervention to be credible.
(3) The Global Intelligence Unit which is tasked with forecasting prices on the basis of market fundamentals (physical demand, supply and storage) in the medium and long run, designing a dynamic price band, and triggering interventions if prices move significantly outside the band; they suggest the unit to be attached to an organization with existing monitoring and forecasting capacity (e.g. AMIS).

(4) The High-level Technical Commission which is appointed by the club countries on a permanent basis. The technical commission requires full independence and is responsible for deciding whether to intervene after an intervention has been triggered by the global intelligence unit.

It has been argued that the publishing of price bands by the global intelligence unit should provide guidance to market participants, thereby avoiding price developments outside the price band (von Braun and Torero, 2009). If the global intelligence unit is believed to have superior market information and if the intervention is perceived as credible by traders, the triggering of an intervention by the global intelligence unit should be sufficient to cause a reversal of the market price, making the actual intervention obsolete. Only if guidance and the threat of an intervention do not lead to market correction will an intervention be implemented, following the final decision of the autonomous technical commission. An intervention will most likely involve going short on the futures exchange (a future commitment to sell the commodity), to reduce prices that have moved beyond what can be justified by market fundamentals.

For such an intervention to be feasible, the club will need to be prepared to sell physical commodities to the market (or take delivery if the intervention involves going long to support prices that are too far below what is justified by fundamentals). Otherwise, the threat of intervention is not credible. Although forced delivery is rare as almost all futures contracts are closed before maturity, they are more likely in thin markets (i.e. markets with low liquidity which can arise in times of high uncertainty) or if traders struggle to source the physical crop elsewhere. Therefore, virtual reserves and physical reserves are jointly required for any intervention to be credible and effective. As a backup measure for extreme emergencies the Club could implement price caps using the service provider model that is triggered when global prices for essential crops shoot above a periodically assessed threshold for a predefined period of time in response to major global shocks. Ideally this would be coordinated with similar emergency price caps on the regional level.

Extending the Club membership to key commodity exchanges and clearing houses as observing members is hence advisable for the scheme to work. The Global Intelligence Unit would also require the participation of financial regulatory agencies with oversight of all food commodity derivative markets (e.g. the Financial Sector Conduct Authority of South Africa, the Securities and Exchange Board of India, Securities and Exchange Commission of Brazil, China Securities Regulatory Commission, the Commodity Futures Trading Commission of the USA, the Financial Conduct Authority of the UK, and the European Securities and Market Authority) for provision of information about position data and other trading activity. The Bank for International Settlements could coordinate regulatory agencies on standardization and collection of data. Thin markets require very little intervention to move prices, and such information is key to making decisions on the adequacy and the size of the intervention required.

However, the success of such a scheme depends on the confidence of the high-level technical commission in the market intelligence provided by the global intelligence unit. High confidence can only be achieved if private storage providers are required to report inventory levels. This could be done anonymously and with a commitment to keeping this information confidential. For publication, only aggregate storage information is required which would anonymize individual submissions. Such information must also be collected and released at a higher frequency. Recent crises have demonstrated that price spikes can emerge in a matter of weeks or months. By reducing price volatility by smoothing price peaks in times of uncertainty, second order effects can be avoided, thereby largely preventing a food price crisis emerging in the first place.

Virtual buffer stocks can only address globally traded food commodities that are referenced against a derivative market price that serves as a global benchmark. Many food commodities that are important staple foods are not globally traded. For those commodities, more localized (e.g. regional) price stabilization mechanisms as outlined in the preceding section are effective without global support and even desirable as they can be combined with other policy objectives beyond price stabilization. Nevertheless, globally traded grains are important drivers of local prices due to second-order effects. Regional grain trade facilities should therefore be part of the Club, both for reporting on storage level, but also for market-intelligence about the best possible time for replenishing stock levels.

While virtual buffer stocks are best targeted at the global level to make use of synergies across markets, they could also be targeted at the regional level. Derivative contracts have location of origin specifications included. Derivative markets which serve as benchmarks for particular crops also tend to be located in countries that are dominant producers and exporters of these crops. The “Club” could hence be organized around a derivative market which provides a regional benchmark for a crop that is an important component of the local diet. In the African context, the prices of maize and wheat traded at the Johannesburg Stock Exchange could be addressed by virtual buffer stocks. However, existing evidence suggests that prices remain closely linked to US American benchmarks, which renders an intervention less effective (Motengwe and Pardo, 2016).

The advantages of this system are:

1. The avoidance of price bubbles in food markets, thereby reducing opportunities for seller’s inflation to arise.
2. The prevention of second order effects with spillovers to other food crops, which are less globally traded.
3. The support of regional price stabilization schemes by stabilizing global reference prices, thereby allowing the regional stabilization scheme to focus on causes for endogenous volatility.
4. Preserving the orderly function of markets even in times of high uncertainty and crisis.

5. Costs and benefits of different policies and complementarities

In an age of overlapping emergencies, there is an urgent need for holistic regional and global strategies to improve food security. The resurgence of global hunger and food insecurity in recent years following decades of progress demonstrates the fragility of the global food system (FAO *et al.*, 2024). Climate change, conflicts, and an increasingly uncertain geopolitical environment are increasing the risk of food supply shocks while undermining countries' abilities to rely on international trade to smooth increasingly frequent domestic harvest failures. At the same time, chronic underdevelopment and economic fragility continue to limit access to adequate nutrition for millions. In this context, policymakers at regional and global levels must come together to formulate pragmatic but comprehensive strategies that address immediate food price instability and lay the groundwork for a more resilient, equitable, and sustainable global food system.

Comprehensive food security strategies require a mix of complementary policies that both directly and indirectly stabilize food commodity prices. In an era of frequent trade and supply shocks, direct price stabilization instruments such as buffer stocks play a critical role in addressing short-term market imbalances and mitigating crisis-induced price distortions. When well-designed, public stockholding systems and complementary tools can also enhance the effectiveness of long-term structural and institutional reforms aimed at indirectly achieving long-run price stability and sustainable cultivation practices. Such reforms include improving market transparency and regulation, reducing market concentration, strengthening market integration, incentivizing more ecologically viable crops and agricultural techniques and increasing supply resilience. Taken together, these policies reduce the incidence of supply shocks today while increasing the responsiveness of agricultural markets to imbalances going forward. This report has reviewed a range of policy instruments, including market design and regulation tools (e.g., taxes, subsidies, tariffs, trade agreements, and competition policy), public market participation (e.g., physical and virtual buffer stocks, public procurement of food for vulnerable populations – including at minimum purchase prices, and infrastructure investment), and targeted direct price interventions such as temporary price caps as an emergency tool of last resort.

The selection of an effective policy mix must account for the specific characteristics of different commodities and must be adapted at suitable levels of governance including the local, national, regional and global levels. To support evidence-based decision-making, the following four-step framework is proposed to guide policymakers in identifying and evaluating the most appropriate combination of interventions:

Step 1: Diagnosing volatility drivers, structural and institutional constraints, and short-run and long-run policy objectives. The first step begins with identifying key food staples and primary sources of nutrition, followed by an analysis of the factors driving current and historical price instability—whether domestic, international, or linked to trade disruptions—and mapping potential future vulnerabilities. An evaluation of institutional and structural impediments—such as power imbalances in markets and shortcomings of storage systems—can help to identify opportunities for long-term market regulation and integration. Particular attention should also be paid to over-reliance on specific crops, high degrees of market concentration and to regional climate-related risks, both of which underscore the need to enhance supply resilience.

It is important to create synergies between national, regional and international strategies for food security. Regional approaches benefit from economies of scale, while trade enables diversification of harvest risks and promotes ecological sustainability and climate resilience by allowing crops to be produced in the areas best suited to their cultivation. Building a resilient and diverse global food system therefore requires coordinated action at national, regional and international levels

Step 2: Holistic evaluation of short- and long-run impacts of direct and indirect price stabilization techniques, their feasibility and costs. Following the identification of policy objectives, policymakers should undertake a holistic evaluation of expected impacts, feasibility and costs to determine the most effective combination of tools. This assessment must ensure comparability across alternatives—avoiding mismatched comparisons—and consider both direct impacts and broader strategic fit. For example, a region may consider implementing a public stockholding facility that stabilizes the price of regionally traded crops and also incentivizes regional production by using public procurement for food aid to raise the lower bound stabilization price above what would be indicated by a market-neutral price stabilization approach. A holistic evaluation of this public stockholding system must compare the cost-effectiveness of the whole range of impacts of this instrument (i.e. price stabilization, food sovereignty, food security of vulnerable groups) to the sum of the costs of a comparable producer subsidy (input- or output-price subsidies, hectare-based lump sum subsidies, etc.), a comparable food subsidy and emergency reserve system, and alternative direct price stabilization measures. A holistic assessment of the feasibility of the implementation of price stabilization similarly has to account for the whole range of anticipated impacts. For example, public stockholding systems require large initial investments in storage and distribution infrastructure which can make them appear less feasible or too slow. But the assessment of the feasibility and pace of this intervention has to be based on a comparison with other policy instruments that achieve the same infrastructure development goals necessary for enhanced market integration and food sovereignty, rather than simply with other instruments that pursue short-run stabilization. Measures that can achieve short-run price stabilization in an ad hoc fashion are important complements to such a strategy in the interim.

Step 3: Aligning incentives, ensuring effective implementation, and securing sustainable financing. The design of regional and global price stabilization policies must align incentive structures across producer and consumer countries, as well as among member states at different income levels, to ensure broad political support and discourage defection. While negotiations over contributions are inevitable, it is essential to emphasize the shared benefits of coordinated action: regional market integration benefits both deficit and surplus countries; price shocks harm both producers and consumers; instability and stagnation in one world region undermines demand for products from other regions; ecological degradation threatens food system resilience worldwide; and collective bargaining power in the face of powerful market players and economies of scale can only be realized through cooperation. Regional buffer stock systems that rely on continuous market participation are unlike regional emergency reserves, which can devolve into regional solidarity mechanisms if the countries that most frequently rely on the reserve to mitigate domestic food crises are less able or willing to replenish their national supplies or contribute to regional stocks. By contrast, price stabilization measures can deliver symmetric benefits across member states and are embedded in broader market integration and agricultural development strategies.

To maximize credibility and efficiency, direct price stabilization strategies should be managed by an independent agency operating under a clear mandate with dedicated budget lines. Market participation must be predictable and sensitive to market dynamics to avoid crowding out private investment in storage and trade and support market regulation and integration. Policy implementation should adhere to holistic cost-effectiveness considerations, drawing on best practices and guidance outlined in this report and recent reports on related topics (World Bank, FAO and WFP, 2025). Sustainable financing arrangements should reflect both the strategic mandate and the broader developmental co-benefits of the intervention. International collaboration around capacity-building, knowledge-sharing, market intelligence and technology transfer will be critical to long-term success.

Step 4: Establishing robust monitoring, evaluation, and communication mechanisms. Effective monitoring and evaluation are essential to ensure accountability and improve policy performance. Clear, timely, and transparent communication helps to prevent adverse market reactions and minimizes unintended impacts on producers, traders, processors, and food security in other regions. Policy performance should be regularly assessed against core objectives: stabilizing essential commodity prices, enhancing commodity market functioning, improving food access and increasing the diversity and resilience of the food system. Each policy tool should be evaluated considering first its primary mandate and second its co-benefits and should be benchmarked against feasible comparable alternative instruments. Positive spillovers and complementarities between public and private storage technologies and trading infrastructures should be explicitly identified and encouraged where desirable in relation to the policy objectives.

References

AGRI (2024) *Research for the AGRI committee: the role of commodity traders in shaping agricultural markets*. Brussels: European Parliament. Available at: https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU(2024)747276 (Accessed: June 27, 2025).

Amrouk, E. (2023) *Food outlook – biannual report on global food markets*. FAO. Available at: https://doi.org/10.4060/cc3020en.

Arias, D. and Caballero, J. (2015) *Bahia state, Brazil: agricultural sector risk assessment*. Washington, D.C.: The World Bank. Available at: https://documents1.worldbank.org/curated/en/400771467998231000/pdf/100992-WP-P150895-PUBLIC-Box393257B.pdf.

Baffes, J. (2024) "Global food price inflation: trends, channels, and insights." *Workshop on "Food Prices and Forecasting", 2024 AAEA Annual Meetings*, New Orleans, 31 July.

Barrett, C.B. and Mutambatsere, E. (2016) "Agricultural markets in developing countries," in *The New Palgrave Dictionary of Economics*. London: Palgrave Macmillan UK.

Barrientos, S. *et al.* (2011) "Decent work in global production networks: framing the policy debate," *International Labour Review*, 150(3–4), pp. 297–317. Available at: https://doi.org/10.1111/j.1564-913X.2011.00118.x.

Birkmann, J. *et al.* (2022) "Poverty, livelihoods and sustainable development," in *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]*. Cambridge, UK and New York, NY, USA: Cambridge University Press, pp. 1171–1274.

von Braun, J. and Torero, M. (2009) "Implementing physical and virtual food reserves to protect the poor and prevent market failure." Available at: https://hdl.handle.net/10568/161885 (Accessed: June 26, 2025).

Cashin, P., McDermott, C.J. and Scott, A. (2002) "Booms and slumps in world commodity prices," *Journal of Development Economics*, 69(1), pp. 277–296.

Clapp, J. *et al.* (2022) "Viewpoint: the case for a six-dimensional food security framework," *Food Policy*, 106, p. 102164. Available at: https://doi.org/10.1016/j.foodpol.2021.102164.

Clapp, J. (2023) "Concentration and crises: exploring the deep roots of vulnerability in the global industrial food system," *The Journal of Peasant Studies*, 50(1), pp. 1–25. Available at: https://doi.org/10.1080/03066150.2022.2129013.

Dana, J., Gilbert, C.L. and Shim, E. (2006) "Hedging grain price risk in the SADC: case studies of Malawi and Zambia," *Food Policy*, 31(4), pp. 357–371. Available at: https://doi.org/10.1016/j.foodpol.2006.03.007.

Danau, A., Flament, J. and van der Steen, D. (2011) *Choosing the right strategies for increasing farmers' market power. Instruments put to the test*. Brussels: Collectif Strategies Alimentaires asbl.

Dao, M.C. *et al.* (2023) "Unconventional fiscal policy in times of high inflation," *International Monetary Fund* [Preprint]. Available at: https://www.imf.org/en/Publications/WP/Issues/2023/08/31/Unconventional-Fiscal-Policy-in-Times-of-High-Inflation-537454 (Accessed: July 9, 2025).

Dorin, B. and Landy, F. (2004) *Agriculture et alimentation de l'inde: les vertes années (1947-2001)*. Paris: INRA Editions. Available at: https://journals.openedition.org/developpementdurable/1241 (Accessed: July 6, 2025).

ECOWAS (2021) *The West African food security storage system - in brief*. ECOWAS Commission. Available at: https://ecowap.ecowas.int/media/ecowap/file_document/2021_The_West_African_Food_Security_Storage_System_IN_BRIEF_EN.pdf.

ECOWAS Commission (2021) "The West African food security storage system: summary of lessons learnt and prospects." ECOWAS. Available at: https://ecowap.ecowas.int/media/ecowap/file_document/2021_The_West_African_Food_Security_Storage_System._Summary_of_less_x16zR2T.pdf.

EM-DAT (2024) "The international disaster database. Centre for Research on the Epidemiology of Disasters." Available at: www.emdat.be.

Ethiopian Business Review (2024) *Revisiting Ethiopia's strategic food reserve system*, *https://ethiopianbusinessreview.net*. Available at: https://ethiopianbusinessreview.net/ (Accessed: July 7, 2025).

European Commission (2018) *Food reserves using food reserves to enhance food and nutrition security in developing countries. Case studies*. Brussels: Directorate-General for International Cooperation and Development.

European Commission (2023) *State of the energy union report 2023*. European Commission. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:b27b8b93-725d-11ee-9220-01aa75ed71a1.0001.02/DOC_1&format=PDF.

European Commission (2024) *Market measures explained*. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/market-measures/market-measures-explained_en (Accessed: February 28, 2024).

European Commission (2025) *AggregateEU*. Available at: https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform/aggregateeu_en (Accessed: July 9, 2025).

Ezekiel, M. (1938) “The cobweb theorem,” *The Quarterly Journal of Economics*, 52(2), pp. 255–280.

FAO (2021) *Public food stockholding a review of policies and practices*. Rome: Food and Agriculture Organization. Available at: https://doi.org/10.4060/cb7146en.

FAO *et al.* (2024) *The state of food security and nutrition in the world 2024- financing to end hunger, food insecurity and malnutrition in all its forms*. Rome: FAO. Available at: https://doi.org/10.4060/cd1254en.

FAO (2025) *FAOSTAT*. Available at: https://www.fao.org/faostat/en/#data/TCL (Accessed: July 9, 2025).

Faruqee, R., Coleman, J.R. and Scott, T. (1997) “Managing price risk in the Pakistan wheat market,” *The World Bank Economic Review*, 11(2), pp. 263–292. Available at: https://doi.org/10.1093/wber/11.2.263.

Galtier, F. (2011) *What can the international community do to help developing countries manage food price instability?* CIRAD – UMR MOISA. Available at: https://agritrop.cirad.fr/568970/2/document_568970.pdf.

Galtier, F. and Vindel, B. (2013) “Managing food price instability in developing countries,” *A Critical Analysis of Strategies and Instruments. Paris, Agence Française De Développement (AFD)* [Preprint].

Ghosh, J., Heintz, J. and Pollin, R. (2012) “Speculation on commodities futures markets and destabilization of global food prices: exploring the connections,” *International Journal of Health Services*, 42(3), pp. 465–483.

Gouel, C. (2012) “Agricultural price instability: a survey of competing explanations and remedies,” *Journal of Economic Surveys*, 26(1), pp. 129–156.

Gouel, C. and Legrand, N. (2022) “The role of storage in commodity markets: indirect inference based on grains data,” *HAL Working Paper*, No. hal-03809825.

Government of Malawi (2020) *National agriculture strategy*. Lilongwe, Malawi.

Gulati, A. *et al.* (2023) “Is restricting exports and imposing stocking limits the optimal policy?” Policy Brief No. 15. New Delhi: Indian Council for Research on International Economic Relations.

Gupta, S. *et al.* (2017) “Distressed selling by farmers: model, analysis, and use in policy-making,” *Production and Operations Management*, 26(10), pp. 1803–1818. Available at: https://doi.org/10.1111/poms.12726.

Headey, D. (2011) “Rethinking the global food crisis: the role of trade shocks,” *Food Policy*, 36(2), pp. 136–146. Available at: https://doi.org/10.1016/j.foodpol.2010.10.003.

HLPE-FSN (2020) “Food security and nutrition: building a global narrative towards 2030”. The High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Available at https://openknowledge.fao.org/server/api/core/bitstreams/8357b6eb-8010-4254-814a-1493faaf4a93/content.

Huang, J. and Yang, G. (2017) “Understanding recent challenges and new food policy in China,” *Global Food Security*, 12, pp. 119–126. Available at: https://doi.org/10.1016/j.gfs.2016.10.002.

van Huellen, S. *et al.* (2024) “The political economy of pricing and price risk in Ghana’s cocoa marketing system.” Available at: https://research.manchester.ac.uk/en/publications/the-political-economy-of-pricing-and-price-risk-in-ghanas-cocoa-m (Accessed: June 27, 2025).

IATP (2023) “Buffer food stocks for addressing volatility and food security in developing countries – trends and future direction,” *Institute for Agriculture and Trade Policy* [Preprint].

IFPRI (2024) *Leveraging digital systems for food security in North Africa*. Washington, D.C.: International Food Policy Research Institute.

International Gas Union (2025) *2025 World LNG report*. Available at: https://www.igu.org/press-releases/2025-world-lng-report-press-release (Accessed: July 9, 2025).

IPC - IG (2013) *Structured demand and smallholder farmers in Brazil: the case of PAA and PNAE*. Brasilia: International Policy Centre for Inclusive Growth, United Nations Development Programme. Available at: https://www.oneplanetnetwork.org/knowledge-centre/resources/structured-demand-and-smallholder-farmers-brazil-case-paa-and-pnae (Accessed: July 2, 2025).

IPCC (2022) “Summary for policymakers,” in *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]*. Cambridge, UK and New York, NY, USA: Cambridge University Press, pp. 3–33.

Kaldor, N. (1976) “Inflation and recession in the world economy,” *The Economic Journal*, 86(344), pp. 703–714.

Kaldor, N. (1980) “On the economics of the international wheat agreement (1952),” in N. Kaldor (ed.) *Essays on Economic Policy II: Vol. IV of Collected Economic Essays of Nicholas Kaldor*. New York, NY: Holmes and Meier.

Kang, M.G. and Mahajan, N. (2006) “An introduction to market-based instruments for agricultural price risk management,” *FAO publication* [Preprint]. Available at: https://openknowledge.fao.org/handle/20.500.14283/ap308e (Accessed: July 1, 2025).

Keynes, J.M. (1938) “The policy of government storage of food-stuffs and raw materials,” *The Economic Journal*, 48(191), pp. 449–460.

Kornhuber, K. *et al.* (2023) “Risks of synchronized low yields are underestimated in climate and crop model projections,” *Nature Communications*, 14(1), pp. 1–10.

Krebs, T. and Weber, I.M. (2024) “Can price controls be optimal? The economics of the energy shock in Germany,” *IZA Institute of Labor Economics Discussion Paper Series*, IZA DP No. 17043. Available at: https://docs.iza.org/dp17043.pdf.

Kumar, R. and Raju, K.V. (2018) “Leveraging policies for self-sufficiency in pulses in India,” *Journal of Development Policy and Practice*, 3(2), pp. 155–178. Available at: https://doi.org/10.1177/2455133318772408.

Lamm, R.M. (1981) “Prices and concentration in the food retailing industry,” *The Journal of Industrial Economics*, 30(1), pp. 67–78. Available at: https://doi.org/10.2307/2098087.

Levin, J.H. (1985) “Does leaning against the wind improve exchange-rate performance?,” *Journal of International Money and Finance*, 4(1), pp. 135–149. Available at: https://doi.org/10.1016/0261-5606(85)90010-5.

Lloyd, T. (2017) “Forty years of price transmission research in the food industry: insights, challenges and prospects,” *Journal of Agricultural Economics*, 68(1), pp. 3–21. Available at: https://doi.org/10.1111/1477-9552.12205.

Manduna, C. (2024) *Buffer food stocks for addressing volatility and food security in developing countries – trends and future direction*. Available at: https://www.iatp.org/buffer-food-stocks-developing-countries-trends (Accessed: July 2, 2025).

Ministry of Commerce (2002) “*Provisional Measures for the Administration of Tariff Rate Quotas on Fertilizer Imports*.” Beijing, China. Available at: https://m.mofcom.gov.cn/article/swfg/fgdwmy/201101/20110107352189.shtml (Accessed: July 7, 2025).

Moessner, R. (2022) “Exchange rate pass-through to food and energy consumer price inflation.” Rochester, NY: Social Science Research Network. Available at: https://doi.org/10.2139/ssrn.4315991.

MofA (2022) *Annual report on agricultural sector performance*. Accra, Ghana: Ministry of Food and Agriculture, Government of Ghana.

Motengwe, C. and Pardo, A. (2016) “Major international information flows across the safex wheat market,” *South African Journal of Economics*, 84(4), pp. 636–653. Available at: https://doi.org/10.1111/saje.12128.

NAFCO (2023) *Operational overview and strategic plan 2023–2027*. Accra, Ghana: National Food Buffer Stock Company.

National Food and Strategic Reserves Administration (2024) *Nationwide grain purchases exceeded 400 million tons in 2023*. Beijing, China. Available at: https://www.lswz.gov.cn/html/mtsy2024year/2024-01/09/content_279184.shtml.

NBS (2025) *National data*, *National Bureau of Statistics of China*. Available at: https://data.stats.gov.cn/english/easyquery.htm?cn=A01 (Accessed: July 10, 2025).

NDRC (2021) “*Refine the mechanism for adjusting state pork reserves and prepare a plan to ensure supply and stabilize prices in the pork market*.” National Development and Reforms Commission. Beijing, China. https://www.ndrc.gov.cn/xxgk/zcfb/tz/202106/t20210609_1282866.html

Nehring, R., Miranda, A. and Howe, A. (2017) “Making the case for institutional demand: supporting smallholders through procurement and food assistance programmes,” *Global Food Security*, 12, pp. 96–102. Available at: https://doi.org/10.1016/j.gfs.2016.09.003.

Niti Aayog (2017) *Report on buffer stock norms for pulses. New Delhi: Government of India*. Available at: https://www.niti.gov.in/sites/default/files/2023-02/Buffer_Stock_Norms_of_Pulses.pdf.

Obstfeld, M. and Rogoff, K. (2000) “The six major puzzles in international macroeconomics: is there a common cause?,” *NBER Macroeconomics Annual*, 15, pp. 339–390. Available at: https://doi.org/10.2307/3585403.

OECD-FAO (2024) *OECD-FAO Agricultural outlook 2024-2033*. Paris: OECD. Available at: https://doi. org/10.1787/4c5d2cfb-en.

Rashid, S. and Lemma, S. (2011) “Strategic grain reserves in Ethiopia,” Discussion Paper 01054.

Sandri, D. (2023) “FX intervention to stabilize or manipulate the exchange rate? Inference from profitability,” *Journal of International Money and Finance*, 131, p. 102786. Available at: https://doi.org/10.1016/j.jimonfin.2022.102786.

Sarris, A., Conforti, P. and Prakash, A. (2011) “The use of organized commodity markets to manage food import price instability and risk,” *Agricultural Economics*, 42(1), pp. 47–64. Available at: https://doi.org/10.1111/j.1574-0862.2010.00463.x.

Smith, J., Banda, M. and Phiri, T. (2023) “Crop diversification strategies and nutrition outcomes in malawi: a policy perspective,” *Journal of Agricultural Economics*, 74(2), pp. 198–214.

State Council (1994) “*Notice of the State Council on Reforming the Circulation System of Fertilizers and Other Agricultural Production Materials*”. Beijing, China. Available at: https://www.gov.cn/zhengce/content/2015-12/31/content_10541.htm (Accessed: July 7, 2025).

State Council (2010) “Tariff Commission of the State Council - Notice on the Implementation Plan for Tariffs in 2011”. Beijing, China. Available at: https://www.gov.cn/zwgk/2010-12/15/content_1766030.htm (Accessed: July 7, 2025).

State Council (2019) *2019 Adjustment Plan for Provisional Import and Export Tariff Rates and Related Matters*. Beijing, China. Available at: https://www.gov.cn/xinwen/2018-12/24/content_5351532.htm.

The Economic Daily (2024) *Improve the Grain Price Formation Mechanisms. Beijing China*. Available at: http://www.news.cn/food/20240808/5250d346c000456f991eed8340517ac6/c.html (Accessed: July 9, 2025).

Timmer, C.P. (1997) “Building efficiency in agricultural marketing: The long-run role of BULOG in the Indonesian food economy,” *Journal of International development*, 9, pp. 133–146.

Torero, M. (2016) “Alternative mechanisms to reduce food price volatility and price spikes: policy responses at the global level,” in *Food Price Volatility and Its Implications for Food Security and Policy*. Springer, Cham, pp. 115–138. Available at: https://doi.org/10.1007/978-3-319-28201-5_6.

UNCTAD (2022) *A double burden. The effects of food price increases and currency depreciations on food import bills*. Available at: https://unctad.org/publication/double-burden-effects-food-price-increases-and-currency-depreciations-food-import-bills.

U.S. Department of the Treasury (2025) *Phase two of the price cap on Russian oil: two years after Putin’s invasion* |. Available at: https://home.treasury.gov/news/featured-stories/phase-two-of-the-price-cap-on-russian-oil-two-years-after-putins-invasion (Accessed: July 9, 2025).

USDA (2024) *Food Distribution | USDA*, *U.S. Department of Agricultural*. Available at: https://www.usda.gov/topics/food-and-nutrition/food-distribution (Accessed: February 28, 2024).

Wallinga, D. (2009) “Today’s food system: how healthy is it?,” Journal of Hunger & Environmental Nutrition, 4(3–4), pp. 251–281. Available at: https://doi.org/10.1080/19320240903336977.

Weber, I. (2021) *How China escaped shock therapy: the market reform debate*. Oxfordshire: Routledge.

Weber, I.M. *et al.* (2025) “Implicit coordination in sellers’ inflation: how cost shocks facilitate price hikes,” *Structural Change and Economic Dynamics*, 74, pp. 690–712. Available at: https://doi.org/10.1016/j.strueco.2025.04.005.

Weber, I.M. and Schulken, M. (2024) *Towards a post-neoliberal stabilization paradigm: revisiting international buffer stocks in an age of overlapping emergencies based on the case of food*. 602. Political Economy Research Institute. Available at: https://peri.umass.edu/images/publication/WP602c.pdf.

World Bank (2005) *Managing food price risks and instability in an environment of market liberalization*, *World Bank*. Available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/en/395421468313515237 (Accessed: July 1, 2025).

World Bank (2012) *Using public foodgrain stocks to enhance food security*. 71280-GLB. Washington D.C.: The World Bank. Available at: http://documents.worldbank.org/curated/en/412711468336603745/Using-public-food-grain-stocks-to-enhance-food-security.

World Bank, FAO and WFP (2025) *Strengthening strategic grain reserves to enhance food security*. Washington, D.C.: The World Bank.

World Food Programme (2023) *Ethiopia annual country report* |. Available at: https://www.wfp.org/operations/annual-country-report?operation_id=ET02&year=2023#/26253 (Accessed: July 7, 2025).

Wright, B.D. (2012) “International grain reserves and other instruments to address volatility in grain markets,” *The World Bank Research Observer*, 27(2), pp. 222–260.

Appendix

Trade-Deficit and Trade-Surplus Countries in Africa for Major Food Crops

Table 1. Trade-Deficit Countries in Africa for Top Producing Crops: 2014-2023 annual averages

Product	Country	Production (t)	Imports (t)	Exports (t)	Net Trade (t)
Maize (corn)	Angola	2601514	46053	247	-45807
	Benin	1548050	2756	425	-2331
	Eswatini	92556	136160	341	-135819
	Ethiopia	9600512	24128	5014	-19114
	Kenya	3591980	502827	5159	-497668
	Lesotho	79151	68796	231	-68566
	Malawi	3417726	53364	5991	-47373
	Mali	3228263	3336	3213	-123
	Mozambique	1588260	154962	8933	-146029
	Namibia	67349	134053	432	-133621
	Nigeria	11417819	232211	5608	-226603
	Togo	889210	1196	467	-729
	Zimbabwe	1032253	390178	1972	-388206
Millet	Gambia	53390	79	0	-79
	Namibia	46056	2486	3	-2482
	Niger	3418804	7065	738	-6327
Rice	Gambia	43573	181	0	-181
	Guinea	2506952	757	53	-705
	Guinea-Bissau	187946	203	0	-203
	Liberia	275787	55	0	-55
	Madagascar	4184733	97	0	-97
	Mali	2766909	205	33	-173
	Mauritania	318322	180	0	-180
	Senegal	1145040	370	193	-177
	Sierra Leone	1153948	210	2	-209
Sorghum	Botswana	41664	8235	1912	-6323
	Chad	936459	25000	0	-25000
	Eritrea	140000	58016	0	-58016
	Mauritania	77044	167	0	-167
	Niger	1818077	8711	31	-8680

	Somalia	105500	58317	25	-58293
	South Sudan	677175	103828	0	-103828
	Sudan	4359363	105051	83258	-21793
Sugar cane	Cabo Verde	25109	3	0	-3
	Democratic Republic of the Congo	2300118	7	0	-7
	Egypt	15671057	2957	358	-2599
	Eswatini	5570408	2	1	-1
	Liberia	273953	1	0	-1
	Mozambique	2952767	1	0	-1
Wheat	Algeria	2860276	7539585	333	-7539253
	Egypt	9134597	10025424	7464	-10017960
	Ethiopia	5110319	1321512	1092	-1320421
	Morocco	5133027	4805887	89	-4805798
	Tunisia	1075686	1890207	708	-1889500

Source: FAOStat

Table 2. Trade-Surplus Countries in Africa for Top Producing Crops: 2014-2023 annual averages

Product	Country	Production (t)	Imports (t)	Exports (t)	Net Trade (t)
Maize (corn)	Burkina Faso	1702892	1340	44129	42789
	South Africa	13963074	531736	2332516	1800780
	Uganda	3171863	23624	257856	234232
	United Republic of Tanzania	6569284	49494	201035	151541
	Zambia	2982343	1794	208160	206365
Millet	Chad	678319	17	50	33
	Mali	1779350	398	2651	2254
Sorghum	Burkina Faso	1724380	95	8617	8522
Sugar cane	Kenya	6411510	0	2	2
	Senegal	1258582	0	0	0
	South Africa	17489741	0	46	45
	Sudan	5398378	0	22	22
	Uganda	5507365	1	6077	6077
	Zambia	4447790	8	20	12
	Zimbabwe	4978663	0	40	40

Source: FAOStat