Food and Agriculture Organization of the United Nations

TRADE AND SUSTAINABLE DEVELOPMENT GOAL 2 – Policy options and their trade-offs

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TRADE AND SUSTAINABLE DEVELOPMENT GOAL 2 – Policy options and their trade-offs

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Foreword

Sustainable Development Goal (SDG) 2 committed governments to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture", with five specific targets that cover: ending hunger; ending all forms of malnutrition; doubling the agricultural productivity and incomes of small-scale food producers; ensuring sustainable food production systems; and maintaining genetic diversity.

According to the most recent estimates, nearly 690 million people, or 8.9 percent of the world population, are undernourished and 10 percent of global population live in extreme poverty, most of whom are engaged in the agricultural sector. At the same time, agricultural production systems face a number of environmental challenges related to soil health, greenhouse gas (GHG) emissions, land conversion, biodiversity loss, water use and pollution and material footprint.

In this context, trade is identified as a "means of implementation", or a mechanism for achieving the SDGs, under Agenda 2030. Specifically under SDG 2, SDG 2b sets out trade as a means of implementation, alongside increased investment and proper functioning commodity markets. This commits countries to *"correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round."*

In some of the areas addressed by the SDG 2 targets, markets for food and agriculture may be particularly affected by government interventions such as certain types of agricultural subsidies, export and import restrictions that can distort how these markets function. On the other hand, government interventions may be required to address market failures, for example to protect biodiversity, minimize damage to the climate, or achieve certain social outcomes.

This report seeks to identify the critical trade-offs associated with different policy measures that can affect trade and markets, their implications for the achievement of SDG 2 targets, and the possible priorities for action. The broader aim is to support policy makers in the design and implementation of policies that are appropriate for their contexts. It finds that, while "win-win" solutions are possible, it is important that policy-makers identify and recognize areas in which

difficult choices exist between competing policy objectives, and also identify possible ways in which these can be addressed.

In this regard, monitoring progress towards SDG 2 will be key to ensuring that the goals and targets are achieved within the time-frame that leaders have agreed. In the area of trade and markets, governments will need to go beyond a narrow focus on the elimination of agricultural export subsidies, and take a broader approach to indicators of progress that encompasses the range of measures that affect trade and markets in the global food system.

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Acronyms

CGIAR	former Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
GHG	Greenhouse gas
ICT	Information and communication technology
ICTSD	International Centre for Trade and Sustainable Development
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
IPR	Intellectual Property Rights
LDCs	Least Developed Countries
ODS	Ozone Depleting Substances
R&D	Research and Development
RTAs	Regional Trade Agreements
SDGs	Sustainable Development Goals
SPS	Sanitary and Phytosanitary
TRQs	Tariff Rate Quotas
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
VSS	Voluntary Sustainability Standards
WFP	World Food Programme
WHO	World Health Organization
WTO	World Trade Organization

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2
ZERO
HUNGER

1. Introduction

In September 2015, world leaders meeting in New York agreed to seventeen Sustainable Development Goals (SDGs), setting out overall objectives and specific targets to be met by 2030 at the latest. Among these, SDG 2 committed governments to "end hunger, achieve food security and improved nutrition, and promote sustainable agriculture". The numerous interconnections between the different goals and targets require a holistic approach. At the same time, the scope and complexity of each goal merits an in-depth examination of its policy implications.

Five specific targets set out the level of ambition of SDG 2 in particular areas (Figure 1): in summary, these cover ending hunger; ending all forms of malnutrition; doubling the agricultural productivity and incomes of small-scale food producers; ensuring sustainable food production systems; and maintaining genetic diversity.

The SDG 2 targets are to be achieved in the context of an increasingly globalized food system, with growing trade-dependence at both the upstream and downstream segments of the farm-to-fork cycle. The value of agricultural trade increased from USD 570 billion in 2000 to USD 1.6 trillion in 2016 (in nominal prices); that is, at a rate of 6 percent per annum (FAO, 2018a).

Moreover, the increasing importance of emerging economies in agricultural trade has been a major development since 2000. China's share of world imports increased from 2.3 percent in 2000 to 8.2 percent in 2016; that of other emerging economies, such as India, Indonesia, and the Russian Federation together increased from 3.4 percent to 5.2 percent; while developed economies such as the European Union and Japan experienced a decline in their share of total global import value, although they remain significant importers (FAO, 2018a). Similar trends can be observed for exports, where developed economies like the European Union, the United States, Australia and Canada remain significant exporters, but their share in total exports declined by ten percentage points from 68.5 percent in 2000 to 58.0 percent in 2016, while that of emerging economies increased, with Brazil, China, India and Indonesia together increasing from 8.5 percent of global export value in 2000 to 14.5 percent in 2016 (FAO, 2018a).

Growing agricultural imports by developing countries have been fuelled by rapid economic growth and increases in per capita incomes, while the growth in agricultural exports from developing countries has been driven by growing agricultural productivity. A key feature of the increased participation of middle- and low-income countries in global agricultural markets has been the rapid growth of South-South trade. The share of imports by middle- and low-income countries sourced from other middle- and low-income countries increased from about 42 percent in 2000 to about 54 percent in 2015, with exports following a similar trend (FAO, 2018a). The structure of agricultural trade and investment is expected to continue evolving, with increasing levels of vertical coordination, consolidation of the supply base, and increased dominance of large multinational food companies in global agricultural value chains (Charveriat, 2018).

Figure 1. Sustainable Development Goal 2 Targets

End hunger; achieve food security and improved nutrition and promote sustainable agriculture

Targets

TARGET 2.1 By 2030, **end hunger** and **ensure access** by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round.

TARGET 2.2 By 2030, **end all forms of malnutrition**, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

TARGET 2.3 By 2030, **double the agricultural productivity and incomes of small-scale food producers**, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

TARGET 2.4 By 2030, **ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production**, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

TARGET 2.5 By 2020, **maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals** and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

Means of Implementation Targets

TARGET 2.A **Increase investment**, including through enhanced international cooperation, **in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks** in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.

TARGET 2.B **Correct and prevent trade restrictions and distortions in world agricultural markets**, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.

TARGET 2.C **Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information**, including on food reserves, in order to help limit extreme food price volatility.

It is in this context that trade is identified as a "means of implementation" under Agenda 2030; in other words, it is a mechanism for achieving broader public policy goals, rather than being an end in itself. All the means of implementation, including trade, are clustered under SDG 17,[1] although specific trade-related targets are also identified under a number of SDGs, such as SDG 8, SDG 10 and SDG 14.

In the area of food security, nutrition and sustainable agriculture, SDG 2.b sets out trade as a means of implementation, alongside increased investment (SDG target 2.a) and properly functioning commodity markets (SDG target 2.c). SDG 2.b commits countries to:

> *"Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round".*[2]

In some of the areas addressed by the SDG 2 targets, markets for food and agriculture may be particularly affected by government interventions that distort how these markets function – such as, for example, distortions arising from certain types of agricultural subsidies. However, in others, market failures may mean that basic public goods are not adequately delivered by market forces – requiring governments to step in more actively, for example to protect biodiversity or to minimize damage to the climate. The commitments in SDG 2.b on trade therefore need to be seen in conjunction with those in SDG 2.a and SDG 2.c, which relate directly to areas in which governments need to become more involved in order to achieve the level of ambition set out under Agenda 2030.

More generally, SDG 2.b is coherent with the broadly positive view of trade under Agenda 2030, including that set out under SDG 17.10. This commits governments to:

> *"Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda."*[3]

As governments embark on designing and implementing policies to achieve their SDG 2 commitments, it is important to recognize that each of the targets under SDG 2, as well as trade itself, often constitute distinct policy priorities in many countries. The optimal mix of policies (including trade and market-related policies) that are required to address hunger and ensure access to food for the poor, for example, are likely different from, and potentially conflictual

[1] SDG 17 commits governments to "strengthen the means of implementation and revitalize the global partnership for sustainable development." Trade is one among five broad categories of targets in SDG 17; the others being finance, technology, capacity-building, and systemic issues.

[2] The World Trade Organization's (WTO) Doha Development Round was launched in 2001, and was due to be concluded in 2005. Trade ministers meeting at the global trade body's ministerial conference in December 2015 acknowledged that there was no consensus on the negotiating mandates, despite their stated commitment to advance negotiations on the remaining Doha issues, including agricultural domestic support, market access and export competition.

[3] Similarly, the Addis Ababa Action Agenda states that "international trade is an engine for inclusive economic growth and poverty reduction, and contributes to the promotion of sustainable development", and commits countries to the promotion of "meaningful trade liberalisation".

with the policies required to improve agricultural productivity or the policies required to support adoption of environmentally sustainable production practices. At the same time, trade and industry-related objectives such as promoting value-added exports in agriculture, can necessitate the implementation of policy measures that would affect the food system as a whole; from measures affecting pesticides, seeds and other inputs, through to food production, services (such as transport, finance and logistics), and those affecting food consumption and food loss and waste.

This report seeks to identify the critical trade-offs associated with different policy measures that can affect agricultural trade and markets, their implications for the achievement of SDG 2 targets, and the possible priorities for action, with the broader aim of supporting policy makers in the design and implementation of policies that are appropriate for their contexts.

The remainder of the report is organized as follows: Section 2 provides a background, describing the conceptual linkages between trade and the five SDG 2 targets; Section 3 delves into the different types of policy measures affecting agricultural markets – i.e. those directly affecting imports and exports, as well as domestic support measures – and discusses their possible impacts and options for achieving the SDG 2 targets. These are followed by some concluding remarks in Section 4.

2

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2. Conceptual linkages between trade and SDG 2

Each of the SDG 2 targets aims to address different global challenges related to agriculture and food security. While there has been significant progress in reducing levels of hunger, malnutrition and poverty over the last two decades, the achievements have been uneven across regions and across different demographic segments. According to the most recent estimates, almost 690 million people are undernourished while at the same time nearly 676 million adults are obese,[4] with countries increasingly facing a high prevalence of more than one form of malnutrition (FAO, IFAD, UNICEF, WFP and WHO, 2020). At the same time, 736 million people live in extreme poverty, most of whom are engaged in agriculture (World Bank, 2018) – a sector that is increasingly facing environmental challenges related to soil health, GHG emissions, land conversion, biodiversity loss, water use and pollution, and material footprint.

Greater openness to trade can help to address some of these challenges. For instance, by helping to balance food deficits and surpluses across countries, trade can ensure sufficient quantities and adequate diversity of food supply, both of which are important for reducing hunger and addressing some forms of malnutrition. It can enhance access to markets, which could translate into higher incomes for producers and increased environmental sustainability depending on the production practices adopted. However, greater openness to trade can also exacerbate the challenges that the SDG 2 targets aim to address. For instance, trade, together with other factors such as foreign direct investment (FDI), can contribute to increased availability and lower prices of nutritionally unbalanced products, contributing to the global epidemic of overweight and obesity. For some producers – particularly small-scale producers – exposure to competition may undermine their livelihoods and their ability to bear the costs of complying with environmental and other international standards.

The relationship between trade and food security is influenced by the way food markets work, by the ability and willingness of producers to respond to the changing incentives that trade can bring, and by the geography of food insecurity (FAO, 2015). The links between trade and SDG 2 therefore need to be seen in a comprehensive way, examining the state of play of each of the SDG 2 targets, and the potential positive or negative implications of greater openness to trade. These implications are summarized in Table 1, and discussed in more detail in the remainder of this section.

[4] Undernourishment numbers are from 2019, while the estimate on the number of obese adults refers to 2016.

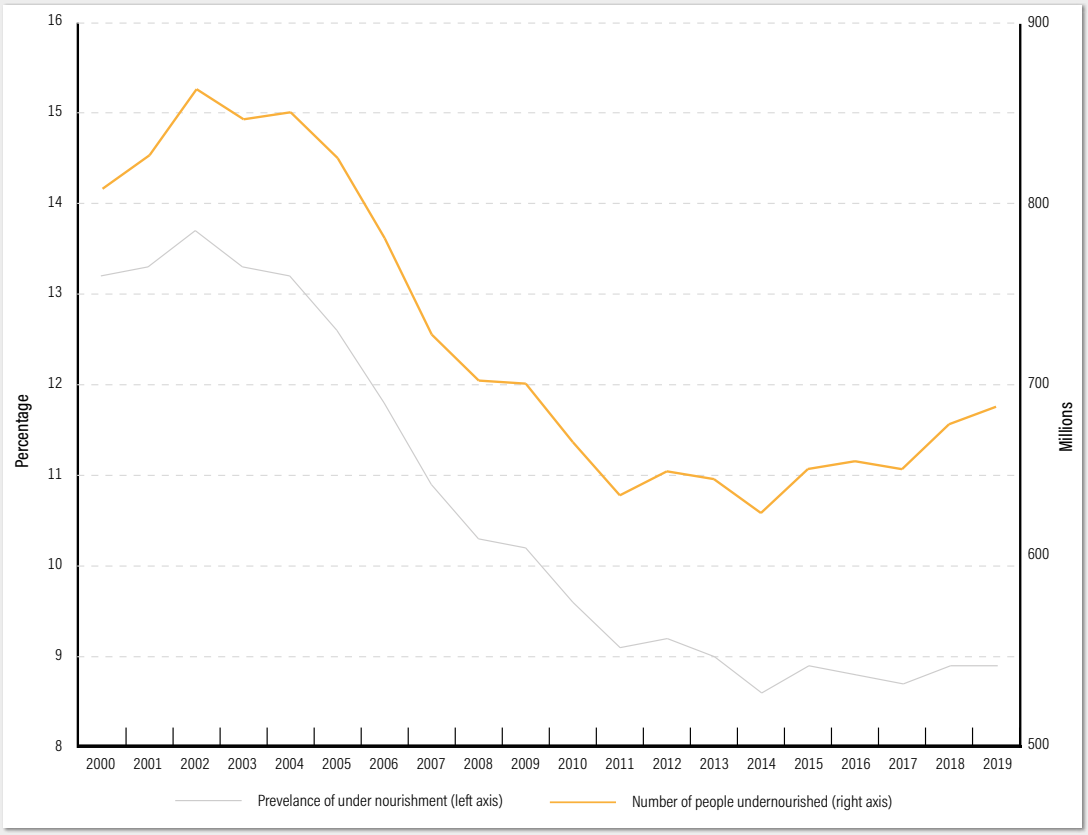
Table 1. **Potential positive and negative implications of trade openness for the SDG 2 targets**

	Greater openness to trade can:
SDG 2.1: *End hunger, ensure access*	+ Mitigate supply and demand shocks, ensuring sufficient supplies all year round + Bring down the cost of food to consumers, improving economic access - Increase vulnerability to import surges, which can be disruptive to some sectors and particularly smallholder farmers
SDG 2.2: *End all forms of malnutrition*	+ Increase the variety of food supplies that can promote diversified diets + Contribute to improvements in food safety and quality, through the implementation of strict food safety controls - Increase the availability and decrease the prices of nutritionally unbalanced and ultra-processed foods - Together with liberalization of FDI, contribute to diet transition towards higher intakes of animal products, sugar and processed foods
SDG 2.3: *Double agricultural productivity and incomes of small-scale producers*	+ Expand access of small producers to potentially more remunerative markets and boost their incomes - Increase exposure to competition, which for some farmers, can provide an impetus for investments in productivity- and quality-enhancing technologies. For others, competition may undermine livelihoods and incomes
SDG 2.4: *Ensure sustainable food production systems, resilient agricultural practices*	+ Expand markets for sustainably produced products such as organic products + Support countries to adapt to climate-change related changes in production patterns, with imports used to buffer production losses - Bring down the prices of, and thereby promote the consumption of products with high environmental footprint - Bring down the farm gate price of products, making it harder for small producers to bear the costs of complying with environmental standards or adopting climate-smart agricultural practices
SDG 2.5: *Maintain genetic diversity of cultivated plants and farmed and domesticated animals*	+ Improve efficiency in resource allocation in agriculture at the global level, which on aggregate is beneficial for the environment, including for biodiversity + Facilitate access of small-scale producers to remunerative international markets, compensating them for their on-farm innovations that help maintain genetic diversity - Lead to biodiversity loss at the country level if it induces unsustainable agricultural practices and depletes natural resources - Reduce farmer autonomy to innovate or maintain traditional production practices, depending on the rules governing intellectual property rights in trade agreements

2.1 Trade and SDG Target 2.1: end hunger, ensure access by all people

Target 2.1 focuses on ending hunger and ensuring access, particularly for the poor and people in vulnerable situations, to safe, nutritious and sufficient food all year round. Overall, significant progress has been made in reducing global hunger. The share of undernourished people in the world decreased from 14.7 percent in 2000 to 10.8 percent in 2018 (Figure 2). However, after decades

Figure 2. Trends in undernourishment



Source: FAOSTAT, Food Security Indicators.

of steady decline, the trend in world hunger reverted in 2015, largely due to armed conflicts and climatic events in Africa and the Middle East, and weaker economic growth in Latin America and the Caribbean. While it is still lower than the level in 2000, about 690 million people, or 8.9 percent of the world population, remain undernourished (FAO, IFAD, UNICEF, WFP and WHO, 2020).

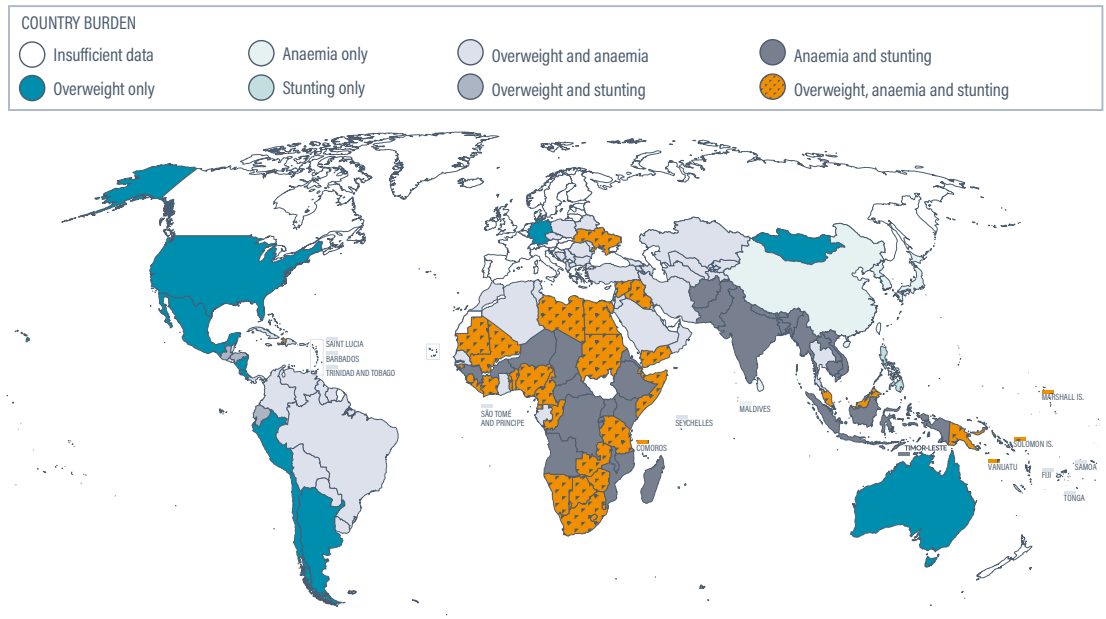
Trade most directly affects the availability and price of food. Trade can help balance food deficits and surpluses across countries, ensuring sufficient supplies where they would otherwise be lacking and promoting greater physical access to food all year round. Greater openness to international markets can also bring down the cost of food to consumers, thereby promoting economic access to food. Moreover, global markets are less prone to policy or weather-induced shocks than domestic markets. By integrating national and international food markets, trade can help absorb domestic supply and demand shocks that could otherwise result in excess domestic food price volatility. Trade can thus contribute to reducing the vulnerability of populations to such shocks. However, greater openness to trade can also pose some risks. It can make countries more vulnerable to import surges, which can be disruptive to some sectors if they are frequently exposed to fluctuating levels of imports. This can increase the vulnerability of farmers, particularly smallholders who are also among the poorest, if they are not adequately equipped to bear the risks associated with such market instability (FAO, 2015).

2.2 Trade and SDG Target 2.2: end all forms of malnutrition

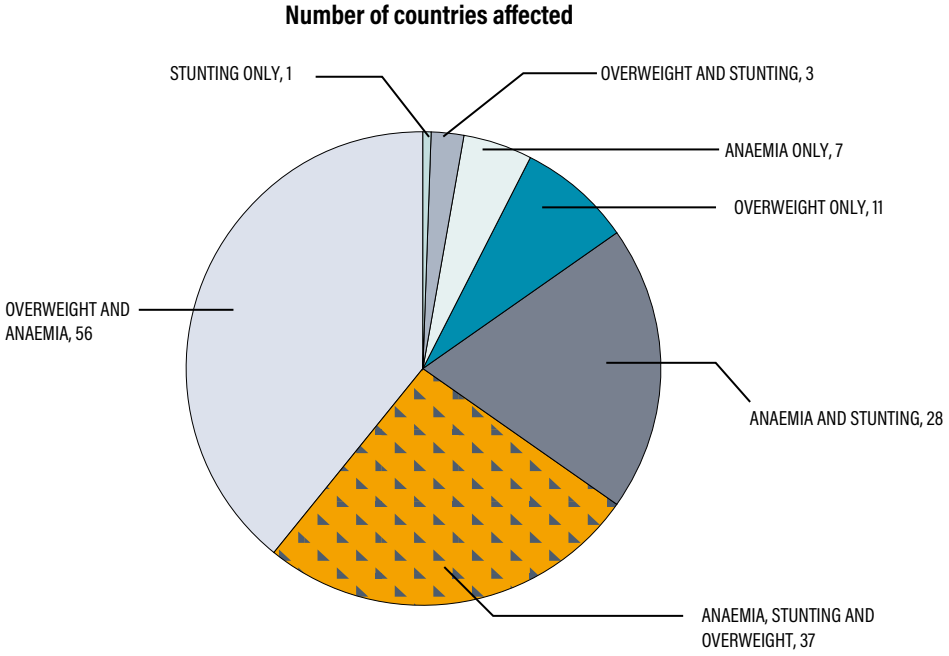
Target 2.2 focuses on ending all forms of malnutrition (hunger, or insufficient intake of calories; micronutrient deficiencies, also known as hidden hunger; and excess consumption of calories such as sugar and fats), and achieving by 2025, internationally agreed targets on stunting and wasting among children under five years of age, and addressing the nutritional needs of women and older people. While there has been progress in the reduction of stunting in children under five (with the global prevalence falling from 32.6 percent in 2000 to 21.9 percent in 2018), 149 million children under five still are stunted today and 49.5 million children are wasted, both of which are associated with increased mortality (Development Initiatives, 2018 and Development Initiatives, 2020). At the same time, the global prevalence of overweight and obesity has been increasing, with over 2 billion adults and 207 million adolescents classified as overweight, of which about a third are obese (FAO, IFAD, UNICEF, WFP and WHO, 2020). These problems are linked to the rising rates of high blood glucose or diabetes, hypertension, and other non-communicable diseases. Finally, the prevalence of anaemia remains high, affecting 613.2 million adolescent girls and women of reproductive age, having increased from 31.6 percent in 2000 to 32.8 percent in 2018 (Development Initiatives, 2018 and Development Initiatives, 2020). As such, the Global Nutrition Report 2020 concludes that "malnutrition persists at unacceptably high levels on a global scale", and that countries affected by conflict and fragility can be particularly burdened by multiple forms of malnutrition. Figure 3 demonstrates the findings of an assessment of 143 countries for which sufficient data was available: 124 countries experience more than one form of malnutrition, of which 37 countries (27 in Africa) struggle with high levels of all three forms (Development Initiatives, 2020).

Trade can contribute to improved health and nutrition by diversifying the supply of healthy food and lowering food prices (Fan *et al.*, 2015). The greater variety of food supplies that trade can bring broadens consumer choices, thus promoting more diversified diets, especially of fresh and minimally processed foods such as fruits, vegetables, and meat and dairy products. Imports can also be a source of healthy processed foods that can add variety and palatability to meals. These foods are convenient to prepare, with their long shelf life, and contribute to offsetting seasonal scarcities of fresh foods (FAO, 2018b). Moreover, trade can contribute to improvements in food safety and quality, as it can promote the implementation of stricter food safety controls in domestic production and distribution systems in order for producers to be able to participate in global value chains. However, trade, together with FDI in food production and distribution, can increase the availability and decrease the prices of nutritionally unbalanced processed and highly processed products, such as fast foods with large portion sizes and high energy density. This can contribute to a "nutrition transition" towards foods that are higher in calories and saturated fat, sugar and salt, resulting in less healthy diets (FAO, 2018b). In particular, the growth of global value chains in agro-food products, where large multinational food manufacturers and retailers typically make significant investments in marketing their food products, can contribute substantially to changing the food environment where less nutritious food becomes widely available, affordable, convenient and desirable (FAO, 2018b).

Figure 3. Countries with overlapping forms of childhood stunting, anaemia and overweight in adult women



Notes:
Prevalence (%) thresholds used to determine whether a country is experiencing a high prevalence for a given form of malnutrition: stunting in children aged under 5 years: ≥20%; anaemia among women of reproductive age (15–49 years): ≥20%; overweight (including obesity) in adult women aged ≥18 years: body mass index of ≥25kg/m^2 ≥35%. Based on latest data available for 143 countries.



Source: (Development Initiatives, 2020), citing UNICEF/WHO/World Bank Joint Child Malnutrition Estimates Expanded Database: Stunting, Wasting and Overweight, (March 2019, New York), NCD Risk Factor Collaboration 2019, WHO Global Health Observatory 2019.

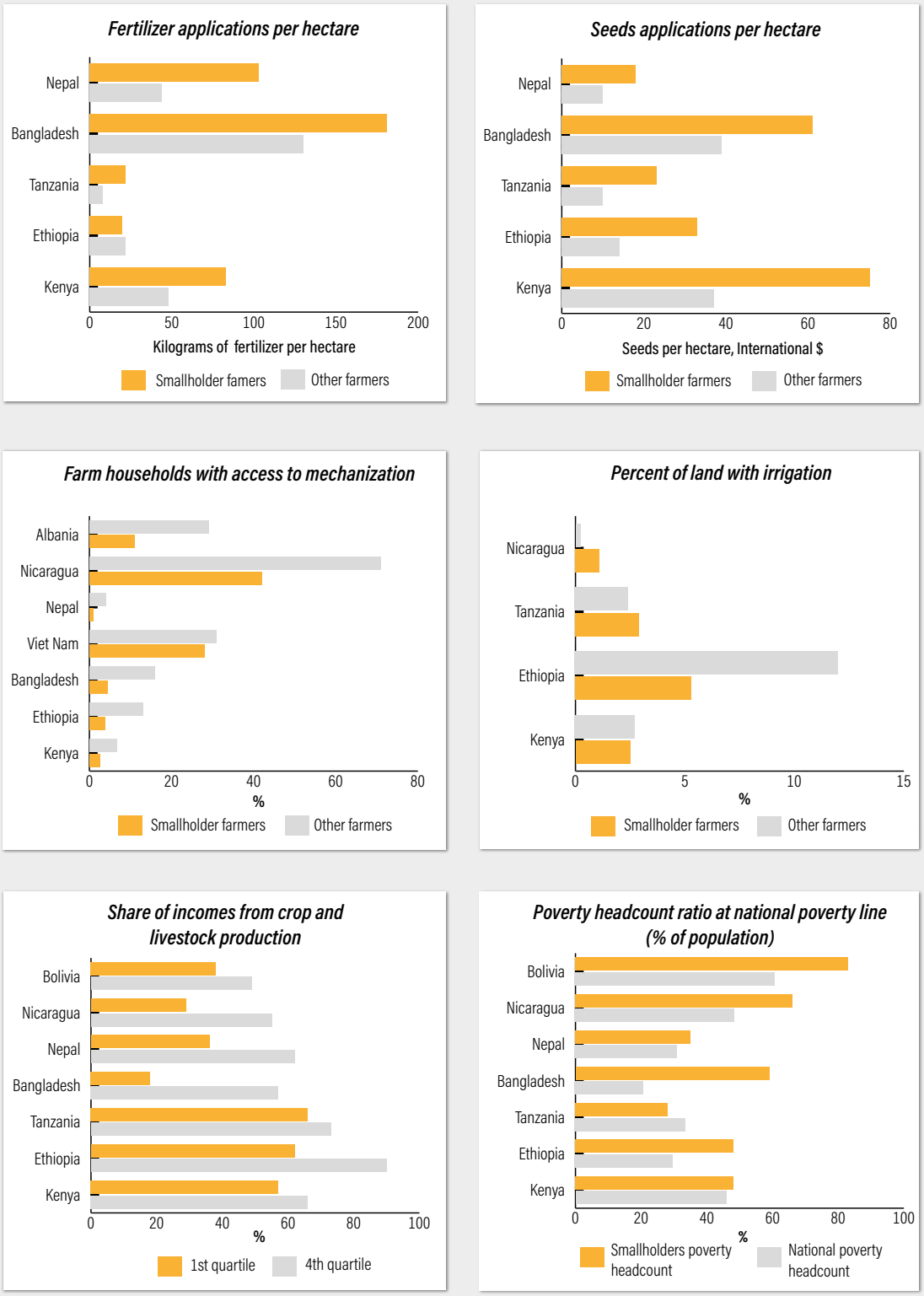
2.3 Trade and SDG Target 2.3: double agricultural productivity and incomes of small-scale producers

Target 2.3 focuses on improving agricultural productivity as well as the incomes of small-scale food producers, with a particular emphasis on improving their access to productive resources and market opportunities. For crop production, small-scale producers are often referred to as "smallholders", although there is no universal definition of the term since farm size distribution in a country is dependent on agro-ecological, economic and other factors. The FAO Smallholder Farmers' Data Portrait incorporates such country-specific farm size variability in developing a dataset characterising the "typical" smallholder farm in nine countries in Africa, Asia and Latin America. Analysis based on this dataset (Figure 4) shows that smallholder farmers generally cultivate land that is smaller than one hectare but they collectively produce the majority of total food consumed in a country (Rapsomanikis, 2015). In many developing countries, due to suboptimal use of inputs and insufficient adoption of the most productive technologies, there is a large gap between existing yields (average for all farmers) and those achievable with the latest varieties and conditions. In 2005, these yield gaps ranged from 11 percent in East Asia and 76 percent in Sub-Saharan Africa (FAO, 2011). Within countries, there is some evidence that smallholder farmers actually achieve higher yields than their larger counterparts, possibly due to higher applications of seeds and fertilizers per hectare – as the result among other factors of input subsidization policies – and also higher use of family labour input, but this advantage erodes over time (Rapsomanikis, 2015). Smaller farmers face difficulties in accessing credit from banks due to lack of collateral and in adopting technologies due to lack of technical and managerial knowledge, and as such, their access to capital assets such as irrigation equipment, tractors, and threshing machines, as well as fuel and electricity, is limited (Rapsomanikis, 2015).

Trade openness can expand the access of farmers to markets beyond the local areas that they would otherwise supply, potentially allowing them to receive higher prices and more stable and dependable outlets for their products. This can give farmers the incentive to expand and diversify their production, improve their efficiency and productivity, and ultimately increase their incomes. International competition can also provide an impetus for farmers to experiment with, refine and adopt new and improved technologies in order to reduce costs and improve product quality and value. However, the ability of small-scale producers to realize such benefits from trade depends *inter-alia* on their capacities and access to resources to produce products that satisfy the volume and quality requirements of increasingly sophisticated markets at competitive prices. In fact, smallholders tend to sell only a small share of their produce to markets and thus earn only a small proportion of their income from farming. Instead they diversify their incomes with off-farm agricultural and non-agricultural work, but since these rural employment opportunities tend to be low wage, poverty among smallholders is widespread (Rapsomanikis, 2015).

The specific constraints that these producers face in connecting to markets include high transaction costs, little marketable surplus, low storage capacity, high seasonality of produce and low level of product quality control (FAO, 2013). Without the required capacities and resources to make the necessary upgrades to their production practices, imports that expose small-scale producers to

Figure 4. Selected indicators of smallholders incomes and their access to productive resources



Source: (Rapsomanikis, 2015), from *FAO Smallholders Farmers' Data Potrait.*

greater competition may undermine their livelihoods and incomes. In some cases, producers may transition out of agriculture into other non-farm activities, depending, among other factors, on a country's comparative advantages. At a global level, this may contribute to more productive and efficient food systems, as trade allows for food production to shift from regions of low production cost and ample supply to areas of high production cost and insufficient supply to meet demand (Fan *et al.*, 2018). At a national level however, managing the benefits and risks of trade for small-scale producers remains an important issue, with governments often addressing these priorities with a mix of domestic support and border policy measures, which will be discussed in Section 3 of this report.

2.4 Trade and SDG Target 2.4: ensure sustainable food production systems, resilient agricultural practices

Target 2.4 focuses on ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity and production, help maintain ecosystems, and strengthen capacities for adaptation to climate change and natural disasters. It is generally acknowledged that today's agricultural production systems face a number of environmental challenges, particularly with regard to soil health, greenhouse gas (GHG) emissions, land conversion, biodiversity loss, water use and pollution, and material footprint (Table 2, which was prepared by (Charveriat, 2018), synthesizing findings from several studies). Policy makers are increasingly concerned about identifying pathways for sustainable growth of agricultural production, including through the promotion of healthier and more sustainable diets, moving away from using food crops for the production of energy, and reductions in food waste at all stages of the value chain (Charveriat, 2018).

Trade can play an important role in facilitating or hindering the transition towards sustainable agricultural practices. For instance, exports from water abundant to water scarce regions can promote food security without pressuring local water levels, and contribute to an environmentally sustainable food system (Fan *et al.*, 2018). By expanding markets for organic products, trade can also contribute to improving the commercial viability of sustainable production practices. Moreover, trade can help countries to adapt to climate-change related supply disruptions by facilitating the movement of food from surplus to deficit regions, thereby stabilizing markets and food prices (FAO, 2018a). However, greater openness to trade, through its effects on prices and through trade-related domestic policy reforms, could also have the effect of undermining efforts to achieve SDG target 2.4. A country that takes measures to mitigate climate change, for example through a carbon tax, could end up contributing to emissions leakage i.e. displacing domestic production with cheaper imports that may have a higher carbon footprint. The impact of trade on global emissions thus depends on the relative emissions efficiency of imports *vis-à-vis* domestic products (FAO, 2018a). Moreover, downward pressure on farm gate prices as a consequence of greater competition from imports can make it difficult for producers to bear the cost of higher environmental standards – if their competitors are not under the same constraint (Charveriat, 2018). Opening to trade is also often associated with the adoption of certain rules (e.g. related to intellectual property), or the implementation of certain policies (e.g. related to supporting agricultural producers), which could provide disincentives for the widespread adoption of climate-smart agricultural practices.[5]

[5] The impacts of policies will be discussed in greater detail in the following section of this report.

Table 2. Key environmental challenges linked to agricultural production

Issue	State of play
Soil health	• 10 million hectares abandoned per year because of soil erosion and related loss of productivity. • 5 Gt (billion tonnes) of soil eroded by tillage every year. • Decline in soil's capacity to retain nutrients, retain moisture, and maintain a healthy pH, with soil being lost ten to 40 times faster than it is being replenished
GHG emissions	• GHG emissions from agriculture, forestry and fisheries have nearly doubled over the past fifty years due to crop and soil management, enteric fermentation and manure management.
Land Conversion	• Today, 37 percent of the planet's landmass -outside of Antarctica- is dedicated to growing food. • The majority of current land-use change in the world comes from forests, wetlands, and grasslands being converted into farms and grazing pastures. For instance, world agriculture was responsible for roughly 80 percent of tropical deforestation between 2000 and 2010.
Biodiversity Loss	• About three-quarters of the genetic diversity found in agricultural crops has been lost over the last century, and this genetic erosion continues. 90 percent of our food energy and protein comes from only 15 plant and eight animal species. • Agriculture is also a major contributor to habitat loss, pollution and eutrophication of ecosystems.
Water Use and pollution	• Agriculture accounts for 70 percent of the world's freshwater withdrawals. A 14 percent increase in water withdrawals for irrigation is expected for developing countries by 2030. • Impacts of excess nutrients and chemical pesticides include pollution and eutrophication of surface waters as well as impairment of groundwater.
Material Footprint	• Lost or wasted food has high environmental costs—perhaps 30 percent of the world's agricultural land is devoted to producing food that will never be eaten. • Food and beverage packaging constitute more than half of all packaging uses (food 41 percent and beverage 14 percent).

Source: (Charveriat ,2018).

2.5 Trade and SDG Target 2.5: Maintain genetic diversity of seeds, cultivated plants and farmed and domesticated animals

SDG 2.5 concerns genetic diversity of cultivated and domesticated plants and animals and their wild relatives, highlighting the importance of soundly managed and diversified seed and plant banks, and access and benefit sharing from the use of these resources and associated traditional knowledge. Genetic diversity is important for innovation in the production of plant and animal

products. By providing a source of variability, genetic diversity allows farmer-breeders, pastoralists, and plant and animal scientists to develop plants and animals that integrate new traits, or new variants of known traits (e.g. disease resistance), that ultimately improve both the quantity and nutritional quality of food (Dutfield, 2018). Crop innovation and the related maintenance of genetic diversity can come from different sources: (1) traditional cultivators, whose selection of seeds and on-farm experimentation can contribute to a cumulative process of plant innovation; and (2) seed banks and plant collections, which can contribute varieties acquired from genetic material that is newly circulated as breeding material (Dutfield, 2018). As such, the conservation and protection of genetic diversity, both *in situ* and in seed banks and plant collections, is a global public good, and open access to genetic resources remains important. The FAO International Treaty on Plant Genetic Resources for Food and Agriculture acknowledges this, establishing a multilateral system of facilitated access to plant genetic resources while respecting national sovereignty and requiring benefit sharing (Dutfield, 2018). However, a key issue is ensuring that small-scale producers are not only adequately rewarded for their contributions towards the promotion and preservation of genetic diversity (i.e. that they share in the benefits), but also that their access rights to such resources are ensured.

Compared to the other SDG 2 targets, the implications of trade openness for achieving the objectives outlined under SDG target 2.5 are more indirect. Trade can facilitate the access of small-scale farmers to remunerative international markets, which may be able to compensate them for their on-farm innovations that help to maintain genetic diversity. However, trade can also have important implications for small-scale farmers through the rules governing intellectual property rights and seed laws in international trade agreements. Such laws and regulations can provide incentives for plant breeders to invest in the development of high-yielding varieties, particularly in the absence of sufficient government expenditures in agricultural research and development. However, such laws may also have the effect of reducing farmer autonomy to innovate, if they are drafted in a way that narrows their rights to replant and exchange saved seed. Seed regulations may also reduce farmer autonomy if they require that only those varieties on an official seed list may be sown by farmers, with farmers' varieties largely excluded from such lists for failing to meet strict criteria (Dutfield, 2018). Moreover, intellectual property rights can also lead to neglect of crops that are important in local contexts, towards a narrow range of crops that are favoured by the private sector. These issues can reduce the incentives for small-scale farmers to continue providing indispensable public goods through on-farm experimentation and innovation.

On a broader level, trade can lead to biodiversity loss at the country level if it induces unsustainable agricultural practices and depletes natural resources as a consequence of intensified agricultural production. Agricultural biodiversity, for instance, can be affected by extensive use of agrochemicals, over-fertilization and certain forms of tillage. These risks are exacerbated by the lack of enforceable environmental regulations. A loss in non-agricultural biodiversity can occur through the conversion of natural habitats to farmland and the associated displacement or eradication of wildlife (Rockström *et al.*, 2009). Several studies link biodiversity loss to agricultural land use and land use change, distinguishing between production for exports and domestic consumption (e.g. Chaudhary and Kastner 2016; FAO 2016). Export products such as sugarcane, palm oil, rubber and coffee tend to have higher biodiversity impacts. Moreover, consumption in developed countries is cited

as the main driver of the demand for imports from developing countries that ultimately lead to a reduction in the number of species (Moran and Kanemoto, 2017; Lenzen *et al.*, 2012).

At the same time, it is important to recognize that through specialization trade improves efficiency in resource allocation in agriculture at the global level, which on the aggregate is beneficial to the environment, including biodiversity. Without trade, some countries would have to produce a wider range and larger quantities of food commodities, even when their natural endowment is not compatible with such an expansion, placing an additional pressure on fragile ecosystems. For example, increased agricultural production in the net food importing countries in the Middle East and North Africa would likely be at the expense of further water depletion in an already water scarce region (Biewald *et al.*, 2014), with negative implications for associated biodiversity. In addition, trade can lead to technological change and efficiency gains, including through transfer of technological best practices between trading partners, and leading to increased productivity and more efficient resource use (Conway, 1998). Greater agricultural output per hectare may release some agricultural land from production (land sparing) which thus becomes available for natural habitats and species, contributing to non-agricultural biodiversity (Phalan *et al.*, 2011). The productivity-increasing effects of trade can be amplified through appropriate environmental policies.

3

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3. Key policy measures affecting trade and markets and their implications for achieving SDG 2

3.1 Overview

This section examines a number of policy measures affecting trade and markets in terms of their intended and unintended implications for the achievement of SDG 2 targets (Figure 5). These measures include those that are applied at the border, such as tariffs, export restrictions, and standards (to the extent that they may become non-tariff barriers to trade), all of which directly affect trade flows. In addition, a number of "behind-the-border" domestic measures in agriculture can also affect trade flows through their more immediate impacts on production and market development.

Policy measures in each of these areas can have an impact on the achievement of the various SDG targets, through implications for both domestic and international markets. The direction and extent of the impacts will depend for example, on whether a country is a net exporter or importer; the size of its production, trade and consumption; and the way in which policies are designed and implemented. Moreover, impacts may vary in the short and long run, as the expectations and responses of economic actors to the policy measures vary over time.

3.2 Policy measures applied at the border

Border measures can have implications for the achievement of SDG 2, both in domestic markets and abroad. These measures include tariffs; tariff rate quotas; and safeguards. Some governments also regulate trade at the border through various forms of export restrictions, including export bans and prohibitions, export taxes, export quotas, and other measures such as administrative and licensing arrangements. Finally, public and private standards and regulations are non-tariff measures that can also have implications for the ability of producers to access international markets.

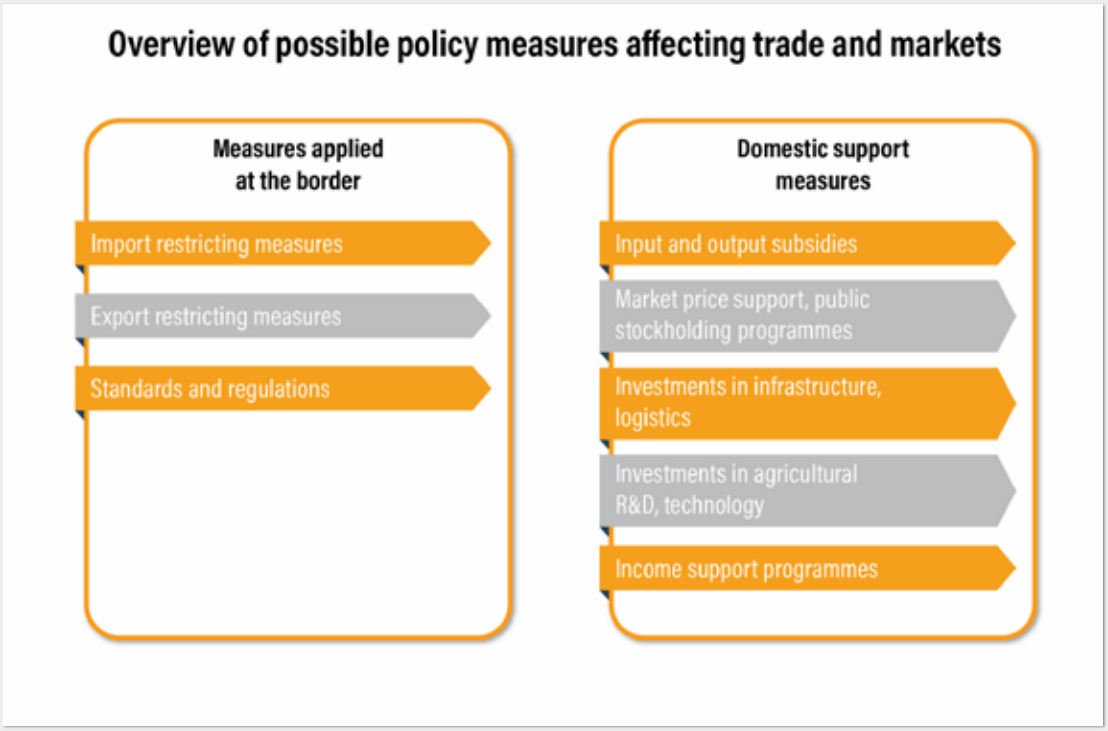
3.2.1 Import restrictions: tariffs, tariff rate quotas and safeguards

This section examines three main types of import restriction instruments – tariffs, tariff rate quotas, and safeguards – and explores their relationship with the targets under SDG 2.

Tariffs

Tariffs are essentially taxes levied by the government on the import of a particular product. They are usually defined as a percentage of the product's value, but may also be expressed in monetary

Figure 5. Overview of possible policy measures affecting trade and markets



terms per unit of weight or volume of the product. While tariffs may help raise revenue for governments, they are often applied in order to provide a form of support to domestic producers of a given product, by making imported goods more expensive and therefore less competitive on the domestic market. While domestic producers can benefit from higher prices of the protected product, domestic consumers can also be adversely affected by higher prices – including other actors within the value chain that may rely on the imported good as an input in the production process. WTO members have agreed not to exceed product-by-product ceilings on tariff levels as part of their market access commitments at the global trade body.

Tariff rate quotas

Tariff rate quotas allow for a predefined volume of imports to enter the country at a lower tariff rate. For example, a country may allow for 100 000 tonnes of beef per year to be imported at a 20 percent tariff, but once this volume has entered the country, tariffs revert to a higher level (for example 100 percent), in order to protect domestic producers. In some cases, tariff rate quotas remain unfilled, in which case all imports enter the country at the lower tariff rate. Exporters frequently argue that tariff rate quotas increase the bureaucracy associated with trading agricultural and other goods, and can also reduce transparency around the administration of trade arrangements. However, trade negotiators from exporting countries frequently seek to expand their trading partners' import quotas as a "second-best" way to improve their market access.

Safeguards

Safeguard measures allow countries to temporarily increase their tariffs on imported goods in cases of price depression or volume surges. The main rationale behind such instruments relates to the fact that agricultural markets are by nature cyclical and subject to wide variations. Trade liberalisation tends to increase the transmission of international price variability to the domestic market. Therefore, as countries reduce their tariff protection or quantitative restrictions they become more vulnerable to external agricultural market instability and import surges. Such episodes can in turn wipe out even competitive agricultural production activities or depress incentives for investment in domestic market development by private sector actors with limited recourse to risk management instruments. For many developing countries, the set of policy instruments available to protect their economies from such instability is lvargely restricted to tariff surcharges in the form of safeguards. Another argument in favour of safeguard measures has been the need to offset the price depressing effect of trade distorting subsidies provided by exporting countries. From that perspective, safeguards are seen more as a countervailing instrument. Others still, consider safeguards as an adjustment mechanism, which provides an effective insurance

policy against the potential negative effects of trade liberalisation. As such, safeguards are often seen as a critical instrument to gain support for further trade opening domestically. At the same time, depending on their specific parameters, safeguards can limit market access opportunities for exports from both developed and developing countries, ultimately distorting normal trade. Thus, balanced safeguard mechanisms that would preclude raising tariffs in an arbitrary manner need to be negotiated and agreed upon.

TARGET 2.1 TARGET 2.2 Implications of reductions in import restrictions for prices, improving economic and physical access to food

In general, the question of how tariffs and other import restrictions affect food security and sustainable agriculture get to the heart of the debate over trade and SDG 2. Reducing high import tariffs and gradually phasing out tariff-rate quotas (TRQs) is important in expanding equal access to markets for agri-food products. In this view, reductions in tariffs and TRQs can contribute to SDG targets 2.1 and 2.2, improving health and nutrition by diversifying the supply of healthy food and lowering food prices. It can also help move food from regions of low production cost and ample supply to areas of high production cost and insufficient supply to meet demand. This may be particularly relevant for countries with a high dependence on food imports to meet food security and nutrition requirements.

TARGET 2.3 Implications of reductions in import restrictions for producer incomes in exporting and importing countries

From a producer perspective, reducing tariffs can help ensure that trade contributes to SDG 2.3 by creating jobs and raising average incomes in exporting sectors (Díaz-Bonilla and Hepburn, 2016). SDG 2.3 refers explicitly to the need for "secure and equal access to markets and opportunities for value addition". While small-scale food producers frequently face numerous challenges in accessing markets at the national level, tariffs and other types of import restrictions at the international level can also affect their income prospects. Numerous developing countries and LDCs depend on agricultural exports for their economic development; for example, the share of agricultural exports as a percentage of GDP is 61 percent in the case of Sierra Leone, 50 percent in Chad and 43 percent in the Central African Republic (Charveriat, 2018).

On the import side, however, small-scale food producers in many countries are often concerned that rapid reductions in tariffs and other restrictions could expose them to international competitive pressures that they would be unable to withstand. Such concerns call for a progressive approach to trade liberalisation supported by safeguard clauses to deal with episodes of import surges or price depression. While net food importing countries may look at safeguards as an important tool for achieving SDG 2.3, exporting countries often express concern that these instruments tend to exacerbate price volatility on international markets at the expense of other countries. They also argue that such measures can isolate domestic producers from long-term trends and penalise efficient exporters. The use of safeguards should thus be carefully evaluated considering their costs

and benefits, particularly as the current safeguard mechanism can provide permanent protection for producers who are not necessarily poor (Fan *et al.*,2018).[6]

TARGET 2·3

Implications for actors in different segments of agricultural value chains

The reference in SDG 2.3 to "opportunities for value addition" also has implications for the design of trade policy in the area of import restrictions. In particular, governments seeking to address this aspect of the SDGs would need to take action on "tariff escalation", whereby higher tariffs are applied to imports of processed products than to those on the unprocessed raw materials. Changing patterns of economic activity in the food and agricultural sector have meant that global and regional value chains have become more important in recent decades. In 2011, almost 71 percent of world exports of agro-industry products originated from industries supplying inputs to agricultural firms to produce their exports, with 38 percent contributed by the services sector, another 23 percent coming from primary industries, and 10 percent coming from inputs from other manufacturing industries (fertilisers, pesticides, tools and agricultural machinery); the rest of the 29 percent of value added was contributed by the agro-food sector itself (WTO, 2017). Therefore, tariffs or other import restrictions applied at different stages of processing of agricultural products can have differing implications for the incomes of various value chain actors involved.

TARGET 2·4

Implications for environmental sustainability

For farm goods such as meat, soybeans, or palm oil, which tend to be associated with significant environmental degradation in the form of biodiversity loss, land conversion or water depletion, reduction in import restrictions may also affect SDG 2.4. When competitors in different countries face different environmental requirements, removing tariffs can put downward pressure on farm gate prices, making it difficult for producers to bear additional costs (Charveriat, 2018). Policies to support climate adaptation and mitigation, such as carbon taxes, could be complemented by border measures such as tariff adjustment to prevent carbon leakage and level the playing field.[7] Under WTO rules, the ability of countries to introduce such tariffs is constrained by bound tariffs and the principle of non-discrimination. Regional trade agreements, on the other hand, could be designed in a way that would encourage trade in low carbon footprint products (FAO, 2018a). In other cases, countries may consider applying import bans or restrictions on certain pesticides or substances which have negative health and environmental impacts, and which are already prohibited in the domestic market. International protocols play an important role in this regard (Box 1).

[6] As per current WTO rules, all countries can use the margin between bound and applied tariffs or apply the common safeguard of Article XIX of the General Agreement on Tariffs and Trade (GATT) 1994 (Fan *et al.*, 2018). The Special Safeguard of the Agreement on Agriculture is available only to countries (mostly developed countries) that have transformed quantity restrictions into tariffs under the agreement (Fan *et al.*, 2018). In the context of the Doha Development Agenda, proposals have been submitted for the establishment of the "Special Safeguard Mechanism", which would be only available to developing countries. Once agreed, this mechanism would allow for a temporary increase of tariffs in the case of volume surges or price depressions.

[7] In contrast, Charveriat also notes that opening markets can support environmental sustainability under certain circumstances, giving the example of increased trade in organic farm goods.

Box 1. Trade implications of The Montreal Protocol on Substances that Deplete the Ozone Layer

The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in 1987 to phase out the consumption and production of a wide range of ozone-depleting substances (ODS). The Protocol also restricted trade in ODS with those countries that were not party to the Protocol. The Protocol had important consequences for agricultural trade since it affected the use of methyl bromide – an efficient broad-spectrum fumigant used to control pests in agriculture and shipping. While the rules allowed for quarantine and pre-shipment uses of methyl bromide, the restrictions on soil and post-harvest fumigation meant that countries had to look for alternative substances in order to continue to produce for markets and comply with phytosanitary requirements. This process had to be carried out against the background of established production systems, with infrastructure, equipment, and supply chains already in place (UNEP, 2014), proving it difficult in particular for small-scale farmers to introduce alternative handling methods. Recognizing this, the Protocol contained provisions for financial assistance and transfer of technology to help developing countries adapt. Methyl bromide phase-out is an example of a successful international treaty that, while focusing on environmental sustainability, took into consideration the trade implications and the consequences for livelihood of farmers and exporters.

3.2.2 Export restrictions

Export restrictions can take the form of export bans or quotas (i.e. quantitative limits on agricultural exports), or export taxes, including taxes that are specific (i.e. a given sum per unit exported) or ad valorem (i.e. a percentage of value of the exported good), or a mix of the two. These policies are often used with the objective of addressing domestic food security concerns related to rising food prices. Export restrictions may also be used to increase domestic supply of the product concerned as an input for domestic agro-processors, as part of a broader industrial strategy. Export taxes may also be used to raise fiscal revenues.

TARGET 2·1 TARGET 2·2 TARGET 2·3

Implications for domestic food availability, prices and producer incomes in the immediate term

Export bans and restrictions can increase the availability and lower the prices of food on domestic markets, improving access to food for people in the jurisdiction concerned. The experience of Malawi, which has had intermittent bans on maize exports since 2005/06 mainly citing food security concerns, provides an illustrative example. An FAO study examined of the economy-wide implications of export restrictions in Malawi in both the short and long run (Aragie, Pauw and Pernechele, 2016). In the short run, i.e. immediately following the export ban, when there are no changes in the production practices of producers, maize grain supply was boosted by roughly 7 percent and prices were lowered by roughly 16 percent. However, disposable incomes in rural areas declined while in urban areas they went up. Consumption of maize grain as well as maize flour increased in both rural and urban areas, but more so for net consumers of maize, e.g. the urban non-poor. The

immediate effects of such policies may therefore address concerns of policy makers about their ability to manage food availability and prices.

TARGET 2.1 TARGET 2.2 TARGET 2.3

Implications for food security and nutrition outcomes as well as producer livelihoods in the longer term

It is important to take a dynamic view of the effects of policy interventions, as the short-vs. longer-term outcomes could be very different, owing to the behavioural responses of producers. Lower expectations of market access and prices can mean that producers shift productive resources towards other crops in the next season, and over the longer-term, they may reduce investments in crops that are frequently affected by export restrictions. The findings of the study of maize export bans in Malawi lends support to this thesis, finding that in the long run, maize producers shifted to other crops, with an overall reduction in disposable incomes in rural areas, affecting the achievement of SDG target 2.3 (Aragie, Pauw and Pernechele, 2016). Crucially, despite lower prices,

consumption of maize grain declined in rural areas and among the urban poor, calling into question the long-term achievement of SDG targets 2.1 and 2.2. Export bans may therefore favour urban non-poor and food processors at the expense of farm households, many of whom are among the poor. Overall, together with other policies that may be suppressing domestic prices, export restrictions may contribute to disincentives for commercial cultivation of the products concerned. In Argentina, evidence shows that quantitative export restrictions did not result in benefits for the consumers, while at the same time being difficult to administer and not producing fiscal revenues (Krivonos and Dawe, 2014).

TARGET 2.1 TARGET 2.2

Implications for availability and prices in importing countries, particularly during simultaneous restrictions by multiple exporting countries

Export restrictions, particularly when implemented simultaneously by many countries, can cause prices on global markets to rise more steeply than they would otherwise, thereby diminishing access to food for people in other countries, including for vulnerable communities and individuals. Although food prices have declined significantly since their 2011 peaks, there is evidence to suggest that export prohibitions and restrictions during the episode of price spikes from 2007-11 may have exacerbated shortages on global markets and aggravated food insecurity in developing countries that are net importers of food (ICTSD, 2014). Sharma (2011) found that out of 105 countries that were studied, 33 resorted to one or more export restrictions in the period covered. By some estimates, between 2006 and 2008, the aggregate effect of all countries' price-insulating behaviour was a 52 percent increase in the price of rice and 18 percent in the case of wheat and maize (Anderson, Ivanic, and Martin, 2013). Moreover, such policies can affect trading relationships between neighbouring countries and traditional trading partners, weakening the reputation of international markets as a source of food supplies, thereby perpetuating countries' trade-restricting policy orientation. When several countries undertake measures to insulate domestic markets from international food price fluctuations, global price volatility is amplified (Anderson, 2012).

The commitment in SDG 2b to "correct and prevent trade restrictions and distortions in world agricultural markets" can also be seen as a call to curb restrictions on exports. While article 12 of the WTO Agreement on Agriculture contains some provisions on this topic, many analysts have suggested that existing multilateral rules in this area do relatively little to protect low-income consumers in poor food-importing countries from the imposition of export restrictions on foodstuffs at times of sudden price spikes on global markets. Anania (2013) examines in detail the options for promoting food security by addressing the issue of export restrictions at the WTO, ranging from measures to exempt humanitarian food aid to agreeing new multilateral trade disciplines in this area.

3.2.3 Public and private standards and regulations

Standards specify requirements about a product or a process that producers, traders or retailers need to meet in order to access certain markets. They are typically accompanied by implementation

and enforcement measures such as labelling requirements and procedures to assess conformity. Standards can be applied by the public sector as well as the private sector. Sanitary and Phytosanitary (SPS) standards are an example of public standards, which governments apply in order to ensure food safety and animal and plant health. Private standards on the other hand, while not mandatory, can be equally important for producers to access markets. For example Voluntary Sustainability Standards (VSS), specify products which specify product and process requirements that aim to achieve a variety of sustainability objectives, such as respect for basic human rights, workers' health and safety, the environmental impacts of production, or land use planning (FAO, 2017).

TARGET 2.2 TARGET 2.3 TARGET 2.4 Implications for improving food safety and animal and plant health, environmental sustainability and labour rights

Overall, the application of standards and related regulations can aim to achieve a number of the SDG 2 targets. The application of SPS measures typically aims to ensure food safety and protect human health from food-borne diseases and to tackle animal and plant health problems, which are important for achieving SDG target 2.2 on ending malnutrition in all its forms. Food safety standards can include for instance, specifications regarding food additives, contaminants, and hygiene requirements. Environmental standards typically aim to promote the use of climate-friendly goods and technologies towards the achievement of environmental sustainability objectives, such as those set out in SDG target 2.4. These can include, for instance, standards for energy efficiency for products and production methods; defined maximum levels of emissions of energy consumption; and related implementation and enforcement measures such as carbon labelling requirements and procedures to assess conformity (WTO and UNEP, 2009). Lastly, labour standards typically aim to enhance the living conditions of workers, which can be important for addressing SDG target 2.3. These can include, for instance, standards on wages, working time, occupational safety and health, equality of opportunity and treatment, and child labour (ILO, 2014).

At the multilateral level, the application of food safety and animal and plant health standards are regulated by the WTO Agreements on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and on Technical Barriers to Trade (TBT Agreement), which strongly encourage WTO members to use international standards, guidelines and recommendations as the basis for their measures.[8] VSSs on the other hand, are not governed by WTO disciplines, but they remain important, as the number and use of such standards continues to grow. Regional Trade Agreements (RTAs) could explore measures to incentivise sustainability, including through committing to improve the quality of sustainability impact assessments Charveriat (2018). RTAs may include deeper commitments around environmental goods and services, such as in the European Union–Chile agreement on organic products, and on labour rights, which is also included in the European Union-Chile Free Trade Agreement, as well as in some others such as the Dominican Republic-Central America Free Trade Agreement, and the United States-Mexico-Canada Agreement (USMCA).

[8] The SPS Agreement explicitly refers to the Codex as the standard-setting body for food safety standards.

TARGET 2.3

Implications for small producers' access to markets and impacts on their incomes

The key trade-off in the application of standards is the potential impact on the incomes of some producers affecting the achievement of SDG target 2.3. On the one hand, the implementation of standards can help certified farmers in developing countries to improve their farming techniques and product quality, thereby allowing them to participate in remunerative value chains and receive higher and more stable prices (FAO, 2017). This is often the case for those moving towards economies of scale, whereby compliance costs are reduced by spreading the economic burden among a number of farmers, or by inducing processes of consolidation and concentration, as larger producers have greater access to resources that can help meet compliance costs (FAO, 2017).

However, due to high costs of certification and compliance, some of which would be borne by producers, smallholders may also experience an increase in production costs, which in turn can hamper profitability. Moreover, a lack of institutional and technical capacity to enable accessible certification in developing countries can present significant challenges to smallholders in demonstrating compliance to standards (FAO, 2017). This can affect government efforts to achieve objectives of improving productivity and enhancing incomes of the poorest, such as those set out in SDG target 2.3.

In order to ensure that the application of standards does not become a hidden barrier to entry for small-scale producers and value chain actors, developing countries should receive technical assistance to improve their capacities to enforce international standards and guidelines (Fan *et al.*, 2018). This may include, for instance, efforts to enhance awareness of food safety, environmental sustainability and labour rights issues among value chain actors. Moreover, economic actors along the value chain, from producers, to processors and exporters, will need government assistance in complying with regulations and requirements, both public and private. This would in turn require technical assistance for policy makers to implement an integrated approach in regulation – one that involves wide stakeholder engagement and strong collaboration between governance structures. It would also require significant public investments in research and development (R&D) and information and communication technologies (ICTs), to strengthen testing and surveillance systems to ensure compliance with standards. Such interventions at the domestic level can allow local producers to supply local markets efficiently and generate an actual and viable opportunity to channel their surplus to foreign markets. The WTO Trade Facilitation Agreement (TFA), which entered into force in 2017, establishes a framework for simplification, modernization and harmonization of export and import procedures. Implementation of TFA provisions and the corresponding investments into improved SPS and customs systems would improve the ability of small producers to overcome the procedural bottlenecks associated with imports of agricultural inputs and exports of products to external markets.

3.3 Domestic support measures

As noted above, achieving SDG 2 will require significant investments in agriculture, particularly in poorer countries where under-investment and a tendency to tax rather than subsidize farming

has historically prevailed.[9] While a large part of such investments should come from private operators themselves, government spending on domestic support measures can play a critical role in the agricultural transformation pathways of countries, with different forms of support adopted by policy makers depending on the status of agricultural development. At earlier stages of development, when agricultural production systems are rudimentary and critical infrastructure is absent, public investments in transport and market infrastructure, as well as in extension and technology transfer can be key to establishing the basic conditions for agricultural productivity to rise and for farmers to generate surplus production for markets (FAO, 2015). In other instances, where farmers are able to generate surplus production but they are still significantly exposed to market risks, policy makers often use other domestic support measures such as market price support and input and output subsidies, or in some cases, direct income transfers, in order to stabilize prices and/or incomes (often coupled with some level of import protection) (FAO, 2015).

[9] United Nations data indicate, for example, that government expenditures for agriculture, together with official development assistance for the sector, have in fact significantly declined in relative terms over the years.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As such, while domestic support policies can contribute significantly to the achievement of SDG 2 – particularly in ending hunger, doubling productivity and farmers' incomes and promoting sustainable production, the scale and the way in which such support is provided may also generate negative spillovers in the form of trade distortions, which could affect third countries. For example, subsidizing agricultural production and exports in one country may undermine small-scale producers in another, who are unable to compete with highly subsidized imports. In the design of such programmes, governments therefore need to ensure that domestic support policies are consistent with means of implementation target 2.b which calls for correcting and preventing trade restrictions and distortions in world agricultural markets. Moreover, the design and implementation of domestic support programmes must also consider the competing priorities for public expenditures within the country, which are discussed in detail in this section.

Overall, international trade rules as defined under the WTO Agreement on Agriculture provide significant leeway for governments to support agriculture. While they impose some limitations on subsidies that are directly linked to production, they exempt from any limitation so–called "green box" measures that cause no more than minimal trade distortions. Such production and trade-neutral subsidies typically include general services – like farm research, pest control, or advisory services – as well as domestic food aid, decoupled income support, disaster relief, investment aid, or environmental programmes. By establishing a cap on the more trade distorting measures – e.g. input and output subsidies or price support schemes – WTO disciplines implicitly encourage a shift towards unconstrained green box measures.

3.3.1 Input and output subsidies

Input and output subsidies are often used to support the production of staple food crops, and as such, can be important for ensuring food security and achieving SDG target 2.1 in a country. However with, output subsidies on the other hand, typically provide producers with a certain income transfer that is linked to the volume of production, which, like input subsidies, has the effect of providing incentives to increase production.

TARGET 2.1 TARGET 2.3

Implications for improving food security and producer incomes

Input and output subsidies are often used to support the production of staple food crops, and as such, can be important for ensuring food security and achieving SDG target 2.1 in a country. However, with their focus on improving productivity, access to credit and raising incomes of producers, these policies can be considered important for achieving SDG target 2.3. Subsidies to producers have historically represented an important feature of agricultural development trajectories of many countries, and they continue to dominate agriculture-sector budgets in many developing countries, for example in sub-Saharan Africa today (Pernechele, Balie and Ghins, 2018). For input subsidies, typically, a key objective is to support agricultural productivity improvement: by reducing costs of inputs, not only are farmers able to afford the inputs, but higher profitability can reduce their risks of adopting new technologies and production practices (Dorward, 2009). By

supporting producer incomes, output subsidies can similarly aim to reduce production risks of small-scale rural producers, who would otherwise remain vulnerable to fluctuations in the market. In other cases, output subsidies aim to promote the production of strategic crops e.g. corn and soybean for biofuel. Finally, subsidies supporting investment by poor farmers in their farm – e.g. through preferential credit lines – can help correct market failures which often result in insufficient credit allocation in developing countries to medium, small and micro-produce farmers.

Beyond their effects on domestic markets, input and output subsidies can also have implications for producer incomes in the country's trading partners. By lowering the costs of production in the case of input subsidies, or promoting higher incomes in the case of output subsidies, subsidies allow farmers to compete with imports. At the same time however, these types of policy measures can unfairly under-price competitors in the export market. They can deprive small producers in both developed and developing countries of the opportunity to sell their products abroad even if they are actually more efficient and competitive.

Subsidies on biofuels also need to be examined for their impacts on other countries. Using crops for biofuels can reduce the availability of food and feedstock, and consequently increase their prices, ultimately contributing to lower consumption and nutritional well-being of net buyers. While it could also mean higher incomes for some farmers in developed and developing countries, and perhaps, under some conditions, some reduction in greenhouse emissions, there is still debate about the potential trade-distorting effects of biofuel subsidies, and the welfare distribution among winners and losers (Fan *et al.*, 2018).

TARGET 2.3 Implications for other public investments

While there is evidence that measures such as input subsidies can support significant improvements when they are effectively applied to overcome market failures constraining growth in rural areas, it is also acknowledged that these are very costly measures, and prone to inappropriate design and implementation (Dorward, 2009). Such policies can divert resources away from potentially higher-impact public investments towards achieving the same stated objectives of improving production and productivity. Input subsidies can crowd out the private sector from participating in input markets, which, among other issues, can impact their fiscal sustainability. Moreover, the food production response is often lower than expected, due to policy implementation issues such as poor targeting of programmes to the poorest and most vulnerable households, and lack of appropriate monitoring mechanisms. The efficiency and equity implications of input subsidy measures should therefore be carefully evaluated and considered against the expected benefits and costs of other policy options that could achieve the same objectives, in particular in the long-term, as efficiency tends to decrease over time (FAO, 2015).

TARGET 2.4

Implications for the achievement of environmental sustainability targets

The environmental implications of the use of input subsidies must also be considered, particularly when they are provided to producers of products associated with high GHG emissions, such as cotton, livestock products, livestock feed, or rice (Charveriat, 2018). Taking into account that food production and its supply chain accounts for approximately 30 percent of global energy consumption, shifting away from fossil fuel subsidies towards incentives for more renewable energy will be important (Fan *et al.*, 2018). For instance, incentives may be needed for farmers to adopt climate-smart agricultural technologies, particularly for small-scale farmers who face significant cash constraints and tend to be risk averse. In this context, it may be important to discuss the rules in the WTO Agreement on Agriculture and their implications for the efforts of governments to implement measures promoting environmentally sustainable practices. For instance, certain risk management measures that may be needed to provide stability to farmers, could nonetheless be classified as Amber Box support, and thus face limits on the amount of support that can be provided (FAO, 2018a). The concept of trade distorting subsidies in the WTO could be complemented


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by the notion of environmentally harmful or climate change distorting subsidies, which could be phased out within a specific timeline (Charveriat, 2018).[10] These may include for instance, subsidies for unsustainable energy use (e.g. subsidies for fossil fuel use, as well as those for non-sustainable energy production e.g. biofuels), as well as direct and indirect input subsidies (e.g. pesticides and fertilizers, and under-priced water and electricity use, respectively). Moreover, a peace clause for subsidies to encourage sustainable production and consumption could be explored, possibly together with requirements for countries to have a long-term sustainability plan in place (Charveriat, 2018). At the global level, both WTO negotiations as well as the G20 could serve as appropriate platforms to address these issues.[11]

3.3.2 Market price support and public stockholding programmes

Market price support schemes and public stockholding programmes have been growing in a number of developing countries and particularly emerging economies. In practice, such schemes differ widely in their objectives and design, and often target different types of producers (ICTSD, 2016). They also tend to involve several agencies and institutions responsible for the procurement, storage and release of food grains, often in conjunction with provincial governments and private companies. Many countries operate government food reserves, most notably for grains, purchasing from farmers at administrative prices and selling to consumers at reduced prices. In the past, the use of buffer stocks designed specifically to stabilize prices were more widespread, however these attempts have proved either costly or ineffective (FAO *et al.*, 2011). Several countries such as Ethiopia or the Philippines also have emergency stocks in case of natural disasters or production shocks. Others operate social safety net stocks or combine stocks with public distribution systems. In many cases, the government buys cereals such as wheat or rice at above market prices and sells them to poor consumers at prices lower than the market prices.

TARGET 2·1 TARGET 2·2 TARGET 2·3 **Implications for farm incomes and food security in domestic markets**

Through government purchases at a minimum guaranteed price, market price support programmes can bring about important benefits to farmers who can gain access to a guaranteed outlet with a higher and more predictable price than achievable on the open market. This can encourage on-farm investment and improvements in productive practices. Moreover, such programmes can encourage improvements in product quality and food safety, as farmers often have to comply with the required standards to participate in the programmes. From a food security perspective, the purchase of crops under such schemes is often related to the building of public stocks which are

[10] The 2017 WTO decision on fisheries agreement, which calls for *"comprehensive and effective disciplines that prohibit certain forms of fisheries subsidies that contribute to overcapacity and overfishing"*, could be used as a precedent. See WTO, "Ministerial ends with decisions on fish subsidies, e-commerce duties; ongoing work continues", accessed on 13 December 2017.

[11] A promising step outside the G20 process is the initiative taken by a group of countries during the 2017 WTO Ministerial Conference in Buenos Aires which issued a statement that calls for "enhanced WTO transparency and reporting" to enable "the evaluation of the trade and resource effects of fossil fuel subsidies programmes," seeking "the rationalisation and phase out of inefficient fossil fuel subsidies that encourage wasteful consumption …" (Ministerial Statement WT/MIN(17)/54, 11 December 2017).

then used to run public distribution systems that provide food grains at concessional prices to the poorer segments of society, therefore playing a critical role in fighting hunger and malnutrition.

In practice, however, the complexity of public procurement programmes implies a high degree of organization and skills in the responsible public institutions (FAO and ICTSD, 2013). Their impact on stabilizing prices is often limited and critics point to the "leakage" of food grains due to factors ranging from poor targeting to outright corruption or wasteful management of stocks. In other cases, such schemes end up benefiting only a small set of wealthier farmers, with small producers often unaware of the existence of government procurement programmes and selling their products at prices below the administered price. Guaranteed minimum prices also tend to increase consumer prices, and governments are not always successful in offsetting such increases through food distribution programmes at subsidised prices. Finally, from a government perspective, the fiscal cost can be substantial, especially if the prices paid to farmers exceed market prices. For all these reasons, public stockholding programmes are relatively less developed in poorer countries compared to more advanced emerging economies.

On the other hand, not all schemes necessarily involve expensive procurements at administered prices. Brazil for example has created a programme specifically for family farms, benefiting approximately 200 000 farmers and distributing food to 15 million people each year (FAO and ICTSD, 2013). Unlike many other countries, the government purchases food at market prices. While this may not include any price support dimension, the programme still provides a stable and reliable market for family farms, enabling them to sell their excess production directly, without having to compete with larger suppliers.

TARGET 2·1 TARGET 2·2 TARGET 2·3

Implications for farm incomes and food security in trading partners

Public stockholding policies can contribute to suppressed international prices, to the detriment of farmers' livelihoods and food security in importing countries, if the food from reserves are periodically sold at below-market prices on international markets. This is especially the case if large quantities of surplus stock are released into already thin global markets (such as for rice). Moreover, the timing of the disposal of stocks, especially if unpredictable and not factored into traders' decision-making can influence world price levels and volatility (FAO and ICTSD, 2013). Considering the potential effects of public food stockholding on global markets, in particular when such stocks are procured through administered prices, the matter has been subject to intense debates at the WTO.[12]

[12] In the WTO Agreement on Agriculture, footnote 5 to Annex 2 clarifies that while governments have the right to acquire and sell food at administered prices, the difference between such prices and the "external reference price" must be accounted for in the Aggregate Measurement of Support (AMS) as "Market Price support". A group of developing country members proposed that food purchased at administered prices from low income or resource-poor producers be exempted from the calculation of countries' maximum permitted ceiling on trade-distorting support, however other countries have expressed concerns with this approach. At the Bali WTO Ministerial Conference in 2013, ministers opted for an interim solution in the form of a peace clause until Members agree on a permanent solution, which remains to be found.

3.3.3 Public investments in infrastructure and logistics

Agricultural infrastructure and logistics usually refer to a wide range of public services that facilitate production, procurement, processing, preservation and trade. They can include resource based infrastructure (e.g. water/irrigation, farm power/energy); physical infrastructure (e.g. road, connectivity, transport, storage); institutional infrastructure (e.g. information and communication, financial services) or marketing infrastructure (e.g. quality infrastructure for compliance with public or private standards including SPS requirements).

Infrastructure projects such as roads or irrigation can involve significant initial capital investments, long gestation periods, high risk, and low rate of returns on investments. In other cases, they may involve the creation of formal and informal institutions, such as credit institutions, agricultural research and extension, or rural literacy. Large-scale infrastructure projects remain largely funded by the public sector through direct investment. However, governments have increasingly been experimenting with different funding options, including public-private partnership and promoting the participation of financial institutions. The models of public-private partnerships range in turn from donor-funded projects to entirely privately financed projects.

While the state of rural infrastructure varies widely among developing countries, most lower-income developing countries still suffer from significant deficiencies in transportation, energy, telecommunication, and related infrastructure resulting in poorly functioning domestic markets, low price transmission, and weak international competitiveness.

From a trade perspective, and in contrast with input or output subsidies, such support measures do not involve transfer to individual producers but rather to the sector as a whole, and often focus on the delivery of public goods. Because of their horizontal nature and the fact that they are not linked to production, they are less likely to affect relative prices or to generate trade distortions. For this reason, such programmes tend to be relatively uncontroversial. In the WTO they usually fall under the green box category and are not subject to any limitation. The main constraint affecting such spending remains their high cost. Given budget limitations in most developing countries, infrastructure tends to be underdeveloped or funded at the expense of other agriculture sector priorities including input or output subsidies which often lead to more immediate results in production terms and usually have more political appeal.

TARGET 2.1 TARGET 2.2 TARGET 2.3 Implications for promoting access to food and increasing income and productivity

From an SDG perspective, government spending for infrastructure and logistics are particularly relevant to targets 2.1 to 2.3. Transport and storage infrastructure can help reduce food waste and bring farm products where they are needed promptly and efficiently. In the absence of storage facilities, farmers often need to sell their farm products all at once and immediately after harvest when prices tend to be lower, which has clear consequences on their incomes. The level of both physical and institutional infrastructures also influences the spread of proven and demonstrated

yield-enhancing agricultural technologies. More broadly, adequate infrastructure tends to raise farm productivity and lower farming costs. Its fast expansion accelerates agricultural as well as economic growth rates by producing large multiplier effects. For example, research (notably in China) has shown that government investments in rural infrastructure — such as irrigation and roads — together with agricultural research and development have a significant impact on agricultural productivity growth and reductions in poverty (Fan *et al.*, 2018). Logistic infrastructures also play a critical role in supporting integration in world markets. In a global agricultural system increasingly dominated by international value chains, transport, storage, cold chain management, and the ability to meet standards and product specifications is a *sine qua non* condition for accessing markets. Government support for standard compliance can also lead to economic upgrading as illustrated by different experiences in the Kenyan and Sri Lankan tea industries (Fessehaie and Morris, 2018).

TARGET 2.4

Implications for supporting resilient agricultural systems

The biophysical impacts of climate change – including long term changes in temperatures and precipitation and the increased likelihood of extreme weather events – are likely to affect agricultural production and trade patterns. Investment in infrastructure such as irrigation systems but also storage and transport infrastructure or information and monitoring systems can significantly strengthen countries' capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters as envisaged under SDG target 2.4.

3.3.4 Public investments in agricultural research and development (R&D), extension and technology transfer, and related rules on intellectual property rights (IPR)

Investment in agricultural research and development (R&D), extension services and technology transfer can play a critical role in addressing some of the more daunting challenges facing agriculture such as deteriorating soils, climate change or food price volatility. Over the past 50 years, most of the improvements in agricultural productivity have arisen from innovations and changes in technology. Both public and private investments in agricultural R&D and extension services have contributed to this achievement. The traditional mechanism of supporting research, both in developed and developing countries, was through public sector subsidies for agricultural research, including food processing research as well as seed and breeding research.[13] On the private sector front, the rise of hybrid maize in the United States in the mid-20th century and the development of genetic engineering in the late 20th century saw the developed world seed industry becoming a source of significant advanced technology, both through traditional breeding and through biotechnology. With significant costs involved in the development of such technologies the industry changed in the 1990s from a broadly decentralized seed industry to a highly centralized one of roughly five major firms.

[13] For the developing nations, the leading institutions in breeding new varieties during much of the last three decades of the twentieth century were those of CGIAR, which coordinates research centres throughout the world to meet developing world agricultural research needs.

Following a decade of slow growth, global public spending on agricultural R&D increased steadily in the 2000s in developing countries, whereas growth in high-income countries continued to stall or even decline. However, spending growth in the developing world was largely driven by a few advanced middle-income countries — such as China, Brazil and India — often masking negative trends in numerous smaller, poorer, and more technologically challenged countries. Poorer countries, notably in Africa, have remained highly vulnerable to funding volatility, which has tended to impede continuity and ultimately the viability of research programs. Many countries lack the necessary human, operating, and infrastructural resources to successfully develop, adapt, and disseminate science and technology innovations (Beintema *et al.*, 2012).

From a trade perspective, public support for R&D investment or extension services focuses on the delivery of public goods. In the WTO, support to R&D usually falls under the green box category and is not subject to any limitation.

TARGET 2.1 TARGET 2.2 TARGET 2.3

Implications for agricultural productivity, nutrition and food security

With some of the highest rates of return among all rural development investments, support to R&D is often considered as a key vehicle to end hunger and poverty, and meet expected increase in demand for food in the 21st century. During the 1960s and 70s, the Consultative Group on International Agricultural Research (CGIAR) centres were largely responsible for the success of the Green Revolution under which approximately 60 percent of the rice and wheat of Asia and Latin America was replaced by high-yielding dwarf varieties able to use fertilizer more effectively. This investment in agricultural research has been one of the highest benefit forms of public expenditure ever undertaken. Similarly, in the 1980s, policy and institutional reforms, as well as a strong commitment to research, lifted agricultural productivity in Brazil and China above the rest of the developing world, and both countries have maintained rapid growth ever since.

From an SDG perspective, a major challenge consists in focusing R&D spending on the concerns of subsistence farmers, particularly in the remaining areas of serious poverty in Africa and South Asia, and the need to find new ways of working with the private sector, both for achieving long-term goals such as responding to climate and environmental change and for achieving more short term goals such as bringing the benefits of commercial technologies to subsistence farmers. For example, with cellular phone services now becoming available even in remote rural areas, user-friendly applications that allow farmers to monitor prices, purchase inputs, or sell their crops electronically can be extremely beneficial and cost-effective. In a smallholder economy, the task of R&D and technology transfer remains to improve the subsistence farmer's standard of nutrition. In a more market-oriented economy however, R&D and technology transfer aim to increase production of marketable products, improve the movement of food from the farm to the consumer and contribute to economic diversification. As farmers venture into new crops, for example, they often rely on new technologies that are affordable, profitable and simple enough for them to understand and apply (Montemayor, 2018).

TARGET 2.4 TARGET 2.5

Implications for promoting sustainable food production systems and resilient agricultural practices

Environmental concerns including water scarcity or the need to adapt to climate change and to reduce GHG emissions are generating new research and innovation priorities in agriculture. While new traits, varieties and crops will play an important role, the range of relevant practice and technologies that are needed for mitigating or adapting to climate change in the agricultural sector is much broader. Water management, production practices, post-harvest technologies, information and forecasting, insurance, and other practices or technologies with the potential to increase sustainably the intensity of land use may be as effective in addressing climate change. In many countries, however, agricultural research and extension services need greater capacity to enable responses to climate change, including adequate funding and policy support for requisite expertise in climate science and agricultural science. The new challenges brought by climate change reinforce the pressing need for revitalization of a holistic extension system that can help farmers make locally appropriate innovations and balance between sustainable food production

and delivery of environmental services. A broader perspective on extension systems should be adopted by governments and private sector representatives, including a more important role for farmer organizations in setting the agenda for extension and research institutions. Developing such capacities could lead to better coherence among poverty alleviation, market orientation, food security, and climate change goals that are being pursued in rural development.

To some extent, public and private investment in research and development can also contribute to safeguarding genetic diversity, including through support for plant breeding and innovation, thereby contributing to the target set out under SDG 2.5. This can include support for seed and plant banks which seek to promote the conservation and sustainable use of varieties in a centralised location. However, arguably the most significant contribution to this SDG target is carried out by farmers themselves, through the use of traditional breeding techniques *in situ,* on their fields. Because these efforts are not rewarded commercially by markets, effectively these producers are providing a public good which is under-recognised. Many farmers maintain genetic diversity and conduct innovation despite often being trapped in persistent poverty (Dutfield, 2018). While trade agreements frequently contain provisions aimed at establishing higher levels of protection for intellectual property, these may conflict with public policy goals that developing countries may have established around the protection of genetic diversity or technology transfer, especially if complementary measures such as competition policy frameworks are poorly developed or non-existent.

3.3.5 Policy measures to support income including income-diversification, insurance programmes and social safety net measures

Measures to directly support inocmes of the poor can include crop or income diversification programmes or subsidised insurance schemes to protect farmers against climatic risks, production or price shortfall. Alternatively, support policies can target poor consumers by providing social safety nets of different kinds ranging from food-for-work schemes through in-kind or conditional cash transfers. Unlike infrastructure spending or investments in R&D and extension services, such forms of support tend to target farmers or consumers as opposed to the sector as a whole. Depending on how these programmes are designed, they may be linked to production (e.g. subsidised insurance schemes), or completely decoupled (e.g. social safety nets or direct decoupled payments).

TARGET 2.3 Implications for promoting diversification, value addition and non-farm employment

In many developing countries, government interventions tend to focus on improving yields and boosting incomes of farmers from the primary crops they cultivate and/or animals they raise. However, these primary sources of income may not always be sufficient to lift farmers out of poverty not least because of the small scale of their operation and the relatively low value of the crops or animals they normally raise. Accordingly, it may be necessary to increase the range of economic opportunities for farmers to generate more income and diversify their income sources. These opportunities can provide incremental income flows to farmers while they wait to harvest

their main seasonal crops. They can also provide a hedge against losses on primary crop in case of calamities. Farmers can also sell their livestock or supplemental crops to address personal emergencies instead of having to mortgage their land or divert funds intended for their farms (Montemayor, 2018).

Diversification strategies for small producers require the adoption of farming system approaches to create synergies among various farming activities. Non-farm activities such as food processing, intermediate manufacturing, or the provision of carpentry, food supply and other services to rural residents could likewise be significant sources of supplemental income. This implies that income diversification and enhancement programmes should involve farm households and communities and not just individual farmers, farms or crops, and should incorporate productive opportunities to be taken up by different members of the farm family and the farming community (Montemayor, 2018).

TARGET 2.5 Implications for promoting sustainable production and resilient agricultural systems

Income support schemes can also contribute to addressing environmental challenges. In the European Union for example, decoupled direct payments to farmers are designed specifically to encourage practices which address environment and climate policy goals or to assist farmers in areas with specific natural constraints. Such requirements include the need to maintain a diversified set of crops, to conserve permanent grassland and to devote a share of arable land to ecological practices including land left fallow, buffer strips and afforested areas. Other income support schemes may be linked to the adoption of climate-smart agricultural practices. In the WTO Agreement on Agriculture, schemes such as environmental payment programmes, may qualify under Green Box support (i.e. not subject to limits) so long as they meet the condition of having a minimal effect on production, and that payments do not exceed the additional costs of adoption or a resulting loss of income incurred by farmers. However, inducing farmers to adopt climate smart agricultural practices through such programmes, while meeting the condition of generating little or no private gain in the short term can be challenging.

Other types of support, however, can have the opposite effect and reduce the capacity of the sector to adapt to environmental and climate change. For instance, subsidising crop insurance – instead of providing other forms of financial support, conditional on changing practices – could insulate producers from increased climate risk and create a disincentive to the adoption of climate-smart practices (Charveriat, 2018). Similarly, reduced insurance premiums or relief from natural disasters can serve as a disincentive to adaptation or even as a perverse incentive to continue farming on marginal and degraded land not suitable for agricultural production.

TARGET 2.1 TARGET 2.2 Implications for ending hunger and all forms of malnutrition by supporting poor consumers

Another type of income support consists of supporting poor consumers. These schemes may include in-kind transfers when households are unable to source foodstuffs from the market at a reasonable price, or when specific nutritional deficiencies exist. Alternatively, governments can provide cash transfers when food insecurity results more from problems of accessibility. Such transfers tend to provide beneficiaries with a greater degree of flexibility, and can be distributed quickly and at lower cost. They can be beneficial to both producers and consumers, and reduce the risks of market disruption. An FAO-UNICEF impact evaluation project of cash transfers programmes in eight countries in sub-Saharan Africa found positive implications for food security and nutrition outcomes, including through increased food expenditure, particularly on animal-based foods (Davis *et al.*, 2016). It also found positive implications for beneficiary livelihoods, including through increased investment in assets, improved flexibility in household labour allocation and improved ability to manage risks. Higher amounts of transfers, and the regularity and predictability of their provision were found to be important determinants of the positive outcomes (Davis *et al.*, 2016).

Transfers can be both unconditional and conditional. Transfers without particular co-responsibilities are suitable when programmes do not pursue specific objectives or need to

reach particular categories of people unable to meet obligations such as the elderly, infirm and disabled, or orphans. In some countries, governments provide regular cash transfers to pre-identified families for the education or nutrition of their children. Health and medical insurance programmes, and emergency relief services following calamities, will likewise help farmers cope with crises when their cash resources are inadequate. These could include conditional cash transfers or arrangements allowing farmers to work on local infrastructure projects during their free time and receive payment for their services, such as the Mahatma Gandhi National Rural Employment Guarantee Act food-for-work scheme in India (Montemayor, 2018). Overall, large scale adaptive safety nets providing predictable and regular transfers, such as the Productive Safety Net Program in Ethiopia, or Progresa in Mexico, have shown that they are capable of improving consumption and nutrition in vulnerable households significantly while creating the conditions conducive to a long term reduction in food insecurity for both producers and consumers.

From a trade policy perspective, the notion of getting purchasing power directly to poor consumers has many attractions and is superior to more indirect ways of dealing with food insecurity such as price controls or production support. It stimulates the local economy and adds to the demand for local and regional produce. By targeting consumers, this form of support is unlikely to discriminate among producers or create distortions.


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4. Conclusions

With trade recognized as a means of implementation under Agenda 2030, policy-makers will need to ensure that trade, and policies affecting trade and markets, are taken into consideration as part of their efforts to achieve SDG 2.

The five targets that set out the level and ambition of SDG 2 (ending hunger; ending all forms of malnutrition; doubling the agricultural productivity and incomes of small-scale food producers; ensuring sustainable food production systems; and maintaining genetic diversity), as well as trade itself, often constitute distinct policy priorities for governments. Trade and related policy measures which may be designed to achieve one target can potentially have unintended negative consequences that undermine the achievement of other targets, both within the country where the measure is applied and in the trading partner countries.

It is therefore important that policy-makers identify and recognize areas in which difficult trade-offs may be needed between competing policy objectives, and identify possible ways in which these can be addressed. Furthermore, while the different targets set out under SDG 2 are mutually interdependent and inter-related, it is important to address the trade policy dimension of each component individually as part of a broader plan of action.

This paper highlighted the various policy measures that can affect trade and markets. These include border measures such as tariffs, export restrictions, and non-tariff measures, each of which can have immediate effects on trade flows. At the same time, "behind-the-border" domestic support measures, such as input and output subsidies, market price support and public stockholding measures, and public investments in infrastructure and R&D, among others, can also have significant effects on trade and markets, through the impacts that such measures have on domestic production.

It is important to recognize that the same policy measure can have different implications for different SDG targets, depending on whether a country is a net exporter or importer; the size of its production, trade and consumption; and the way in which policies are designed and implemented, among other factors. The impacts may also vary in the short and long run, as the expectations of economic actors vary over time.

Reducing high import tariffs and gradually phasing out tariff-rate quotas on a given product, for instance, can contribute to addressing the priorities of SDG targets 2.1 and 2.2, by diversifying the supply of healthy food, lowering food prices, and generally, by helping to move food from regions of low production cost and ample supply to areas of high production cost and insufficient supply to meet demand, which can be particularly relevant for countries with a high dependence on imported food. At the same time, however, there may be implications for producers in importing

countries, whose incomes might be undermined by import competition, thus negatively affecting the achievement of SDG target 2.3. There may also be consequences for the achievement of environmental sustainability objectives (priorities under SDG target 2.4), if the trading partners apply different environmental requirements, in which case removing tariffs can put farmers in countries with more stringent regulation at a competitive disadvantage and lead to carbon leakage.

The application of export restrictions also provides examples of the competing priorities between different policy objectives; particularly, between short- and longer-run objectives within the domestic market, as well as between the policy objectives of two trading partners. Export restrictions are often used with the objective of addressing domestic food security concerns related to rising food prices. In the immediate term, such measures may indeed boost availability and lower food prices in domestic markets, improving access to food and contributing to the achievement of SDG targets 2.1 and 2.2. However, even in the short-run, there are implications for producer incomes (SDG target 2.3) which may be significantly diminished by lower food prices. Moreover, in the medium-to-long run, the initial effects of the policy may be reversed as farmers respond to lower price incentives and policy uncertainty by decreasing area harvested for the affected product in the following cropping season. This can contribute to lower production and higher prices in the medium-to-long run, mitigating the initial positive implications of the measure for SDG targets 2.1 and 2.2. Crucially, the application of export restrictions can undermine the achievement of SDG targets 2.1 and 2.2 in importing countries by lowering food availability on world markets, and contributing to higher prices, particularly if the measures are implemented simultaneously by many exporting countries.

Among behind-the-border domestic support measures, input and output subsidies as well as market price support measures are among the most contentious elements of governments' agricultural policies. One of the reasons for this is that such measures can involve important choices between different policy objectives. Input subsidies for instance, can be crucial for improving agricultural productivity and lowering farmers' production costs, with positive implications for SDG target 2.3. Market price support measures can directly aim to improve producer incomes, by providing a guaranteed outlet and more predictable prices than achievable on the open market, therefore having similar positive implications for SDG target 2.3. However, in addition to the high fiscal costs and administrative burden associated with such measures, they can also have implications for the achievement of environmental sustainability priorities (SDG target 2.4), for instance, if they provide production incentives for products with high greenhouse gas emissions. At an international level, there may be consequences of such measures for producer incomes in the trading partners (SDG target 2.3), as they can under-price competitors and undermine the opportunity for small producers in the importing country to sell their products abroad, even if they are actually more efficient and competitive. Moreover, they can result in an inefficient allocation of productive resources across regions and exacerbate environmental pressures.

A deliberate effort to ensure complementarity of trade and agricultural policies can go a long way in ensuring the effectiveness of policy measures, and potentially resolving some of the trade-offs associated with them. For instance, there are many cases in which policy makers provide farmers with incentives to produce, such as through input subsidies and market price

support measures, while at the same time applying export restrictions that have the opposite effect on producer incentives. Improving coordination across different ministries and agencies responsible for designing and implementing agricultural and trade policies can help to resolve such inconsistencies. Moreover, while trade and agricultural policies can have a direct effect on SDG 2 outcomes through their impact on production and markets for food and agriculture, policies in other areas can be important too, including in areas such as environment, energy, and health and nutrition. Government frameworks that affect how markets function in these areas can translate directly into impacts on food and nutrition security and sustainable agriculture, and must therefore be part of a holistic, complementary policy package.

It is also important to note that there are some measures that generally have positive implications for the achievement of the SDG 2 targets. These include public investments in infrastructure, such as storage facilities that can improve farmer prices (affecting SDG target 2.3), rural roads that can connect producers to markets (affecting SDG target 2.3), and efficiencies in trade and logistics that can reduce food waste and bring farm products where they are promptly needed (affecting SDG targets 2.1 and 2.2). Similarly, public investments in R&D have some of the highest rates of return among all rural development initiatives, with positive implications for agricultural productivity, nutrition and food security (affecting SDG targets 2.1 to 2.3). From a trade perspective, and in contrast with input or output subsidies, such support measures do not involve transfer to individual producers but rather to the sector as a whole and often focus on the delivery of public goods. For this reason, in the WTO they usually fall under the green box category and are not subject to any limitation. Depending on the specific circumstances, increasing public expenditure in these types of measures can offer a “win-win” solution for many countries.

Lastly, understanding and monitoring progress towards SDG 2 will be key to ensuring that the goals and targets are achieved within the time-frame that leaders have agreed. In the area of trade and markets, governments will need to go beyond a narrow focus on the elimination of agricultural export subsidies, and take a broader approach to indicators of progress that encompasses the range of measures that affect trade and markets in the global food system.

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