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A MULTI-BILLION-DOLLAR OPPORTUNITY

Repurposing agricultural support to transform food systems

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FOREWORD

With eight years remaining, we are falling far short of the trajectory needed to achieve the Sustainable Development Goals (SDGs), and to halve global greenhouse gas emissions in line with the Paris Agreement. As evidence from the Intergovernmental Panel on Climate Change clearly reveals, we are not acting fast enough or comprehensively enough to deliver these commitments in a world that has been further challenged by the health crisis and unprecedented socio-economic impacts of the COVID-19 pandemic.

The international community – including the three United Nations agencies we represent – recognizes that the transformation of our agri-food systems can be a catalyst to building forward better for the post-COVID-19 era. Transforming agri-food systems so that they become healthier, more sustainable, equitable and efficient involves several strategies. This report addresses one critical entry point, namely rethinking and updating the approach used to support agricultural producers.

Agriculture is the ultimate source of our food, feed and fuel, and for millions of farmers, including 500 million smallholder farmers worldwide – many of whom are women – it is the main source of their livelihood. It drives economic activity throughout our agri-food systems, including production, aggregation, processing, distribution and consumption. Agriculture and agri-food systems have a critical role to play in ending poverty in all its forms, eradicating hunger, achieving food security and improved nutrition, and reducing inequalities.

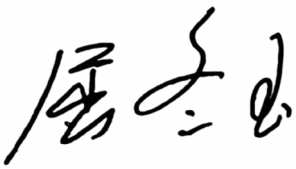
The policies that shape how and where we use land and other natural resources to feed the world's population have extraordinary potential to promote healthy consumption and sustainable production patterns which, in turn, are key to reducing emissions and protecting our planet and its biodiversity.

As this report demonstrates, the way governments around the world support agriculture is a factor in the global and environmental challenges that agri-food systems are facing. Current support to agricultural producers worldwide works against the attainment of the SDGs, the targets of the Paris Agreement and our common future. This support is biased towards measures that are harmful and unsustainable for nature, climate, nutrition and health, while disadvantaging women and other smallholder farmers in the sector. At a time when many countries' public finances are constrained, particularly in the developing world, global agricultural support to producers currently accounts for almost USD 540 billion a year. Over two-thirds of this support is considered price-distorting and largely harmful to the environment.

This report highlights how coherent policymaking for agriculture can result in significant benefits for the sector, the environment and human health. By providing evidence on the potential positive impacts of eliminating harmful agricultural support, it makes a convincing case for repurposing such support – rather than eliminating it altogether. The report presents six steps that governments can consider to develop and implement agricultural support repurposing strategies, while also recognizing that there is no one-size-fits-all solution, and that an optimal repurposing strategy will depend on many factors and on country context.

We urge countries to seize this opportunity and consider options for repurposing agricultural support. Parliamentarians, decision makers, farmers, manufacturers, producers, distributors, consumers, and all other agri-food systems stakeholders, including women, youth, Indigenous Peoples and local communities – all of us must organize to steer our agricultural support away from its current trajectory.

The UN Food Systems Summit, the post-2020 Global Biodiversity Framework at the Conference of the Parties (COP) to the Convention on Biological Diversity (COP15) and the COP26 to the UN Framework Convention on Climate Change (UNFCCC) are milestone opportunities for countries to commit to this bolder path of action, and to prepare repurposing strategies for which our organizations can provide support.



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ABBREVIATIONS AND ACRONYMS

ACT	All commodity transfers
BIOFIN	Biodiversity Finance Initiative
BRIC	Brazil, Russian Federation, India and China
CAP	Common Agricultural Policy
CCFP	Conversion of Cropland to Forest Program
CES	Constant elasticity of substitution
CGE	Computable general equilibrium model
COP	Conference of the Parties
EFDPP	Environmentally Friendly Direct Payment Program
FAO	Food and Agriculture Organization of the United Nations
FISP	Farm Input Subsidy Programme
FLE	Forestry, land management and environmental protection
GATT	General Agreement on Tariffs and Trade
GCT	Group commodity transfers
GDP	Gross domestic product
GHG	Greenhouse gas
HFCS	High fructose corn syrup
IDB	Inter-American Development Bank
IEEP	Institute for European Environmental Policy
IFPRI	International Food Policy Research Institute
ILUC	Indirect land use change
IMF	International Monetary Fund
LES	Linear expenditure system
MAFAP	Monitoring and Analysing Food and Agricultural Policies
NRA	Nominal rate of assistance
NRP	Nominal rate of protection
OECD	Organisation for Economic Co-operation and Development
OTP	Other transfers to producers
PoU	Prevalence of undernourishment

PRACAS	*Programme d'accélération de la cadence de l'agriculture sénégalaise*
PSNP	Productive Safety Net Programme
R&D	Research and development
SCM	Subsidies and Countervailing Measures
SDGs	Sustainable Development Goals
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VAT	Value added tax
VoP	Value of production
WHO	World Health Organization
WTO	World Trade Organization

KEY MESSAGES

- Agricultural support is not providing desirable results for sustainability and human health, but repurposing it can be a game changer. It offers governments an opportunity to optimize the use of scarce public resources to transform food systems in ways that make them not only more efficient, but also more supportive of the SDGs.
- Globally, support to agricultural producers currently accounts for almost USD 540 billion a year, or 15 percent of total agricultural production value. This support is heavily biased towards measures that are distorting (thus leading to inefficiency), unequally distributed, and harmful for the environment and human health. Under a continuation of current trends, this support could reach almost USD 1.8 trillion in 2030.
- Phasing out the most distorting and environmentally and socially harmful producer support (i.e. price incentives and fiscal subsidies tied to the production of a specific commodity) is essential, but this will not bear fruit if resources are not redirected towards investments for the provision of public goods and services for agriculture (i.e. research and development and infrastructure) and to decoupled fiscal subsidies.
- Any repurposing strategy is dependent on a range of factors and country-specific circumstances, involving policymakers and all relevant stakeholders through public outreach and communication strategies to ensure buy-in and policy coherence across all food systems components. This includes measures to mitigate negative short-term impacts especially for the most vulnerable groups, including smallholder farmers, many of whom are women.
- Six steps governments may follow to develop and implement a repurposing strategy include: estimating the support already provided; identifying and estimating the impact of the support provided; designing the approach for repurposing agricultural producer support, including identifying needed reforms; estimating the future impact of the repurposing strategy; reviewing and refining the repurposing strategy, prior to implementation; and monitoring the outcomes of the new agricultural producer support.
- A few countries have begun repurposing and reforming agricultural support, but action needs to be broader, bolder and faster worldwide. The time has come for greater collaboration and cooperation across government, research institutions, non-governmental organizations and the private sector to develop the evidence on which successful repurposing strategies can be built. The United Nations Food Systems Summit 2021 and other subsequent forums present a momentous opportunity to spearhead action in this direction.

Farmer watering
his field in Kenya.

EXECUTIVE SUMMARY

CURRENT AGRICULTURAL SUPPORT POLICIES ARE STEERING US AWAY FROM ACHIEVING THE SDGS AND THE GOALS OF THE PARIS AGREEMENT. BUT THERE IS STILL TIME TO REPURPOSE AGRICULTURAL SUPPORT TO DRIVE A TRANSFORMATION TOWARDS HEALTHIER, MORE SUSTAINABLE, EQUITABLE AND EFFICIENT FOOD SYSTEMS

Food systems[1] are vital for the 2030 Agenda for Sustainable Development. They support ending poverty, eradicating hunger, achieving food security, improving nutrition, promoting sustainable agriculture, fostering sustainable consumption and production, combating climate change, nurturing nature, and reducing inequalities. However, public support mechanisms for agriculture are not helping to improve the conditions under which food is produced; indeed, they are actively steering us away from achieving the SDGs and the goals of the Paris Agreement.

Food systems and the agriculture sector have made impressive strides in producing food to feed a growing population, reducing real food prices in many countries, improving food safety and reducing food-borne illnesses. However, food systems are also contributing to – and facing the consequences of – complex global and environmental challenges including climate change, environmental degradation and natural resource constraints.

The State of Food Security and Nutrition in the World report in its 2021 edition indicates that the world is not on track to eradicate hunger, food insecurity and malnutrition in all its forms by 2030. After remaining virtually unchanged for five years, the prevalence of undernourishment (PoU) increased by 1.5 percentage points in 2020 – reaching a level of around 9.9 percent. In 2020, over 720 million people in the world faced hunger, and nearly one in three people in the world (2.37 billion) did not have access to adequate food. Healthy diets were out of reach for around 3 billion people, especially the poor, in every region of the world in 2019. At the same time, population growth is resulting in an ever-increasing demand for food. These challenges have been exacerbated by the COVID-19 pandemic, which risks overwhelming food systems (FAO, IFAD, UNICEF, WFP and WHO, 2021).

Government agricultural support policies are not fit for today's food systems

As this report demonstrates, the way governments around the world support agriculture is a factor in the global and environmental challenges that food systems are facing. While not accessible to

[1] Agri-food systems is a term increasingly used in the context of transforming food systems for sustainability and inclusivity. Agri-food systems encompass both agricultural and food systems and focus on both food and non-food agricultural products, with clear overlaps (FAO, IFAD, UNICEF, WFP and WHO, 2021). While broader agri-food systems transformation is of upmost importance – hence the reference to it in the Foreword, this report focuses only on food systems.

all producers, agricultural producer support in particular has led to some farming practices that are harmful to nature and health and largely focused on certain commodities, thus hindering the health, sustainability, equity and efficiency of food systems.

Against this backdrop, agricultural producer support needs to be repurposed and reformed to support a transformation of our food systems and the achievement of the SDGs. Repurposing is defined in this report as a reduction in agricultural producer support measures that are inefficient, unsustainable and/or inequitable, in order to replace them with support measures that are the opposite. This means agricultural producer support is not eliminated but reconfigured. In this way, repurposing will always imply reforming.

By repurposing agricultural producer support, governments can optimize scarce public resources to support food systems in ways that make them not only more efficient, but also more supportive of healthy lives, nature and climate. This can also be an opportunity to achieve a strong economic recovery in a post-COVID-19 pandemic world.

This report provides policymakers with an analysis of agricultural support globally and by country income group over time, along with a six-step guide on how to repurpose agricultural producer support – and the reforms required – to better support the transformation of our food systems and the achievement of the SDGs.

AGRICULTURAL PRODUCER SUPPORT TODAY FAVOURS POLICIES THAT ARE DISTORTING AND HARMFUL TO THE ENVIRONMENT AND HUMAN HEALTH

This report provides an updated estimate of agricultural producer support in the world, covering 88 countries. Support to producers makes up the lion's share of all agricultural support and is thus the focus of the report. Between 2013 and 2018, net support to agricultural producers individually averaged almost USD 540 billion per year – representing around 15 percent of total agricultural production value. Of this, about USD 294 billion was provided in the form of price incentives and around USD 245 billion as fiscal subsidies to farmers, the majority (70 percent) being tied to the production of a specific commodity. Only USD 110 billion was used to fund transfers to the agriculture sector collectively, in the form of general services or public goods.

Agricultural producer support measures can have negative effects

Price incentives and fiscal subsidies are forms of support that may have significant negative implications on food systems, as they incentivize production practices and behaviours that might be harmful to the health, sustainability, equity and efficiency of food systems.

Price incentives are the result of border measures (e.g. import tariffs and export subsidies) that generate a gap between the domestic producer price and the border price of a specific agricultural commodity. These measures, while favouring some producers (e.g. of certain crops), can potentially distort food trade, production, and consumption decisions. Similarly, fiscal subsidies linked to the production of a specific commodity (coupled subsidies) can lead to negative environmental outcomes (e.g. through overuse of agrochemicals and natural resources, and the promotion of monoculture) and nutritional outcomes (e.g. by disproportionately fostering production of staples versus fruits and vegetables). These subsidies also drain public resources that could instead be invested in areas where returns are higher and benefits more long lasting, thus hindering efficient and more sustainable use of often-limited public funds.

Support coupled to production can ultimately hamper sustainable market development, trigger price shocks at a global scale, incentivize the production of emission-intensive products, or penalize the availability and affordability of more diversified and nutritious food, particularly for the poorest consumers. On the contrary, subsidies not tied to the production of a specific crop and fiscal transfers for the provision of general sector services are the least distorting measures, and less likely to increase pressures on sustainability. This type of support does not influence the type or volume of agricultural production, thus allowing for decisions that are more efficient.

Emission-intensive and unhealthy commodities receive the most support

The report finds that unhealthy products, like sugar and emission-intensive commodities (e.g. beef, milk and rice) receive the most support worldwide, despite the potentially negative impacts on health as well as on on climate change adaptation and mitigation, and the (relative) disincentives this support creates towards producing healthier and more nutritious foods, such as fruits and vegetables. The negative repercussions on the climate are particularly relevant for high- and upper-middle-income countries that consume more dairy and meat products per capita than poorer countries. In least developed countries, where the production of staple foods (i.e. cereals) receives the highest rates of support, farmers have fewer incentives to diversify production towards more nutritious foods.

Distorting support measures are still prevalent in high- and middle-income countries

The way countries support their agriculture sector varies widely according to their policy objectives, and tends to change as countries develop. Price incentives and fiscal subsidies tied to production are – and have been – the most widely used in high-income countries (e.g. European Union Member States). Such support accounted for over 40 percent of global agricultural production value in 2005, but the trend since then has been mostly downward. Conversely, since the early 1990s, these distorting measures have become more prominent in some middle-income countries with notable emerging economies (e.g. China, Colombia, Indonesia, Philippines and Turkey). Price incentives and other coupled support, especially input subsidies, now account for over 10 percent of agricultural production value in these countries, on average. However, in other middle-income countries (e.g. Argentina, Ghana and India), rates of support to agricultural producers are still negative, as policies penalize farmers through low prices. This trend is similar to the one seen in most low-income countries (e.g. sub-Saharan Africa), where fiscal support is minimal, and the farming sector has been penalized (even more so in the past) by policies that keep food prices low to protect poor consumers.

The persistently strong reliance on agricultural producer support coupled to production clearly shows the need for commitment at country, regional and global levels towards repurposing strategies. Price distorting policies and subsidies tied to production decisions are still widespread, while most support worldwide is still given to commodities with the biggest environmental footprint. Even if some of these policies have been gradually phased out during the last decade in some countries and regions, they seem to be experiencing a resurgence more recently. More efforts are therefore required to reduce the most distorting and environmentally or socially harmful support, and to redirect resources towards investments in public goods and services for agriculture, such as research and development (R&D) and infrastructure. Though their positive impacts take longer to materialize compared, for example, to price incentives or input subsidies, returns of this type of investments on agricultural growth and poverty reduction are recognized to be higher.

THE PROJECTED IMPACTS OF ELIMINATING AGRICULTURAL PRODUCER SUPPORT MAKE A STRONG CASE FOR THE NECESSITY OF REPURPOSING, INCLUDING MEASURES TO MITIGATE NEGATIVE SHORT-TERM IMPACTS

Global support to farmers is projected to increase to almost USD 1.8 trillion in 2030 under a business-as-usual scenario that takes into account the expected economic recovery. About 73 percent of this (USD 1.3 trillion) would be in the form of border measures, which affect trade and domestic market prices. The remaining 27 percent (USD 475 billion) would be in the form of fiscal subsidies that support agricultural producers and could continue to promote overuse of inputs and overproduction.

As demonstrated by this report's modelling analysis, simply removing agricultural support may have important adverse trade-offs. For example, in an extreme scenario whereby all agricultural support were removed by 2030 without being repurposed, GHG emissions are projected to fall by 78.4 million tonnes CO_2 e, but crop production, livestock farming production and farm employment are also projected to decrease by 1.3, 0.2 and 1.27 percent, respectively. Farm employment in emerging BRIC countries (Brazil, Russian Federation, India and China) could fall by 2.7 percent.

If border measures alone were eliminated globally, there would be an increase in crop and livestock production. However, there also would be a shift towards more confined feeding operations, with less deforestation and land conversion for pasture globally and an associated fall in GHG emissions of 55.7 million tonnes CO_2 e by 2030. The impact on nutritious diets would be mixed, although (due to an increase in global farm income) the number of people undernourished would drop by 0.2 percent.

If agricultural fiscal subsidies alone were eliminated globally, there would be a reduction in agricultural production, resulting in fewer inputs (e.g. of previously subsidized agrochemicals) and land use (cropland and pastureland), helping to preserve nature and cutting emissions by an estimated 11.3 million tonnes CO_2 e by 2030. However, this would likely hit consumers with higher food costs for a healthy diet and hurt farm incomes, especially for female-headed households and poorer households dependent on subsidies. The decline in farm income from a removal of agricultural subsidies, if not compensated, would push a small portion of the population in developing countries into extreme poverty, thus increasing the prevalence of undernourishment.

This analysis makes a strong case for repurposing rather than eliminating agricultural producer support. To minimize trade-offs and ensure a beneficial outcome overall, any fiscal savings from support reduction should be repurposed towards healthier, more sustainable, equitable and efficient ways of supporting agriculture. This includes measures to mitigate negative short-term impacts, such as cash transfer schemes, especially for the most vulnerable groups.

SIX STEPS TO DEVELOP A TAILORED REPURPOSING STRATEGY FOR AGRICULTURAL SUPPORT

Given the complex trade-offs with other policy areas and the interactions between policy objectives and impacts, any strategy for repurposing agricultural producer support needs to be systematically assessed both to ensure policy coherence across all stages of the food supply chain and in the intersection with other systems, and to leverage potential synergies. Such policy coherence cannot be stressed enough, and requires systems thinking at multiple levels (local to global) and efforts to reform all parts of the integrated food system with integrated assessments of agricultural support policies.

There is, therefore, no one-size-fits-all optimal repurposing strategy. A range of factors and country-specific circumstances will define what agricultural producer support measures are most conducive to healthier, more sustainable, equitable and efficient food systems. Nevertheless, this report provides governments with a six-step approach to developing a repurposing strategy that fits their purposes, as summarized here:

- Step 1: Estimate the support already provided.
- Step 2: Identify and estimate the impact of the support provided.
- Step 3: Design the approach for repurposing agricultural producer support, including identifying needed reforms.
- Step 4: Estimate the future impact of the repurposing strategy.
- Step 5: Review and refine the repurposing strategy, prior to implementation.
- Step 6: Monitor the outcomes of the new agricultural producer support.

Key considerations for the repurposing process

A successful repurposing strategy needs to be holistic. This involves setting the right goals, understanding causes and effects, putting in place the right conditions to successfully implement the strategy (e.g. strengthened capacities, collaboration across ministries and transparent engagement with all relevant actors) and creating supportive investment opportunities. In order to gain wide acceptance of the proposed changes in agricultural support and of the needed reforms, a communication and engagement strategy targeting stakeholders and the general public form an important part of the overall repurposing strategy.

A transparent, multistakeholder approach is integral to the six-step repurposing process. Transparency and inclusive consultations are critical to address institutional bottlenecks and vested interests that could hinder reform and the effective implementation of the strategy. Reforming agricultural support raises concerns about reduced incomes and food affordability, and is likely to be opposed by farmers benefiting from the current system. It is therefore crucial to communicate that reforming agricultural policies is not about taking away support from farmers, but about repurposing it so that it rewards good practices rather than perpetuating practices that threaten food systems stability, farmers' welfare and the environment.

The multistakeholder approach needs to ensure the inclusion of certain key actors. Smallholder farmers in particular, many of whom are women, make a significant contribution to addressing food security and nutrition and promoting resilience. Furthermore, women produce most of the food consumed locally, making small farms central for poverty reduction, gender equality and for women's empowerment in rural areas. Small farms are found to be more productive per acre than large farms, better for spurring surrounding economic growth, and better for ecosystem and biodiversity conservation. It is therefore critical to recognize the role of these actors and include them in agricultural repurposing policy processes if the shift to healthier, more sustainable, equitable and efficient food systems is to be successful.

Political economy considerations are also central to the design of effective agricultural support policies, as there will inevitably be winners and losers from formulating a repurposing strategy. In reforming policies, policymakers will need to best judge how negative short-term impacts and trade-offs can be mitigated, especially for vulnerable groups (e.g. through cash transfers). Where appropriate, specific compensatory measures should be considered for individuals/businesses who face higher costs, or even unemployment, as a result of repurposing and reform measures. At the same time, repurposing and reforming should make the most of potential synergies that benefit both farmers and consumers.

For example, if farmers are incentivized to diversify into the sustainable production of more nutritious foods, this shift will have a greater payoff if combined with measures that encourage consumers to buy these foods through awareness of the health benefits of eating them over time.

THE UN FOOD SYSTEMS SUMMIT AND THE GLOBAL FORUMS THAT FOLLOW: A MOMENTOUS OPPORTUNITY FOR CHANGE

The transformation to healthier, more sustainable, equitable and efficient food systems needs to be accelerated if we are to meet the SDGs. While a few countries have started repurposing and reforming their agricultural support, broader, deeper and faster reforms are needed for food systems transformation. However, there is no bigger opportunity for countries to commit to repurposing of harmful support policies than at the UN Food Systems Summit in September 2021. The summit will gather global leaders, policymakers and the general public, thus providing a momentous opportunity to determine how to come to an agreement to transform our food systems. Repurposing agricultural support should therefore be on top of the agenda at this event.

The momentum for transformation should continue into October and November and beyond. Actions from the Food Systems Summit should feed into efforts to eliminate incentives harmful to biodiversity, which can then be brought to the post-2020 Global Biodiversity Framework at the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP15). The COP26 to the UN Framework Convention on Climate Change (UNFCCC) is another major opportunity to cement country commitments to working towards the elimination of harmful and distorting agricultural support policies. The decisions and commitments made at these global forums and in the coming years will either support or hinder at least 12 of the 17 SDGs (UNEP, 2016).

These high-profile global events can drive the needed repurposing of agricultural support for healthier, more sustainable, equitable and efficient food systems. They must be used to leverage urgent action on several fronts, both immediately and in the longer term.

In the short term, after the global summit and at the country level, focus should be placed on developing a better understanding of the impacts of existing agricultural support policies as a first step to informing a repurposing strategy. Repurposing should begin by phasing out the most distorting and damaging policies for nature, climate, nutrition, health and equity. In order to achieve policy coherence, greater collaboration and cooperation across stakeholders in government, research institutions, non-governmental organizations and the private sector should also be a priority. Furthermore, moving from the short to the medium term key knowledge and research gaps need to be addressed in collaboration with relevant international organizations, including UN agencies and research think tanks.

In the medium term, the trade community can play an important role in pursuing further reform of border measures and coupled subsidies, which account for a significant and highly distorting part of overall agricultural support. A concerted effort by the WTO members is required to update agricultural trade rules and commitments and make them more conducive to sustainable food systems transformation.

Finally, there is a call to improve and develop standardized monitoring and reporting of agricultural support that countries can adopt. This is important to enable governments to monitor how public funds are spent, identify trends and better align spending and support policies with

national and global objectives in the realms of poverty, nature, climate, nutrition, health and equity, and also to support the political commitments made in the SDGs and the Paris Agreement.

The process of transformation to healthier, more sustainable, equitable and efficient food systems has several entry points. This report has argued that one of the key entry points to this process is to rethink and update the approach used to support agriculture, which is the backbone of food systems. Agricultural producer support has created massive inefficiencies and distortions, leading to unacceptably high costs for nature, climate, nutrition, health and equity. For many countries with strained public purses, this support is not sustainable. Therefore, given the state of the environment and human health needs, a key step towards transforming food systems is to revisit and repurpose the policies that shape agricultural production, with the strong backing of governments worldwide.

Agricultural advisory services for farmers in Azerbaijan.

1 INTRODUCTION

KEY MESSAGES

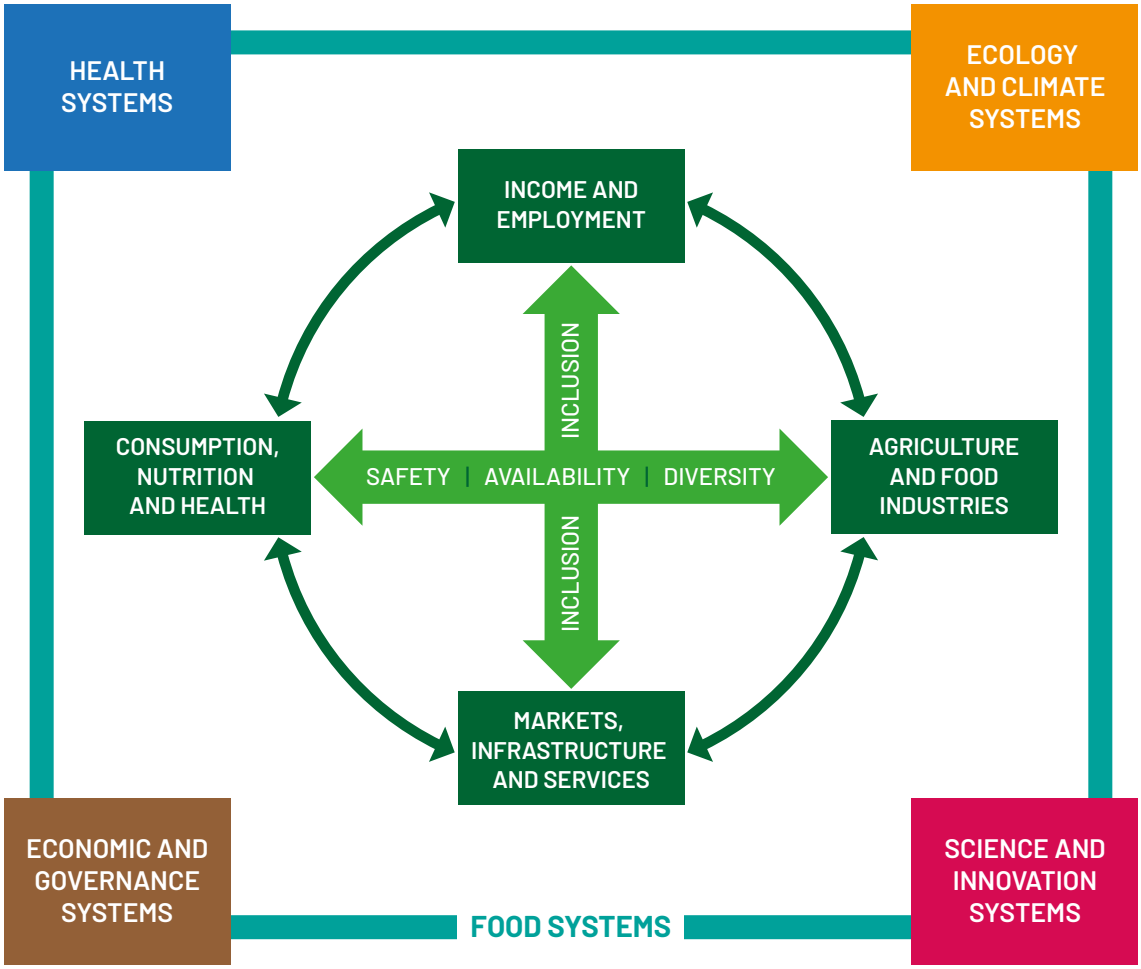
- Food systems are the lifeblood of the 2030 Agenda for Sustainable Development. They support a number of Sustainable Development Goals (SDGs), such as ending poverty, eradicating hunger, achieving food security, improving nutrition, promoting sustainable agriculture, ensuring sustainable consumption and production patterns, combating climate change, nurturing nature and reducing inequalities.
- Currently, food systems are not sustainably managed. This affects people's immediate surroundings, through environmental degradation and climate change, as well as their health, through food insecurity and consumption habits that result in multiple forms of malnutrition.
- Government agricultural support policies are one of the many factors that explain the current mismanagement of food systems. While not accessible to all producers, agricultural production support in particular has led to farming practices – and a focus on certain commodities – that are harmful to nature and human health, thus hindering the achievement of sustainable and equitable food systems.
- Agricultural producer support needs to be repurposed to bring about food systems transformation and to achieve the SDGs. This presents governments with an opportunity to optimize the use of scarce public resources to support food systems in ways that make them not only more efficient, but also more supportive of human health and the environment.

1.1
THE TRANSFORMATION OF OUR FOOD SYSTEMS TO BE HEALTHIER, MORE SUSTAINABLE, EQUITABLE AND EFFICIENT, CANNOT WAIT IF WE ARE TO ACHIEVE THE SDGS

Food systems – according to FAO (2018b) – are defined as encompassing the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and the broader economic, societal and natural environments in which they are embedded. The main components of food systems are depicted in Figure 1. In particular, food systems play a critical role in ending poverty in all its forms, eradicating hunger, achieving food security, improving nutrition, promoting sustainable agriculture, ensuring sustainable consumption and production patterns, combating climate change, nurturing nature and reducing inequalities. Food systems are therefore the lifeblood of the 2030 Agenda for Sustainable Development. Depending on whether or not they are transformed, they can either support or hinder progress towards at least 12 of the 17 SDGs (UNEP, 2016).

▶ **FIGURE 1**

Food systems in the context of other systems (positive systems concept)



Source: von Braun *et al.* (2021).

Food systems are facing global challenges

Currently, food systems face multiple global challenges and urgently require a policy overhaul for their transformation. *The State of Food Security and Nutrition in the World* (FAO, IFAD, UNICEF, WFP and WHO, 2021) indicates that the world is not on track to eradicate hunger, food insecurity and malnutrition in all its forms by 2030. After remaining virtually unchanged for five years, the prevalence of undernourishment (PoU) increased 1.5 percentage points in 2020 – reaching a level of around 9.9 percent, heightening the challenge of achieving the Zero Hunger target by 2030. In 2020, between 720 and 811 million people in the world faced hunger and nearly one in three people in the world (2.37 billion) did not have access to adequate food. In addition, healthy diets were out of reach for around 3 billion people, especially the poor, in every region of the world in 2019.

Moreover, food systems are facing – and contributing to – complex environmental challenges, including climate change, environmental degradation and natural resource constraints. The 2020 Living Planet Report (WWF, 2020) showed that the conversion of land to agriculture has led to 70 percent of global biodiversity loss and half of all tree cover loss. An estimated 1.9 million km^2 of wild and undeveloped land has been lost due to agricultural land conversion. From 1980 to 2000, more than half of new land for agriculture in the tropics came from deforestation of intact forests. Likewise, for the period 2000–2010, it is estimated that 80 percent of deforestation in these areas was the result of conversion to agricultural and grazing lands (Ramankutty *et al.*, 2018).

Food production is also a major polluter of air and water (both freshwater and oceans); the largest consumer of water worldwide, accounting for around 75 percent of all freshwater use (WWF, 2020); and a leading source of greenhouse gas (GHG) emissions, generating around one-quarter of all anthropogenic GHG emissions (IPCC, 2020). The intensification of agriculture, driven by a focus on increasing yields and productivity as well as past agricultural support from governments, has led to severe pollution of both land and marine landscapes from synthetic chemical pesticides and fertilizers and the overuse of antimicrobials (WRI, UNEP and World Bank, 2018).

At the same time, around 14 percent of all food produced is lost (from the post-harvest stage up to, but excluding, retail) (FAO, 2019) and 17 percent is wasted (UNEP, 2021b) every year, squandering scarce natural resources and contributing to GHG emissions and food insecurity.

Food systems also face other challenges such as population growth which has also led to a substantial rise in food demand, and is expected to continue to do so in Africa and South Asia (FAO, 2018a). Moreover, many countries lack national capacities to invest in nature conservation (UNEP, 2019a) and conflict and violence prevention (FAO, IFAD, UNICEF, WFP and WHO, 2017), as well as management of economic downturns (FAO, IFAD, UNICEF, WFP and WHO, 2019) and of zoonotic diseases emerging from animal–human interactions in these systems (Aiyar and Pingali, 2020). The COVID-19 pandemic has exacerbated these challenges and risks overwhelming food systems (FAO, IFAD, UNICEF, WFP and WHO, 2021). Bolder action is needed, including in the form of new policy support.

Global food systems have huge hidden costs to the environment and public health

Against this backdrop, it is unsurprising that the ways in which global food systems produce and deliver food are resulting in externalities for the environment and people's health – externalities that are not reflected in the market prices of food. For example, the hidden costs of global food and land-based agricultural systems to the environment and public health have been estimated at around USD 12 trillion per year and are expected to grow to USD 16 trillion by 2050. Over half of these hidden costs (USD 6.6 trillion) arise from the impacts of obesity, undernutrition and pollution

on human health.[2] An additional USD 3.3 trillion arise from the negative impacts of current food and land-use systems on the climate and natural capital (FOLU, 2019). The remaining USD 2.1 trillion of hidden costs comprise the economic costs of food loss and waste, fertilizer leakage, and the negative impacts on rural welfare from unequal income distribution and people's inclusion within the value chain. These estimates focus on land-based farming systems, but many of the issues they cover may also have arisen outside food systems (for example, undernutrition is primarily a challenge associated with inadequate access to food, due to the low levels of purchasing power of poor consumers).[3]

Nonetheless, it is likely that any estimate of the hidden costs of food systems will be larger once environmental degradation is fully taken into account, and also if aquaculture and its contributions to food security and nutrition are included. There are also other hidden costs that will likely magnify the estimate, such as the health impacts associated with pesticides and foodborne illnesses as well as occupational risks to farmers and farmworkers, particularly in developing countries (IPES-Food, 2017).

Current agricultural support policies largely fail to consider and factor in the impacts of unsustainable production practices on human and natural capital and as a result, food production costs (and food as such) are undervalued (TEEB, 2018). Furthermore, the right incentives (and complementary regulations) are not in place to ensure the uptake of sustainable practices that would mitigate these costs.

Government support to agriculture has the power to turn this situation around

As one of the world's largest employers, the agriculture sector is well positioned to play a central role in efforts to improve the livelihoods of producers (i.e. farmers, fishers and pastoralists) and to effectively reduce poverty, eliminate hunger, enhance food security, and improve nutrition and human health. Agricultural producers have an important role to play as "asset managers", since they can be directly involved in efforts to protect and enhance our supply of natural capital (Dasgupta, 2021). Millions of people also find their livelihood beyond the farm, along the food supply chain (i.e. food storage, aggregation, post-harvest handling, transportation, processing, distribution, marketing, disposal and consumption). According to estimates, 3.2 billion livelihoods depend on food systems, with 2 billion livelihoods related to primary production (UN, 2020).[4]

Government support to agriculture has played a role in reinforcing some of the unsustainable practices and unhealthy consumption patterns that characterize food systems. At the same time, if this support is adequately repurposed, including through new policy reforms as needed, it can become part of the solution to transforming these systems with sustainability, equity and efficiency as core components, so that everybody can afford a healthy diet and live on a healthier planet.

One recent tally of total support to agriculture (including support to farmers, general services to the sector and consumer subsidies) across the 54 countries covered by the 2021 Organisation for Economic Co-operation and Development (OECD) Agricultural Policy Monitoring and Evaluation report (OECD, 2021a) came to USD 720 billion, on average per year, in 2018–2020. Nearly three-quarters was provided in the form of support to farm incomes, either via higher

[2] Furthermore, these costs are estimated to rise to USD 10 trillion in 2050. If medical costs associated with the human health impacts were included, this estimate would be significantly higher.

[3] Other estimates suggest if current food consumption patterns continue, diet-related health costs linked to mortality and non-communicable diseases will exceed USD 1.3 trillion per year by 2030, while the diet-related social cost (i.e. the cost to the environment) of GHG emissions associated with current dietary patterns will reach more than USD 1.7 trillion per year by 2030 (FAO, IFAD, UNICEF, WFP and WHO, 2020). Another study warns that the cost of treating ill health caused by obesity around the world could exceed USD 1.2 trillion a year from 2025. See Boseley (2017).

[4] Estimates in this regard can vary depending on the source, but the numbers are generally quite large.

producer prices or direct payments (OECD, 2021a). Once approximately USD 104 billion in negative price support to farmers (i.e. income penalization via lower producer prices) is subtracted, the net support to individual producers in the OECD estimate is about USD 436 billion per year in 2018–2020. Meanwhile, estimates presented in our report, covering 61 countries for the period 2013–2018, confirm the significance of the net support given to producers.[5] Much of this support is driving unsustainable practices and the degradation of nature, and not necessarily ensuring all people in the world can afford a healthy diet.

Food systems have come a long way over the past few decades in enabling food production to feed a growing population, reducing real food prices in many countries, improving food safety and reducing food-borne illness. However, given the challenges laid out above and the monetary significance of existing agricultural policy support – and with less than a decade to achieve the SDGs by 2030 – new, coherent policy approaches are needed to transform food systems so that they are healthier, more sustainable, equitable and efficient. This was generally the case already, but the COVID-19 pandemic underscored the urgency of this transformation even more so. It has exposed how our social and economic fate is inextricably linked to that of nature, highlighting the need to transform our relationship with nature to increase our resilience to future crises and reduce future risks in the face of uncertainties, while ensuring healthy diets are affordable to all.

A food systems approach to repurposing agricultural support is unavoidable if the world is to meet the SDGs by 2030. Box 1 presents the key features of what a healthier, more sustainable, equitable and efficient food systems transformation would entail.

▶ BOX 1

Features of a healthy, sustainable, equitable and efficient food systems transformation

To promote health, sustainability, equity and efficiency, countries must consider their food systems in their entirety, from farm to fork to food bin – a strategy known as the food systems approach. This means that policy options, incentives and investments must enable transformations in all domains of food systems: food production, food supply chains, food environments and consumer behaviour. A shift to healthier, more sustainable, equitable and efficient food systems, accompanied by targeted support policies, can boost nutrition, reduce food loss and waste, optimize resource use, prevent deforestation, curtail biodiversity loss, limit greenhouse gas emissions, avoid the use of harmful chemicals, and support smallholder farmers.
The food systems approach also emphasizes the importance of considering interactions along the food supply chain and with other systems (healthcare, energy, social protection, etc.) to develop coherent policies and make the most of potential synergies. This requires understanding how policies at any given stage of the food supply chain can have knock-on effects across the system, and where to best intervene along the chain to promote synergies and optimize benefits. ▼

[5] More accurately, our report covers 88 countries, as the 27 European Union countries and the United Kingdom of Great Britain and Northern Ireland are grouped as one entity.

▶ BOX 1 (CONT.)

A just and equitable food system transformation is one in which all, including the most vulnerable, can participate, benefit and prosper. It encompasses a "leave no one behind approach" to reform, including a greater focus on the social dimensions of women and men living in or near poverty and of other marginalized groups. By strengthening the resilience of smallholder farmers, these can then bring about a "groundswell" shift towards nature-based agricultural approaches and strong economic recovery in a post-COVID-19 pandemic world. Such an approach is critical if the SDGs are to be met by 2030, as nearly 80 percent of the world's poor live in rural areas and depend on agriculture for their livelihoods (Maloney, 2019) – particularly smallholder farmers. Furthermore, small farms account for 84 percent of all farms worldwide, and although they operate only around 12 percent of all agricultural land, they produce roughly 35 percent of the world's food (Lowder, Sánchez and Bertini, 2021) and support about 2 billion people in developing countries (EIU, 2018).

1.2 A MOMENTOUS OPPORTUNITY TO REPURPOSE AGRICULTURAL SUPPORT

The 2021 UN Food Systems Summit represents a key opportunity to strengthen country commitments and pathways for action to transition towards healthier, more sustainable and equitable food systems. Given its critical importance, agricultural support is featuring prominently within the action tracks (specifically Action Track 3: nature-positive production) offering stakeholders from a wide range of backgrounds a space to share and learn, with a view to fostering new actions and partnerships and amplifying existing initiatives in the run-up to the Summit.

Appropriately designed agricultural support policy is critical, given that agriculture produces both food to feed people as well as raw materials for industrial use, and is a key departure point in terms of structural transformation and economic development. The development of agriculture, as a core element of the food supply chain, offers opportunities for increasing productivity, off-farm employment, and linkages between agriculture and the rest of the economy, as well as for market integration and export expansion (Timmer, 1988).

These opportunities, depending on how they are pursued, can support a transformation towards healthier, more sustainable, equitable and efficient food systems. To take advantage of them and to achieve interrelated objectives (e.g. economic growth, poverty reduction, food security and improved nutrition), public authorities in all countries – irrespective of the income group they belong to – have put in place various agricultural support policies.

Yet a challenge policymakers face when designing such agricultural support policies is ensuring they can effectively promote agricultural growth and be aligned with sustainability goals while balancing the interests and benefits of multiple actors, which is key to equity. This process often takes place in a context of limited public resources and investment capacity. Policies and programmes therefore need to be coherent in order for them to successfully enable food systems transformation.

Opportunities to transform food systems arise in the context of COVID-19 recovery packages

As countries pursue economic recovery after the COVID-19 pandemic, under even tighter budget constraints, governments have a momentous opportunity to reform some of the most harmful and inefficient agricultural support measures that too often result in negative outcomes across food systems. There is also an opportunity to align pandemic recovery packages with efforts to support a transformation towards sustainable and equitable food systems and advance the SDGs by ensuring consistency and coherence between emergency relief and recovery support provided to food systems, in addition to long-term objectives for sustainability, resilience and equity (UNEP, 2020a). So far, governments have responded to the COVID-19 crisis on a massive scale, mobilizing USD 14.6 trillion in support to date, of which USD 1.9 trillion (13 percent) was for long-term economic recovery (UNEP, 2021a).[6] While short-term rescue packages have focused on providing immediate relief to prevent an even deeper crisis, the biggest driver of long-term impacts will be through fiscal recovery packages.

COVID-19 pandemic recovery support measures targeting food systems have included emergency financial support to farmers, subsidies for agricultural inputs, support to develop local supply chains, measures to ensure smooth trade flows, emergency food imports, cash support programmes, food support programmes and environmental compliance measures, among others – in all, a total of USD 230 billion for 87 of the world's largest economies.

So far, however, these measures have largely ignored the environmental aspects of food systems, including the need to prevent further loss and degradation of natural habitats, which facilitates the kind of animal-to-human transmission associated with the spread of zoonotic diseases such as COVID-19 (UNEP, 2020a).

Some governments have specifically supported food production practices, like confined animal feeding operations that have historically been associated with the spread of zoonoses. However, with the exception of some countries and cities that have included investments in forests and nature-based solutions in their recovery packages (UNEP, 2020b), few of the measures adopted to date are designed to ensure the right incentives are in place to prompt agents across food systems to support a long-term recovery that is sustainable, equitable and resilient. As of 20 May 2021, green measures accounted for just 2.6 percent of total fiscal spending related to the pandemic in the world's 87 largest economies.[7]

Stimulus measures that tackle the current challenges to food access during the COVID-19 pandemic should emphasize not only efforts to keep food supply chains functioning, while also protecting access to locally, regionally and globally produced food, but also to build resilience into food systems to safeguard them against future economic slowdowns and downturns (FAO, 2020a).

Tackling agricultural support that works against transformation towards healthier, more sustainable, equitable and efficient food systems needs to be high up on policymakers' agendas. This is an overlooked policy area that needs a new approach and if done correctly, can help to achieve the many SDGs mentioned earlier. There is thus an opportunity, especially with the upcoming 2021 Food Systems Summit, to redirect scarce public resources towards nature-positive, low-emission, and environmentally sustainable farming practices and food consumption habits that can help deliver healthy diets for all. Agricultural support should thus

[6] In 2021, the total recovery spending for 87 of the world's largest economies amounted to USD 16.6 trillion, of which USD 2.1 trillion was for long-term economic recovery and USD 420 billion for green recovery. See Green Fiscal Policy Network (2021).

[7] Spending is green to the extent that it is considered to have favourable potential impacts on long- and short-term GHG emissions, air pollution, natural capital, quality of life, inequality and rural livelihoods. See Green Fiscal Policy Network (2021).

take centre stage in recovery packages to help kick-start economies, particularly in low- but also middle-income countries,[8] while enabling the transformation towards healthier, more sustainable, equitable and efficient food systems.

1.3 OBJECTIVES AND SCOPE OF THIS REPORT

This report comes at a time of momentous opportunity this year to rethink and improve our food systems. As the world's attention turns to the UN Food Systems Summit in September 2021, this report aims to provide policymakers with evidence-based guidance on how repurposing agricultural support – and implementing the reforms this will necessitate – can accelerate the transformation towards healthier, more sustainable, equitable and efficient food systems.

To that end, the overall objectives are to:

- take stock of current agricultural producer support and analyse the main trends at the global, regional and country level;
- build an understanding of the impacts and costs of this support on nature, climate change, nutrition, health and equity;
- identify the benefits of repurposing agricultural producer support based on both quantitative and qualitative evidence, noting the potential trade-offs and synergies; and
- provide guidance for countries on how to repurpose agricultural support to enable a transition to healthier, more sustainable, equitable and efficient food systems.

Repurposing is defined in this report as the reduction of agricultural producer support measures that are inefficient, unsustainable and/or inequitable, in order to replace them with measures that are the opposite. This means agricultural producer support is not eliminated but reconfigured. In this way, repurposing will always imply reforming.

The definition of policy reform adopted in this report is aligned with the OECD definition. Accordingly, policy reform is a process in which changes are made to the formal "rules of the game" – including laws, regulations and institutions – to address a problem or achieve a goal (OECD, 2006a). In this report, the ultimate goal is to achieve a transformation towards healthier, more sustainable, equitable and efficient food systems. Changes to laws, regulations and institutions will thus involve one or both of the following: (a) full or partial removal of some sorts of harmful support; and (b) allocation of fiscal resources to forms of support that will help improve the efficiency, equity and sustainability of food systems. Thus, policy reform will always be part of a broader repurposing strategy that supports food systems transformation and the achievement of development objectives of various stakeholders.

Box 2 presents key considerations regarding repurposing agricultural support that are addressed in this report.

This report builds on various ongoing food and agriculture policy initiatives by the Consortium for Measuring the Policy Environment for Agriculture, or "Ag-Incentives Consortium", and the Just Rural Transition Policy Action Coalition.[9]

[8] Even in middle-income countries, new public investments in agriculture could enable economic recovery with social welfare gains. See, for example, Sánchez, Cicowiez and Ortega (2021).

[9] The Just Rural Transition's Policy Action Coalition (PAC) to Repurpose and Reinvest Public Support for Food and Agriculture brings together countries, knowledge and implementation partners to support efforts to repurpose food and agricultural support policies to deliver public goods and shape sustainable, resilient agricultural systems (for further information, see: https://justruraltransition.org/pac).

▶ **BOX 2**

Repurposing agricultural support: key questions

Who needs to repurpose agricultural support? Deciding where agricultural support needs to be repurposed is quite context specific, but it will generally be needed in all countries where agricultural support is currently reinforcing unsustainable practices, inequalities, and unhealthy consumption patterns. Because most countries in principle need repurposing strategies to overcome the sustainable development challenges of today, repurposing can be seen as a global shift. Countries whose public budgets are heavily constrained, particularly low- but also some middle-income countries, will find repurposing agricultural support as a tool for increasing the efficiency and sustainability of their public spending. More generally though, all countries aspiring to transform their food systems to achieve the SDGs will need repurposing strategies.

What is the current support provided by governments to the agriculture sector? How does it vary across countries, regions and over time? This involves identifying the types of support provided such as price incentives, fiscal subsidies and general services to the sector in the form of providing public goods.

Why does agricultural support need to be repurposed? Agricultural support needs to be repurposed because it is found to be generally not fit for purpose. The evidence for this is seen in the negative economic, social and environmental outcomes resulting from agricultural practices, and the consequent understanding of how these practices and behaviours are incentivized or disincentivized by agricultural support policies. At the same time, it is important to understand that many actors who depend on agriculture do not benefit from agricultural support which may not only contribute to inequality but also prompt some of these actors to adopt unsustainable practices. For example, a lack of agricultural extension services for smallholder farmers, who often have limited access to land, may amplify inequalities and lead to survival practices that are harmful for the environment.

How can agricultural support be repurposed? This not only involves redirecting support to sustainable and equitable practices that improve resource use efficiency, including policy reforms as needed, but also finding ways of mitigating the potential negative impacts from reforms, including compensatory measures to minimize adverse trade-offs. Context matters a great deal for repurposing support, but some general directions and steps – provided in this report – serve as guidance.

To carry it out, we have used two analytical tools:

- First, to grasp the current magnitude and composition of support provided to agriculture, we have based our analysis on the database developed by the Ag-Incentives Consortium, which aggregates estimates of agricultural producer support indicators for 88 countries for the 2005–2018 period. Hence the report focuses on producer support, leaving out of the analysis other forms of support.
- Second, an analysis of simulations from the International Food Policy Research Institute's global computable general equilibrium model, MIRAGRODEP, provides new quantitative evidence on the impacts of removing different types of support on a range of socio-economic and environmental indicators to enable more informed decision-making. Because these simulations focus on removing agricultural support without finding alternative ways to use it (i.e. repurpose it),

the results from this exercise should be interpreted as approximate quantifications of the gains and losses (i.e. trade-offs) of only removing support, and should not be confused with the expected net effects from also reallocating funding to other policies. Given this limitation as well as others related to the modelling method itself, the analysis of the simulation results is complemented by other analyses to provide as complete a picture as possible of the impacts of repurposing agricultural support. Qualitative and country-case studies analysis help demonstrate that the net impact of reforming agricultural support through repurposing would be positive.

Considering that – as noted above – farmers can be directly involved in efforts to protect and enhance our supply of natural capital while defining whether food supplied is nutritious or not, this report focuses on the support given to producers in the form of **price incentives**, **fiscal subsidies** and, more indirectly, the **provision of public sector services**. The discussion on general support that benefits the sector (i.e. expenditure and investment towards the provision of public goods) is relatively less prominent though, not least because of data challenges. Although subsidies to consumers can also be part of agricultural support, they are not considered in this report: nonetheless, the analysis acknowledges that repurposing agricultural support can result in producers' decisions that can, for example, increase the diversity and reduce the cost of nutritious foods, which may in turn contribute to shifting consumer behaviour towards healthier and more sustainable diets. Environmental regulations are also important in ensuring that agricultural production, whether intensive or extensive, is sustainable. However, their consideration is beyond the scope of this report, not least because (strictly speaking) they fall outside the definition of agricultural support.

Similarly, the analysis does not cover the role of the private sector in enabling food systems transformation, although it acknowledges its importance to bring about this change. Moreover, the scope of agricultural support analysed in the report is limited to land-based agriculture. While fisheries subsidies related to marine and coastal areas and inland waterways are significant in scale and contribute to numerous negative environmental, social and economic impacts, given the limited available data and the ongoing work by other organizations, they are not part of the report discussion.[10]

1.4 REPORT OUTLINE

The rest of this report is organized as follows:

- **Chapter 2** sets out the trends, status and scale of agricultural producer support at the global level, broken down by country income group, subsector (crops vs livestock) and commodity type. It highlights the kind of policy instruments (e.g. trade and market measures or fiscal subsidies) that have been widely used in different contexts and how they have evolved in response to different challenges, needs or government priorities. The chapter also provides a conceptual framework to trace the potentially distorting/harmful impacts of such policies, the channels through which they affect the key dimensions of food systems, as well as the factors influencing these policies. At the very end, the chapter provides some general directions for repurposing agricultural support.

[10] During the period 2016–2018, based on data from 39 countries, average annual support to the fisheries sector was estimated at USD 9.4 billion. As with land-based agriculture, some forms of government support to fisheries – in particular those that lower the cost of inputs – encourage excess capacity, which leads to overfishing and illegal, unreported and unregulated (IUU) fishing. In addition, some support policies fail to address socio-economic objectives in an efficient or equitable way (OECD, 2020b).

- **Chapter 3** uses the results from a global simulation model to analyse and discuss the impacts of current agricultural producer support policies on producers, by means of quantifying the potential implications of removing border measures and fiscal subsidies for nature, climate change and nutrition by 2030. The impact of agricultural support on public health and equity is also examined based on previous studies. The chapter highlights the varying impacts in developed economies, large emerging BRIC (Brazil, Russian Federation, India and China) economies, and non-BRIC developing economies. Thus it provides an informative overview of the implications of removing agricultural support, which is in turn key to understanding the potential fiscal space for repurposing and the trade-offs to consider in the design of repurposing strategies.
- **Chapter 4** identifies the benefits of repurposing and reforming agricultural producer support and the opportunities for countries to repurpose support in ways that enable a transformation towards healthier, more sustainable, equitable and efficient food systems. The analysis includes a qualitative assessment of the impacts and opportunities for countries from repurposing current support, in particular subsidies, based on country experiences. The chapter draws on country case studies to highlight how challenges in undertaking reform have been addressed. It then concludes with a guidance framework for countries embarking on agricultural repurposing and reform, comprised of six steps. This builds on other guidance frameworks such as those provided by The Economics of Ecosystems and Biodiversity (TEEB) and the Biodiversity Finance Initiative (BIOFIN), and is supported by country case studies.
- **Chapter 5** concludes the report by first presenting eight key findings and associated policy implications. Subsequently, the chapter lays out the immediate and longer-term actions needed by the diverse set of actors involved in the development of agricultural support policies, if distorting and harmful forms of support are to be reduced or eliminated and replaced with policies that will catalyse a food systems transformation.

Farmers transplanting yam vegetables to another field, in Cambimba village, Colombia.

2

THE SCALE OF GLOBAL AGRICULTURAL SUPPORT AND ITS IMPACTS ON FOOD SYSTEMS

KEY MESSAGES

- Worldwide agricultural producer support accounts for almost USD 540 billion a year, representing around 15 percent of the total agricultural production value. More than half (USD 294 billion) is provided to farmers as price incentives, while the rest (USD 245 billion) is in the form of fiscal subsidies, the majority (70 percent) being linked to production or unconstrained use of variable inputs.
- There is currently a strong reliance on agricultural producer support policies that, while favouring certain producers (e.g. of certain crops), distort prices and markets and are harmful to the environment, nutrition and health. These policies are most often border measures (e.g. import tariffs or export taxes) that create price incentives or disincentives, and fiscal subsidies that are tied to production or input use.
- Agriculture sector support varies widely and generally changes as countries develop. Price incentives and fiscal subsidies tied to production have been the most widely used in high-income countries and are becoming increasingly popular across some middle-income economies. On the other hand, in most low-income countries the farming sector is penalized by policies that keep food prices low for poor consumers by indirectly taxing producers.
- Most support worldwide, through price incentives, has been given to commodities with high GHG emissions such as beef, milk and rice, which have the largest carbon footprint.
- Least developed countries have given the most support to the production of staple foods (i.e. cereals), reducing the incentive for farmers to diversify production towards more nutritious foods.

2.1 INTRODUCTION

As highlighted in Chapter 1, current agricultural support policies cause more harm than good, and are hindering the transition towards healthier, more sustainable, equitable and effective food systems. Repurposing agricultural support is therefore key to addressing the needs of many food supply chain actors, in particular smallholders and poor consumers, including women, as well as protecting the environment, which is fundamental to make the transition possible in the first place. Repurposing has become even more pressing given the challenges posed by the COVID-19 pandemic, including increased competition for the limited public resources to facilitate a green and equitable economic recovery. It is therefore imperative to redirect the scarce resources available for food systems towards the most rewarding areas, and to use them more sustainably, equitably and efficiently, leaving no one behind in the transformation.

As an initial step for understanding how policies could be repurposed, this chapter provides a quantitative appraisal of current agricultural support in the world. It reviews and analyses the most important policy instruments that are considered economically distorting and potentially harmful to nature, climate, nutrition, health, equity and efficiency, as well as the magnitude and composition of agricultural producer support at the global scale, by income level and by commodity. This analysis relies on agricultural support estimates from the Ag-Incentives Consortium, a global initiative led by the International Food Policy Research Institute (IFPRI) that aggregates agricultural policy support indicators produced by different organizations, including FAO, the Inter-American Development Bank (IDB), the OECD and the World Bank.

Chapter 1 discussed the scope of this report and introduced key concepts (i.e. repurposing and reforming) as well as the types of agricultural producer support included. Box 3 presents additional definitions of key terms and adds further description on the policy support indicators used in the report.

▶ BOX 3
Key terms and definitions

Agricultural support refers to any form of financial support for agriculture resulting from government policies. It covers various types of measures implicitly or explicitly affecting farm gate prices as well as monetary transfers to farmers or public expenditure and investments in general services and public goods that benefit the agricultural sector. However, it does not account for subsidies or transfers to food consumers.

Agricultural producer support (or support to producers) consists of transfers to individual farmers, in the form of both price incentives and fiscal subsidies. In this report, these forms of agricultural producer support are quantified by the nominal rate of assistance (NRA), as defined below. The definition of "agricultural producer support" used in this report does not include transfers to the agriculture sector collectively, in the form of general services or public goods.

Price (dis)incentives are policy measures (mainly border measures and domestic price interventions) that generate a gap between the domestic producer price and the border price of a specific agricultural commodity. They represent implicit transfers from consumers and taxpayers to farmers ▼

▶ BOX 3 (CONT.)

(or vice versa) and are measured by the nominal rate of protection (NRP), as defined below. As such, these policy measures either protect (i.e. incentivize) or penalize (i.e. disincentivize) agricultural producers, as denoted by a positive or negative NRP, respectively.

Border measures refer to policy measures that affect international trade and consequently influence domestic prices. As such, these are policies that relate to import and exports flows through the imposition of tariffs, taxes, quotas or subsidies. Restrictions and subsidies of this sort can generate price incentives or disincentives, as they cause domestic prices to diverge from the border price of a commodity.

The **NRP** is an indicator that quantifies, in relative terms, the extent to which a set of agricultural policies raises or lowers the producer price of a commodity above or below the international reference price, and therefore incentivizes (i.e. protects) or disincentivizes (i.e. penalizes) producers. It is therefore the measure used to estimate price incentives provided to agricultural producers.*

Fiscal subsidies are monetary (budget) transfers made by governments in the context of policy measures, projects and programmes to specific private actors of the agriculture sector. This report only considers fiscal subsidies targeting farmers. These transfers make use of public budgets and may be funded by domestic taxpayers or international donors.

The **NRA** measures, in relative terms, transfers to farmers arising from price incentives (generated by trade and market policies) as well as fiscal subsidies. In other words, the amount of fiscal subsidies (usually commodity specific) is added to the price gap at the farm gate (i.e. difference between the producer price and the undistorted reference price). A positive NRA indicates that farmers are supported overall by the policy measures in place, i.e. border measures and subsidies directed at agricultural producers specifically. A negative NRA means they are penalized overall by the same policy measures.

Coupled support consists of measures that are targeted depending on certain characteristics of agricultural production: for example, the type of inputs used, or the type or amount of agricultural output produced. This means that in order to be a beneficiary, the farmer must produce a certain crop or livestock (World Bank, 2020).

Decoupled support refers to fiscal subsidies that do not depend on the commodity produced or on the inputs used for producing a specific commodity (World Bank, 2020).

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* In its core concept, the NRP is very close to the Market Price Differential and subsequent Market Price Support indicator computed by the OECD and defined as the "annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level" (OECD, 2016a). These measures can also go beyond the agricultural sector and include, for example, macroeconomic policies affecting the exchange rate.

Source: Authors' adaptation from Ag-Incentives (2020) and OECD (2016a), unless otherwise noted.

2.2 AGRICULTURAL SUPPORT POLICIES AND INDICATORS

This section presents an overview of the metrics used in this report to estimate agricultural support.[11] Technical details of the indicators, and how they are computed and aggregated, are included in the methodological annex (Annex 1).

The main source for these indicators is the Ag-Incentives Consortium database for the 2005–2018 period, which aggregates estimates of agricultural support indicators for 61 countries. As the 27 countries of the European Union plus the United Kingdom of Great Britain and Northern Ireland are counted as a single group, the information is actually for 88 countries in total (see Figure A in Box 4 and Table A1 in Annex 1). This database builds on the indicators generated by the International Organisations Consortium for Measuring the Policy Environment for Agriculture, following a consistent and consolidated methodology for policy measurement originally developed by the OECD, and subsequently extended with other partners. Box 4 highlights the main features of this global initiative on agricultural policy monitoring.

▶ BOX 4

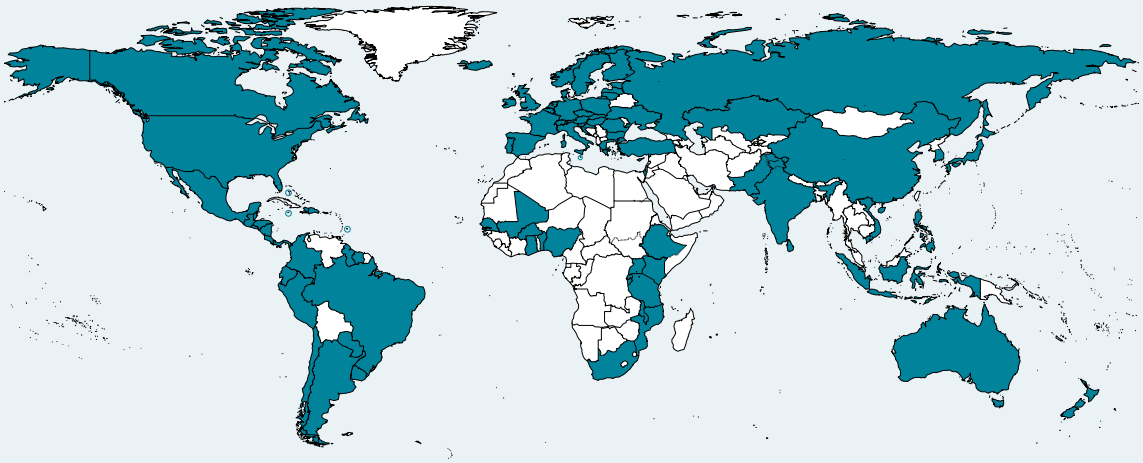
Tracking policy support at the global level: the International Organisations Consortium for Measuring the Policy Environment for Agriculture

The International Organisations Consortium for Measuring the Policy Environment for Agriculture, or "Ag-Incentives Consortium", comprises a number of international institutions who have collectively assembled a database of agricultural policy support indicators (available at http://ag-incentives.org). The partner institutions are FAO, IDB, IFPRI, OECD and the World Bank.
The Ag-Incentives Consortium brings together findings from all organizations that work on agricultural policy measures to provide a globally consistent and harmonized overview of the policy environment, by means of a database that has global coverage, spans a long time period and is regularly updated. In this context, the OECD produces policy support indicators for OECD countries, non-OECD European Union Member States, and some middle-income countries, namely, Argentina, Brazil, China, Colombia, Costa Rica, India, Indonesia, Kazakhstan, Philippines, Russian Federation, South Africa, Ukraine and Viet Nam. IABD covers most of the remaining countries in Latin America and the Caribbean, FAO monitors selected sub-Saharan African countries, while the World Bank produces indicators for Sri Lanka and Pakistan. IFPRI consolidates and aggregates data provided by the various partners. The NRP (and soon NRA) indicators (as defined in Box 3) are included in the database as the core indicators on support provided by agricultural policies to producers. The data from the indicators spans a total of 61 countries (considering European Union and the United Kingdom of Great Britain and Northern Ireland members as single entity) representing close to 90 percent of the global value of agricultural production, and covering the period of 2005–2018. This includes the years with the greatest coverage, such as 2012 (see Annex 1 for the detailed list of countries). ▼

[11] Although the analysis in this report builds on the OECD classification of agricultural policies and subsidies, different metrics of policy assistance to agriculture are used – namely those used by the Ag-Incentives Consortium. The OECD tracks policy measures that provide a transfer to the agriculture sector according to their specific implementation criteria. As such, it is easier to identify economic features of such measures, and to analyse their potential impacts on production, income, consumption, trade and the environment (OECD, 2016a).

▶ BOX 4 (CONT.)

FIGURE A
Country coverage of the International Organisations Consortium for Measuring the Policy Environment for Agriculture, as of 2021



Source: Authors' own elaboration based on data from Ag-Incentives (forthcoming). Conforms to Map No. 4170 Rev. 19 UNITED NATIONS (October 2020).

Source: Authors' adaptation from Ag-Incentives (2020).

Different forms of agricultural support

Support to the agriculture sector can take different forms. The most widely used forms are: (i) **price interventions** that increase or depress domestic prices and, as a result, generate incentives (or disincentives) for farmers; and (ii) **fiscal subsidies** that transfer money to private individuals (e.g. through input subsidies) or that support collective goods such as infrastructure.

Price incentives for agriculture consist mainly of **border measures** (such as import tariffs or quotas, export bans or subsidies), and/or **market price regulations** (e.g. domestic price fixation policies). Price incentives in this report are measured by the **nominal rate of protection (NRP)**.

Fiscal subsidies that target farmers individually consist of:

- **subsidies based on output**, which entail transfers made according to the production output of a specific agricultural commodity;
- **subsidies based on on-farm inputs**, which entail transfers made by lowering the price of variable inputs, fixed capital or credit;
- **subsidies based on factors of production**, using two kinds of criteria: (i) commodity criteria such as area planted, animal numbers, revenues or farmer's income; or (ii) non-commodity criteria such as subsidies tied to environmental or landscape outcomes (e.g. to encourage alternative use of agricultural land or land conservation practices) or lump-sum payments to all farmers subject to cross-compliance conditions.

Fiscal support can also benefit the agriculture sector collectively, instead of targeting individual producers, through the provision of **general sector services and public goods**. In the long term, some of these alternative types of support reduce costs and create an enabling environment for farming and food system marketing activities, through the development of private or public services, institutions and infrastructure. Examples of general sector services include:

- agricultural knowledge generation and transfer (e.g. training, technical assistance);
- inspection and control concerning agricultural product safety, pests and diseases;
- infrastructure development and maintenance, such as roads, irrigation and storage facilities;
- public food reserves and stockholding schemes;
- food system marketing and trade promotion.

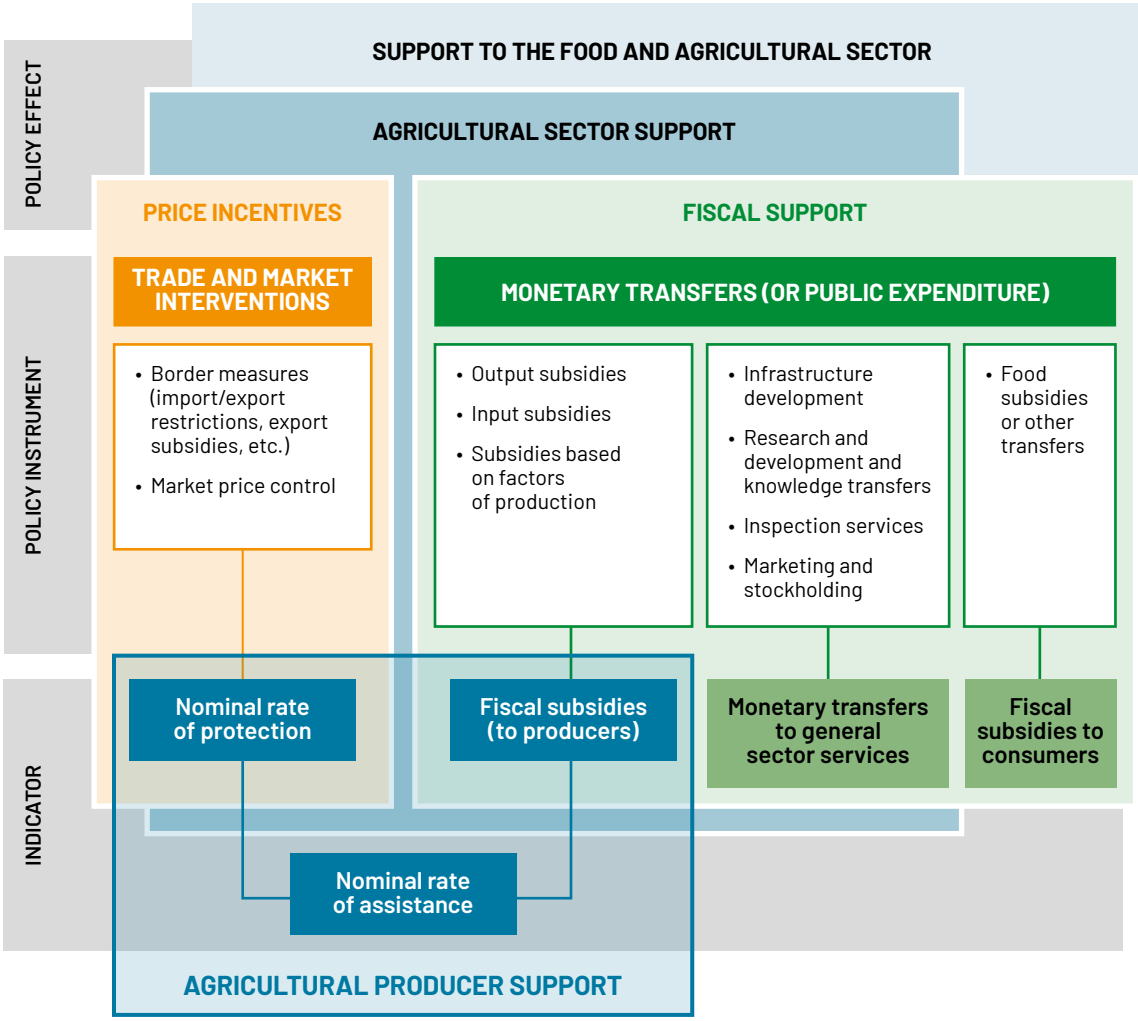
Fiscal subsidies to food consumers are primarily aimed at improving the access and affordability of food products but can also contribute to agricultural development by creating more demand for food products. However, data on these subsidies are not available at a global scale, and are therefore not analysed in this report. As noted in Chapter 1, this report focuses only on support to agricultural producers.[12] This support can be passed on individually (i.e. though price incentives and fiscal subsidies) or collectively (i.e. through general sector services). The scope of the following analysis pertains exclusively to policies explicitly targeting producers individually (as private agents) and, to a lesser extent, collectively (general agriculture sector).

Figure 2 presents a schematic overview of the main policy instruments used to provide support to agriculture and the indicators by means of which the degree of support provided is measured. It visually narrows down the policy instruments and indicators to arrive at agricultural (individual) producer support, which is the focus of the analysis. The key indicator analysed in this chapter is the nominal rate of assistance (NRA), which accounts for price incentives (expressed by the NRP) and fiscal subsidies (e.g. monetary transfers) provided to producers. By accounting for both price incentives and fiscal subsidies, the NRA provides a comprehensive measurement of the total agricultural producer support in a given country. The NRA does not account for fiscal or monetary transfers in general sector services, which may benefit agricultural producers collectively, but not individually.

[12] As noted earlier, this chapter draws upon data from the Ag-Incentives Consortium database. However, data on consumer subsidies are not consistently available within this database, posing issues of cross-country comparability. The OECD has estimated that, across the 54 OECD and non-OECD countries covered in its latest Agricultural Policy Monitoring and Evaluation, during 2018–2020 the agriculture sector received USD 720 billion per year in support. Of this, about three-quarters represented support to individual producers through various measures, 14 percent was for general sector services, and about 11 percent was provided in the form of consumer support (OECD, 2021a). The OECD methodology captures consumer subsidies through its consumer support estimate (CSE) metric, which measures the transfers from or to consumers of agricultural commodities at the farm gate level. This is then added to the total support estimate (TSE) for the agriculture sector together with the producer support estimate (PSE) and the general services support estimate (GSSE) (OECD, 2016a).

▶ **FIGURE 2**

Schematic overview of agricultural policy support instruments and indicators



Source: Authors' own elaboration.

2.3 UNDERSTANDING THE POTENTIAL EFFECTS OF AGRICULTURAL POLICIES

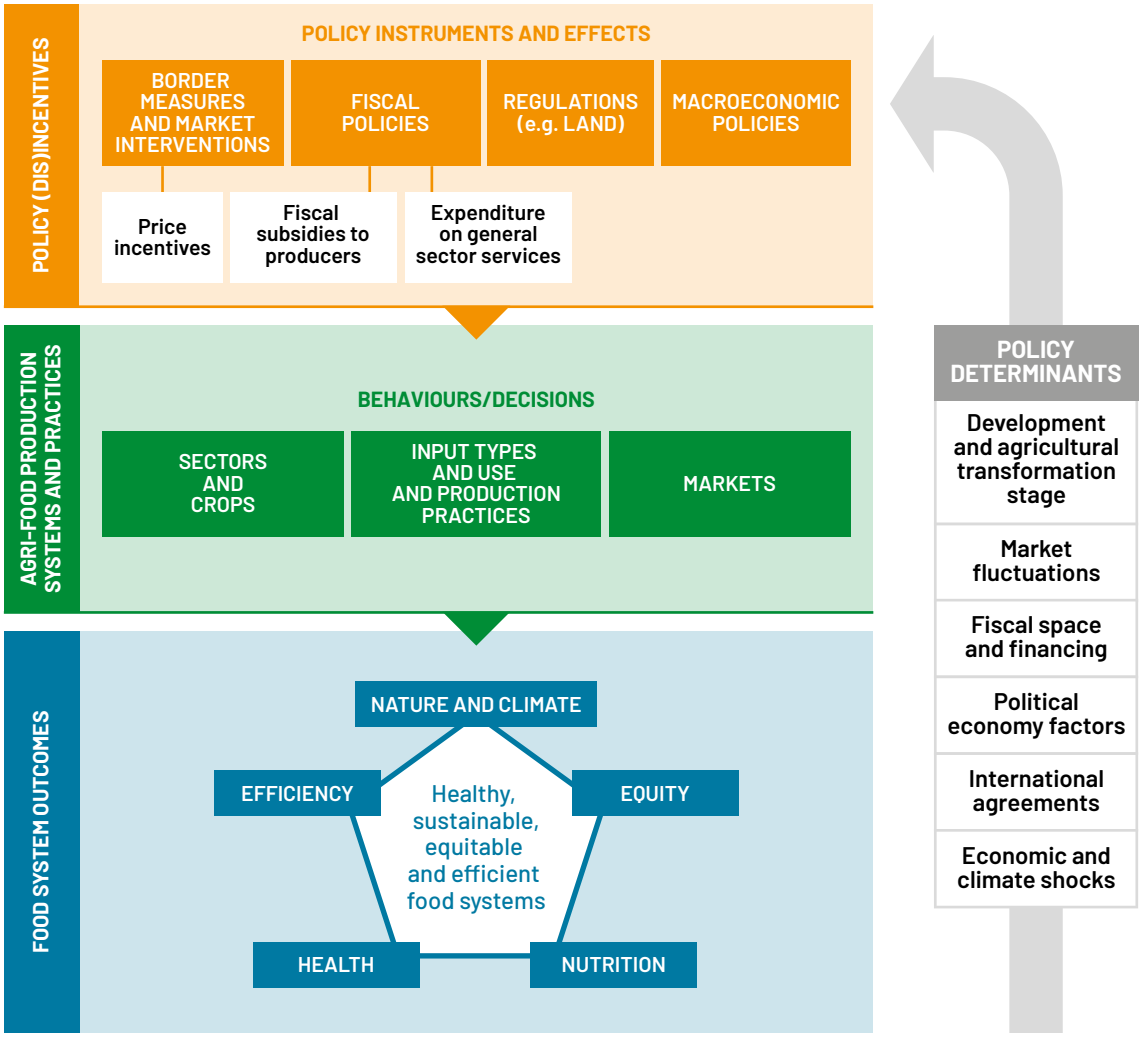
Agricultural production systems undergo rapid changes in response to shifts in production costs, market dynamics (e.g. consumer demand, affordability of food), weather patterns, and concerns for food security and food safety (Hanson, Hendrickson and Archer, 2008). In addition to these factors, production systems are influenced by the incentives or disincentives created by agricultural policies and regulations. That is, policies shape and transform agriculture and food systems by affecting the decisions and choices farmers and other agents make on which commodities to produce and commercialize, which inputs to use, and which market channels to rely on. This section sets out the conceptual framework used in this report to identify and assess the impacts of agricultural support.

Conceptual framework to trace impacts of agricultural policies

Agricultural support has different effects depending on the type of support (price incentives or fiscal subsidies) and the policy instruments used to deploy it (Figure 2). Subsequently, the effects will depend on the transmission channel (sector or crop, type and use of production inputs, and markets) and will ultimately be reflected across key dimensions related to farm systems – namely nature, climate, nutrition, health, equity and efficiency – that have implications for food systems transformation. The effectiveness of policy instruments, in turn, is determined by factors such as international market fluctuations (often triggered by economic or climate shocks); international agreements; political economy considerations and the fiscal space available to implement them; and the stage of development and aspirations of the country in question. The conceptual framework presented in Figure 3 helps understand how agricultural policies can affect food systems transformation, as discussed below.

▶ **FIGURE 3**

Conceptual framework of factors affecting how agricultural policies support food systems transformation



Source: Authors' own elaboration.

Policies shape production practices

Agricultural support can influence decisions on crop types, production practices, inputs and markets. Product-specific support, for example, influences decisions on which **subsector or crop** to invest in. This has implications for the diversity of farming systems and the sustainability of food systems because certain crops or livestock generate more GHG emissions than others (for example, rice compared to cassava, or beef compared to poultry production), some products are more nutritious than others (fruits and vegetables compared to sugar), and some subsectors pose health risks (e.g. sugar).

The choice of **input type and use** and of **production practices** (e.g. machinery, land, seeds and fertilizers) can be influenced by policies that could, for example, favour the use of agroecological or regenerative agricultural approaches instead of synthetic fertilizers and pesticides. Policies can promote the adoption of technologies that improve input use and reduce their negative externalities, through extension, knowledge transfers or even subsidies on on-farm capital (e.g. solar water pumps to some extent). However, in many cases and especially in developing countries, input subsidies do not promote climate-smart goals (Jayne *et al.*, 2018) and are provided without any conditions or constraints to protect against the overapplication of the subsidized inputs (Kurdi *et al.*, 2020).

Land use is also affected by policy regulations and incentives and can have repercussions not only on the financial health of farming systems (level of productivity, costs and revenues), but also on the conservation and restoration of natural resources, such as soils, forests and aquatic ecosystems. Policies can create incentives for land use change. Subsidies, for example, based on area planted encourage the conversion of natural landscapes into agricultural land, while a shift to subsidies not linked to production payments may encourage land retirement or restoration.

Trade and market policies can distort economic signals

Trade and market policies affect both **domestic and international markets**. For example, export taxes or quotas increase domestic supplies and lower prices in the short term, facilitating food access for the industry and final consumers while reducing agricultural producers' revenues. In the long term, lower revenues may discourage national production. In international markets, food supplies end up being reduced, especially if the restrictions are implemented by major food-exporting countries: international prices may increase significantly, penalizing importers. Indeed, the food crisis of 2007–2008 demonstrated that trade restrictions by countries that are large food producers have major implications for food security in low-income food-importing countries (FAO, 2011a). Conversely, import restrictions are often applied to protect domestic producers against international competition and incentivize them to produce more, to the detriment of consumers who end up paying higher food prices. One way or another, trade restriction measures can have important repercussions, as they reduce the potential for international trade to balance global supply and demand, and – depending on the market conditions and the way in which policies are implemented – can contribute to increased international price volatility.

Infrastructure issues hold back production

Another variable affecting production practices and decisions is the presence or lack of infrastructure, i.e. roads, irrigation, storage and so forth. When this is lacking or cannot be accessed by all, farmers – and especially smallholders – will have limited means and opportunities to market their surplus in local or even international markets and may become "trapped" in producing for subsistence only. Limited investment in infrastructure is also a major constraint on the accessibility

and affordability of nutritious foods, especially for the poorest, as high transport costs and lack of cold storage can drive up the price of food, particularly of perishable fruits and vegetables.

Impacts reach well beyond the farm gate

Agricultural policies, while shaping what food is produced, also have impacts well beyond the farm gate. Agricultural production systems are strongly interconnected with other key dimensions of sustainable development, a fact that national and international decision makers need to recognize if their policies are to be conducive to a transformation towards healthier, more sustainable, equitable and efficient food systems. Thus agricultural support also impacts:

- **Nature and climate**, by affecting GHG emissions; carbon sequestration; soil, freshwater and forest preservation; and land and marine biodiversity loss.
- **Nutrition**, by encouraging production practices that have implications for the availability and affordability of the nutritious foods that make up healthy diets or by promoting healthy/unhealthy consumer patterns.
- **Health**, by posing more or less risks to producers (e.g. related to the use of agrochemicals and antimicrobial use) or consumers (e.g. through exposure to foodborne pathogens or by determining the adequacy of healthy foods available and their cost).
- **Equity**, by influencing access to and control of natural resources such as land (but also others, like water); employment and income-generating opportunities; and income distribution across and within farming households and other actors in the food supply chain, which may affect the most vulnerable populations such as women and youth who play a key role in food systems.
- **Efficiency**, by discouraging producers and other economic actors from making production decisions based on efficiency considerations.

Critically, as illustrated in Figure 3 and featured throughout this report, the effects of agricultural producer support can be felt across a range of interrelated dimensions – social, economic and environmental – such that all the direct and indirect impacts need to be well understood for optimal coherent policies to be designed. For example, enacting import tariffs on agricultural products to protect domestic producers from international competition may have negative economic consequences, such as raising consumer prices (thus making food less affordable) or protecting inefficient activities, thus preventing innovation and hampering the development of diversified farming systems.[13] On the other hand, policies that regulate food prices to ensure access and affordability for consumers may hurt farmers' incomes. Restricting exports of food staples can ensure a larger food supply is available to the population, at least in the short term. However, to the extent that such measures can lower prices in the medium term, they may eventually discourage production in the longer term, as farmers could switch to crops that fetch higher prices.

Policies aiming at producing more food at a lower cost by intensifying agricultural production (such as providing unconditional input subsidies) may contribute to natural resource and ecosystem degradation, thus compromising the productive capacity of land and perpetrating the vicious cycle of increasing intensive food production to keep pace with demand (Benton *et al.*, 2021). Strong incentives supporting the production of a few cereals (for example, through subsidies and border protection measures) to ensure adequate supplies in the domestic market may not only be unsustainable but may also discourage production and hence reduce the availability (and affordability) of more nutritious and healthy foods. Hence, policies that are instrumental for

[13] Other trade regulations and non-tariff measures can help improve food safety, quality standards and the nutritional value of food, but they can also drive up the costs of trade and hence food prices, negatively affecting affordability of healthy diets (FAO, IFAD, UNICEF, WFP and WHO, 2020).

preserving food security may be harmful for the environment and may not promote consumption patterns that are more diversified and that include the nutritious foods required for a healthy diet.

Public spending priorities

Another challenge in agricultural policymaking concerns public spending priorities and financing. No policy is cost-free for society as a whole. Price incentives in the form of import tariffs (or export taxes) may be a source of revenue for the government but, at the same time, they can come at the expense of consumers, as they drive up food prices. More generally, a great deal of the cost of agricultural producer support is borne by taxpayers who are also ultimately consumers. As such, diverting public resources to support agriculture may have important repercussions, which are sometimes difficult to factor in without proper evidence.

Increasing direct-tax revenues or resorting to domestic borrowing as a financing strategy for investments in agriculture, for example, could depress consumption and private savings (by reducing disposable incomes), thus hurting output and employment growth. If instead, the government resorts to foreign debt (provided this is a sustainable option in the long term) or even foreign aid to support agriculture, the inflows of foreign exchange may result in an appreciation of the real exchange rate, with negative impacts on export competitiveness (Sánchez and Cicowiez, 2014; Sánchez, Cicowiez and Ramirez, 2020).[14]

What type of agricultural policy support is most challenging for health, sustainability, equity and efficiency?

Chapter 3 of this report provides estimates of the impacts of agricultural producer support on the key dimensions affecting sustainable development and food systems (i.e. nature, climate, nutrition, health, equity, and efficiency). While these impacts generally occur as set out in the conceptual framework presented in Figure 3, this report also recognizes that in practice, the impacts of agricultural support are fairly country- and context-specific. Nevertheless, recent literature shows some degree of consensus on what forms of agricultural support are most harmful for food systems.

Coupled support is linked to various negative outcomes

The most controversial measures are **price incentive** policies, such as border measures (import tariffs or export taxes/subsidies), which create economic distortions and have significant distributional effects. These measures distort both consumption and production decisions at the domestic level and, when enacted mainly by the largest trading countries, they have the potential to distort global production and trade. Price distortions can prevent producers and other economic actors from making production decisions based on efficiency considerations, widen the income gap between small and large farms, reduce the competitiveness of the food industry (DeBoe, 2020; Mayrand, Paquin and Pageot-LeBel, 2003), as well as hinder consumers' access to nutritious food, particularly for the poorest (FAO, IFAD, UNICEF, WFP and WHO, 2020).

Border measures are also found to generally produce negative environmental outcomes and increase GHG emissions (Henderson and Lankoski, 2019). Being tied to the production of a specific commodity, these measures are by definition a form of coupled support. As such, they encourage

[14] Scenarios have showed that support to agriculture by way of public investments in productive infrastructure in Mexico, amounting to 0.25 percent of gross domestic product (GDP) in 2021–2023, would allow for a short-term economic recovery with rural poverty reduction in a post-COVID-19 era – but only if the investments were financed through foreign borrowing. On the other hand, using other forms of domestic financing (i.e. domestic borrowing, direct taxes or efficiency gains in public administration to increase government savings) is found to have adverse macroeconomic trade-offs in the short term (Sánchez, Cicowiez and Ortega, 2021).

more production of that commodity, which can result in an increase in the use of land, fertilizer, water and chemicals (OECD, 2001, 2006b), and can also discourage more complex crop rotations (Nemecek *et al.*, 2015) or boost production on lands that are more environmentally sensitive (Lubowski *et al.*, 2006). However, some studies argue that a protectionary policy in countries that are high producers may discourage price incentive interventions on specific crops in other countries, with the net aggregate result most likely being a lower impact on global emissions (Mamun, Martin and Tokgoz, 2019). This is because trade protection incentivizes domestic production and lowers global prices, which in turn discourages other countries from adopting price support measures, since boosting production for trade purposes when prices are low is not economically sound.

Since trade restrictions do not rely on a country's spending capability and even offer governments an opportunity for generating revenue (through import tariffs, for example), they may be an attractive policy tool, especially for those governments with limited resources. However, when these measures are applied by major exporting countries, they can trigger price escalation and food shortages for food-importing countries, as had occurred during the 2007–2008 food price crisis (Martin and Anderson, 2011).

Fiscal subsidies (i.e. monetary transfers) linked to the production of a specific commodity (according to either production output or inputs used) are another form of coupled support. In particular, those without constraints can potentially lead to significant negative social, environmental and nutritional outcomes. For example, by reducing the cost of a specific input, this form of support provides farmers with strong incentives to increase the use of that input (Henderson and Lankoski, 2019). This could lead to the misuse of agrochemicals, water and other inputs. Subsidies tied to the production of a specific commodity can encourage monoculture and lead to a larger carbon footprint. In low-income countries, coupled support tends to incentivize the domestic production of staple foods, such as rice and maize, often at the expense of more nutritious and healthy foods, like fruits and vegetables (FAO, IFAD, UNICEF, WFP and WHO, 2020).

Fiscal subsidies can also put unsustainable pressure on public budgets, as demonstrated in Malawi (Ricker-Gilbert *et al.*, 2014),[15] as well as increase risks of political capture, collusion and fraud, especially when there is no exit strategy foreseen or effective graduation mechanism in place (Dorward, 2009).[16] Compared to pricing policies, fiscal support depends more on the availability of public funds, on fiscal manoeuvres, and on the broader macroeconomic context. This explains why, usually, in low-income countries, subsidies in the form of budget transfers have been and continue to be limited, as discussed in the next section. Moreover, they potentially imply a redistribution of wealth within the economy which may, as a net result, slow down economic growth and increase poverty or raise the country's external debt burden.

Decoupled and general services support are less distorting and harmful

Decoupled fiscal subsidies or fiscal transfers for the provision of general sector services are the least distorting measures, and more likely to foster sustainability. This type of support is not linked to production decisions (i.e. it is not conditional on planting specific crops or or breeding

[15] A cost-benefit analysis indicates that, especially in its earlier years of implementation, the returns generated by the Farm Input Subsidy Programme (FISP) in Malawi (launched in 2005) have often not been high enough to cover the cost to the government. The heavy reliance on imported fertilizers has also generated huge pressure on the country's balance of payments, which coupled with fuel price increases has contributed in turn to high inflation rates. The FISP also occupies a large share of the agricultural budget and potentially crowds out other investments and social programmes (Ricker-Gilbert, Jayne and Chirwa, 2011).

[16] Graduation means that beneficiaries can gradually exit from the programme of assistance, therefore reducing its scope, coverage and costs over time.

specific livestock) or to the use of specific factors of production and therefore does not influence the type or volume of agricultural production. As such, it promotes a more efficient allocation and use of resources.

These subsidies can relieve liquidity constraints, insure against risk, and at the same time avoid distorting production. When they incorporate some type of conditionality related to their use (e.g. paying farmers to refrain from certain practices or to adopt climate-smart farming approaches), they can potentially improve productivity and at the same time reduce negative environmental outcomes (DeBoe, 2020; Henderson and Lankoski, 2019; OECD, 2019a).

Transfers for funding public goods, such as public investments in innovative R&D, marketing services and infrastructure (e.g. irrigation, roads and electrification), can also be effective (if well-tailored) in lowering the cost of food and improving access to healthy diets (Norton, Alwang and Masters, 2014). Support for public goods implies a fiscal cost, reinforcing the argument for repurposing funds currently allocated to more distorting forms of support. Effects and benefits of these investments on agricultural development take also long time to materialize, making their promotion more challenging from a political economy perspective.

To further define and classify agricultural support and its effects, Box 5 provides an overview of how the WTO categorizes policies based on the extent to which they can potentially distort trade.

▶ BOX 5

Agricultural domestic support and trade distortions: WTO rules and nomenclature

Agricultural support policies fall under the WTO Agreement on Agriculture due to their trade distorting effects. Under Article 1.1 of the Agreement on Subsidies and Countervailing Measures (SCM Agreement), a subsidy exists if there is a financial contribution by a government or any public body and a benefit is thereby being conferred. A financial contribution under the SCM Agreement (WTO, 1994a) occurs where: (i) a government practice involves a direct transfer of funds (e.g. grants, loans, equity infusion) or potential direct transfers of funds or liabilities (e.g. loan guarantees); (ii) government revenue that is otherwise due is foregone or not collected; (iii) a government provides goods or services other than general infrastructure, or purchases goods; and (iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above; or (v) there is any form of income or price support in the sense of Article XVI of the 1994 General Agreement on Tariffs and Trade (GATT).*

The Agreement on Agriculture (WTO, 1994b) provides for specific rules on agricultural subsidies, which, in case of conflict, prevail over the rules of the SCM Agreement. The Agreement on Agriculture classifies the support measures into two basic categories:

i. measures that are subject to ceiling commitments and can be used without any limits on support: the Green, Blue and Development boxes, as described below.
ii. measures that are subject to ceiling commitments, namely those that do not meet the exemption criteria of Green, Development or Blue boxes, and are often referred to as Amber Box measures. Only support under these non-exempt measures is subject to limits. ▼

▶ **BOX 5 (CONT.)**

The **Amber Box** comprises measures that provide market price support or subsidies directly related to production (or inputs or output).** This support is subject to limits, and therefore WTO members that have non-exempt domestic support need to set reduction commitments. Members without such commitments must limit their Amber Box support within the *de minimis* levels, set at 5 percent of agricultural production for developed countries and 10 percent for developing countries, as per Article 6.4 of the Agreement on Agriculture.

The **Blue Box** includes measures similar to those in the Amber Box but these require farmers to limit production, thus limiting the trade- and production-distorting potential of this support. At present, there are no limits on Blue Box support, whose rules are set out in Article 6.5 of the Agreement on Agriculture.

The **Green Box** comprises support that meets the fundamental requirement of having no, or at most minimal, effects on trade and production, with rules set out in Annex 2 of the Agreement on Agriculture. Decoupled subsidies (i.e. not linked to production decisions), environmental protection, regional development programmes, and support through public goods and services (such as research, pest and disease control, agricultural training, extension and advisory services) fall in this category. These subsidies are exempt from reduction commitments and can be increased without any financial limitation under WTO rules. In addition, government spending on public stockholding for food security purposes, such as government purchases for food reserves (when purchased from farmers at market prices), and government spending on domestic food aid (in the form of direct provision of food or provision of means to allow recipients to acquire food at market or at subsidized prices) are also covered in the Green Box. Considering their relevance in developing countries, the agreement foresees that such programmes shall be considered to be in conformity with the provisions of the Green Box.

The **Development Box** is a special box for developing countries. It allows, under specific conditions, the exemption of support from the otherwise applicable ceiling. The premise is that measures to encourage agricultural and rural development are an integral part of the development programmes of developing countries. These measures include support programmes, investments and input subsidies provided to agriculture and to low-income farmers in developing countries; and support to encourage diversification away from illicit narcotic crops (as per Article 6.2 of the Agreement on Agriculture).

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* There is no internationally agreed definition of subsidies, neither in agriculture nor in other domains. However, this definition provided by the WTO is widely adopted and recommended, for example, for measuring fossil fuel subsidies and the related SDG Indicator 12c1 on "Amount of fossil fuel subsidies per unit of GDP (production and consumption)". See UNEP, OECD and IISD (2019).

** The market price support as computed by the OECD and under the WTO provisions are conceptually different. The former is closely associated to the NRP discussed in this report and is based on current world reference prices, and applies to commodities for which there is a measurable gap between the country's current domestic farm price and the world reference price. The latter under the WTO is based on a fixed, historical world reference price and applies to commodities for which a country maintains a statutory administered price. These methodological differences lead to differences in these estimates across the two organizations, as explained in OECD, 2016a (p. 173) and more in detail in Effland (2011). Source: Authors' adaptation from WTO (1994b) and FAO (2018c), unless otherwise noted.

Source: Authors' adaptation from WTO (1994b) and FAO (2018c), unless otherwise noted.

2.4 HOW AND WHERE HAVE AGRICULTURAL SUPPORT POLICIES BEEN USED OVER TIME?

Estimates for the countries monitored by the Ag-Incentives Consortium initiative (discussed in Box 4) are used to understand the type and magnitude of agricultural support used over time globally. These are used to describe how (e.g. type of policy instruments, commodities targeted and extent of support) and where agricultural support has been applied, using the 61 countries presented in Annex 1, grouped by income level.[17] The number of countries covered in the analysis is 61, as the 27 countries of the European Union and the United Kingdom of Great Britain and Northern Ireland are treated as a single country.[18] This dataset represents about 90 percent of the global value of production in the years with the greatest coverage (i.e. 2011–2013), allowing for meaningful analysis at the aggregate level.[19]

This section provides an overview of the level and composition of the support to agriculture at the global level, seen through the NRA. This indicator was defined earlier (Box 3), but it is worth recalling that it measures the total support to the crop and livestock farming sector (excluding fisheries, which are not covered in this report) and includes the NRP. It is a measure of the price incentives provided by trade and market policies (measured by the NRP) and of fiscal subsidies based on output, inputs and factors of production. Then, we present the same indicators by country income level. The different policy instruments used at different stages of development are highlighted, along with some of the political economy considerations behind these different policy choices. Finally, the last subsection focuses on the degree of support to specific commodities, showing how and where support is being implemented.

Global estimates of agricultural policy support

Worldwide, agricultural producer support (see definition in Box 3), in the form of price incentives and fiscal subsidies, accounts for an average of USD 540 billion each year in the most recent period (Figure 4).[20] More than half this amount (almost USD 294 billion) is provided to farmers through price incentive policies, i.e. border measures and market interventions (tariffs, duties, quotas, and fixed or floor prices) that keep producer prices above the market level. About USD 245 billion are provided through fiscal subsidies, of which over USD 90 billion are for use of inputs and about USD 10 billion are provided based on the output level.

Almost 60 percent of the total fiscal subsidies, or USD 142 billion, are defined here as "subsidies based on factors of production" (Figure 4), more than half of which (USD 73 billion) are provided to farmers conditional on planting certain crops or maintaining a herd of livestock, and based on

[17] The country coverage of the dataset varies slightly every year (and particularly at the beginning and end of the period) due to data availability for some countries. Some key players are not included in the dataset (e.g. Bangladesh, Egypt, Malaysia, Morocco and Thailand) and this must be taken into consideration in the analysis of the indicators.

[18] The data relates to the period prior to the United Kingdom of Great Britain and Northern Ireland leaving the European Union, hence this country is grouped with the European Union in this analysis.

[19] In the year with the worst coverage (i.e. 2018) the dataset represents 80 percent of the total agricultural production value, due to lack of support estimates for certain countries.

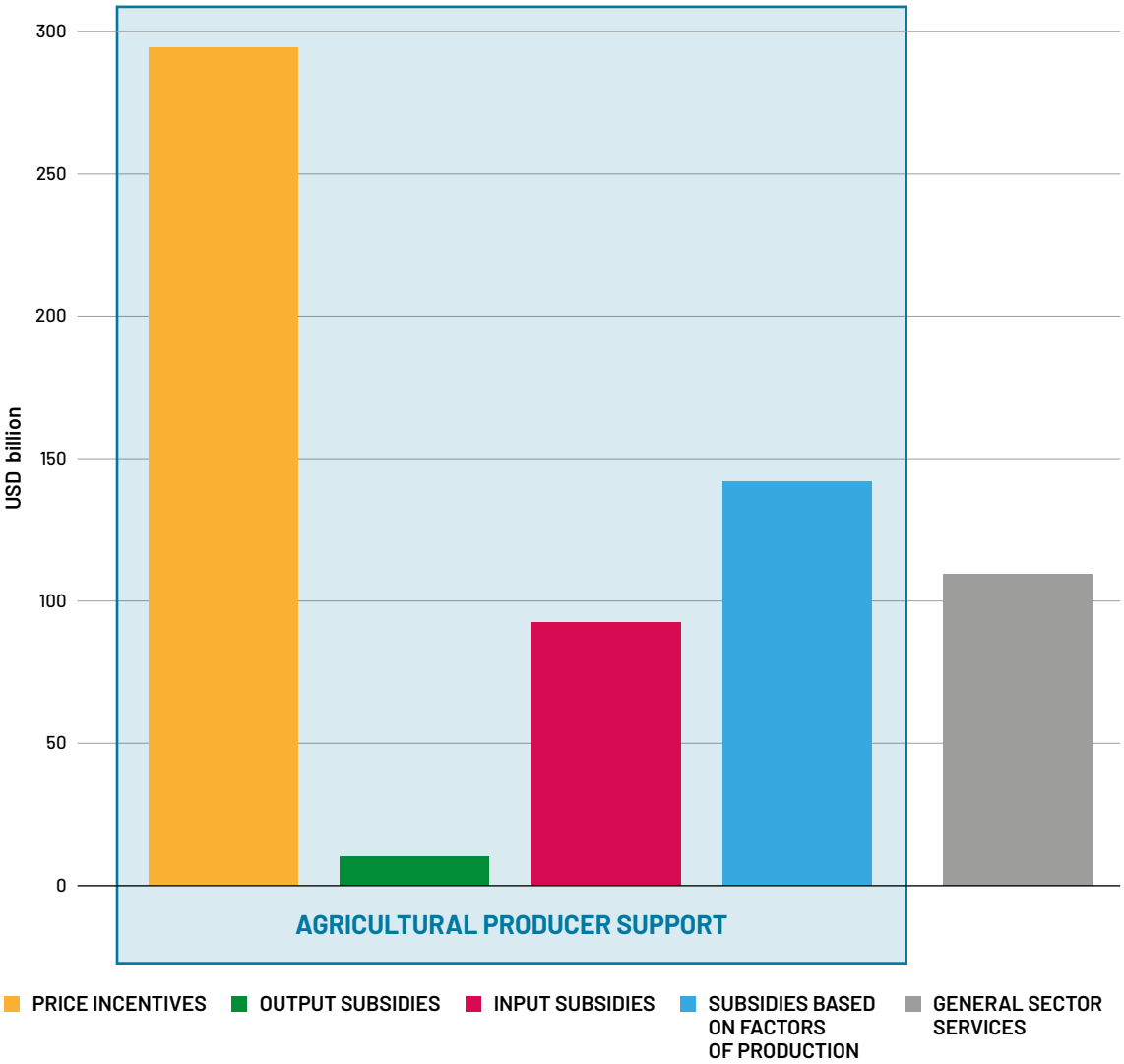
[20] This amount includes only forms of support targeting individual producers, thus with a direct effect on farm revenues, and it is expressed in net terms (deducting price disincentives, or negative support). Budgetary transfers for the provision of services to the general agriculture sector (i.e. public goods) are discussed separately. Consumer subsidies (or payments), as tracked by the OECD, are not captured in the Ag-Incentives database. Recent OECD estimates of agricultural support were noted in Chapter 1 and above in this chapter. The greater country coverage is the main reason why our estimates of agricultural producer support in net terms (i.e. considering both price incentives and disincentives) of nearly USD 540 billion per year are larger than those presented in OECD (2021a) of around USD 436 billion per year. In gross terms (i.e. without subtracting price disincentives), the OECD estimate of agricultural producer support is entirely by coincidence about USD 540 billion per year (i.e. nearly three-quarters of the USD 720 billion estimated as total support to the agricultural sector).

current or historical production. Another USD 69 billion are farming subsidies decoupled from the production of any given commodity. These decoupled subsidies are generally considered less distorting in economic terms and less harmful to the environment; that is, they do not influence decisions on the type or volume of output to produce or incentivize overuse of inputs. Currently, however, this type of subsidy accounts for only 30 percent of all fiscal subsidies and less than 15 percent of total agricultural producer support worldwide.

In addition to these measures, governments also support agriculture and producers collectively, through the provision of general sector services. These monetary transfers averaged almost USD 110 billion annually from 2013 to 2018 (Figure 4). Despite being the form of support most conducive for sustainable growth of the sector, these transfers only amount to one-third of the support provided in the form of price incentives, which are deemed to be most distorting and potentially harmful.

▶ FIGURE 4

Level and breakdown of global agricultural sector support (average 2013–2018)



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Agricultural producer support represents 15 percent of agricultural production value

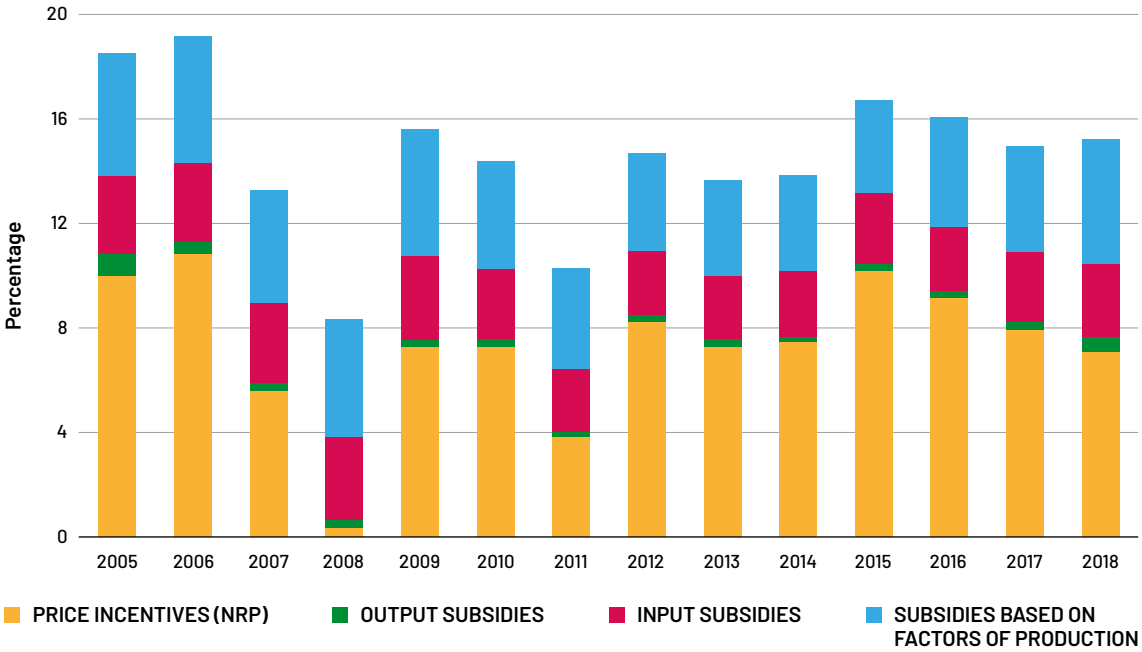
Expressed as a relative share, agricultural producer support represented on average 15 percent of the total agricultural production value, between 2005 and 2018.[21] The NRA ranged between a high of 19 percent in 2006 to a low of 8 percent in 2008, but has remained stable in recent years (Figure 5).

Figure 5 shows the quite volatile trend of price incentives, expressed by the NRP. This is a result of different factors including the volatility of international prices and the poor transmission of international price signals to the domestic market, which is also in part determined by border measures in place.[22] The noticeable drop in price incentives (i.e. NRP) in 2008 is linked to the global food price crisis of that period. In response to international price spikes, many food-importing countries eased their trade restrictions in 2007–2008 (and similarly in 2011–2012) to ensure domestic food availability. At the same time, the need to preserve food security and maintain low domestic prices for consumers, especially the poorest, prompted governments to reduce producer price support measures.

All fiscal subsidies present a more stable trend over the period, reflecting the "programmatic" nature of this support as well as the difficulty of phasing out such subsidy schemes. Subsidies on outputs were minimal, while those on inputs accounted for 3 percent of the global value of production. Subsidies based on factors of production, either coupled with or decoupled from production, were about 4 percent of global value-added, on average, during 2005–2018.

▶ FIGURE 5

Nominal rate of assistance as a percentage of global production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

[21] In this analysis, the NRA and its components are expressed as a percentage of production value at undistorted prices, which are the international equivalent of net prices of a country's tariffs and subsidies. For more details on the computation of the indicators herewith presented, refer to Annex 1.

[22] Beyond trade measures, other factors can contribute to limit price transmission, including poor infrastructure and market performance (whose effect is not captured in the NRA indicators), as well as exchange rate fluctuations and other macroeconomic policies.

Agricultural producer support across different country income groups

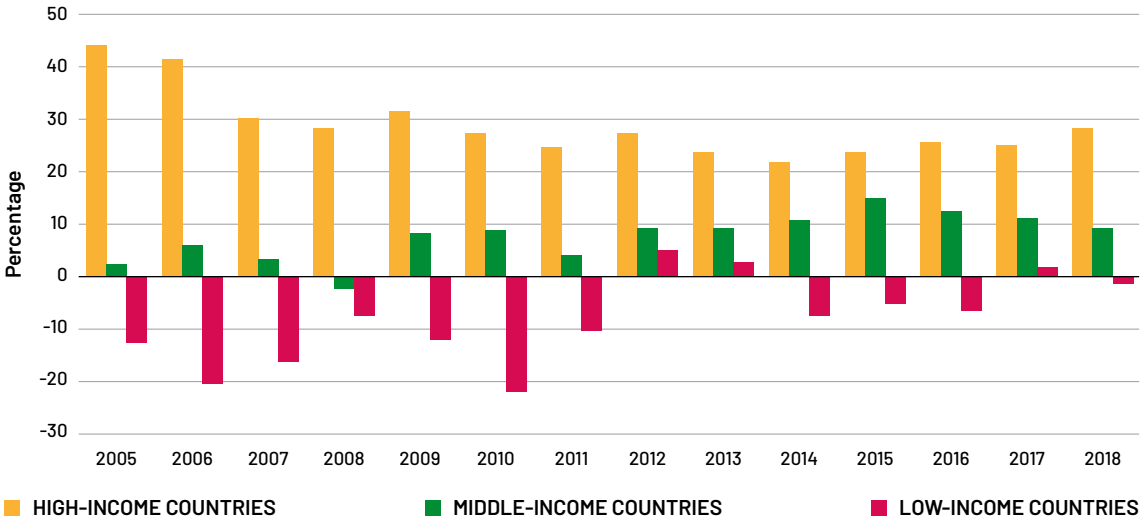
The global estimates discussed above mask significant differences between countries when these are classified by income level. These differences are driven by a country's stage of development, the relevance of the agriculture sector to its economy, and the trade status of its food and agricultural commodities.

For example, food-importing countries often provide stronger price incentives, especially for food staples, with the aim of shielding their weak domestic farming sector from international competition. Exporting countries intervene less so, and tend to favour fiscal subsidies rather than price incentives. High- and middle-income countries with a vibrant agriculture sector have more scope to provide fiscal support compared to low-income countries, where resources are very scarce or "drained" by other priority areas, such as national security or weather-related emergencies.

As presented in Figure 6, **high-income countries** provide large support to their agriculture sector, though these aggregate NRA figures hide wide variations across countries within this group. Agricultural producer support expressed as a share of the total value of production has followed a downward trend in most recent periods, driven by attempts to repurpose support towards less harmful policies (e.g. funding general sector services), but also because of the decrease in agriculture as a share of the overall economy of these countries.[23]

▶ **FIGURE 6**

Nominal rate of assistance as a percentage of production value, by income level



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Within **middle-income countries**, the average rate of assistance for agriculture rose during the analysed period, reaching a highest 14 percent of agricultural production value in 2015 (Figure 6). However, the picture within these countries is also highly heterogeneous, including countries with very different support profiles, and hence requires a cautious interpretation (as will be further discussed later).

[23] More modern agriculture may also be characterized by lower production costs. For example, labour costs may decrease as agriculture develops and becomes more capital intensive and migration makes it possible to hire seasonal workers at a lower cost. Other inputs (e.g. improved seeds and fertilizers) may become cheaper due to technical progress and its widespread uptake. Such reduction in costs of producing food could make agricultural producer support less necessary from a political economy perspective.

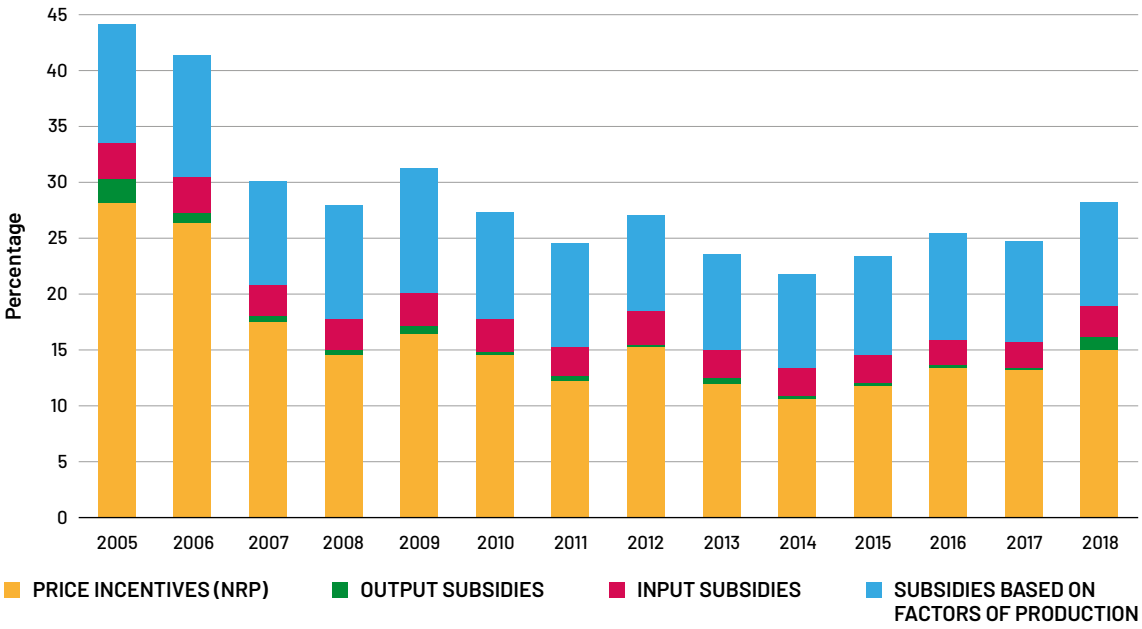
In **low-income countries**, which are mostly found in sub-Saharan Africa, the aggregate agricultural producer support is negative for most of the years analysed (Figure 6). In these countries, a large share of the population is poor and the affordability of food is a key concern, hence governments adopt policies that tend to suppress producer prices, resulting in a "transfer" away from producers to consumers, who benefit from lower food prices. Public resources to provide fiscal subsidies are also limited and therefore these cannot compensate for the price disincentives generated by the trade and market policies. This result is unsurprising, as developing countries have typically implemented policies that hurt their agriculture sector, while providing extensive protection to the industrial sector (Baliño *et al.*, 2019).

High-income countries: highest but declining rates of support

The degree of support is positive for all the high-income countries, although the level among them varies. The NRA was over 40 percent in 2005, dropping to 22 percent in 2014 and then following a slightly upward trend to 28 percent in 2018 (Figure 7), mainly driven by increasing support in some major economies, including the European Union and the United States of America in the form of budget transfers, and in Japan as price incentives.

▶ FIGURE 7

Nominal rate of assistance for high-income countries as a percentage of production value, by type of support

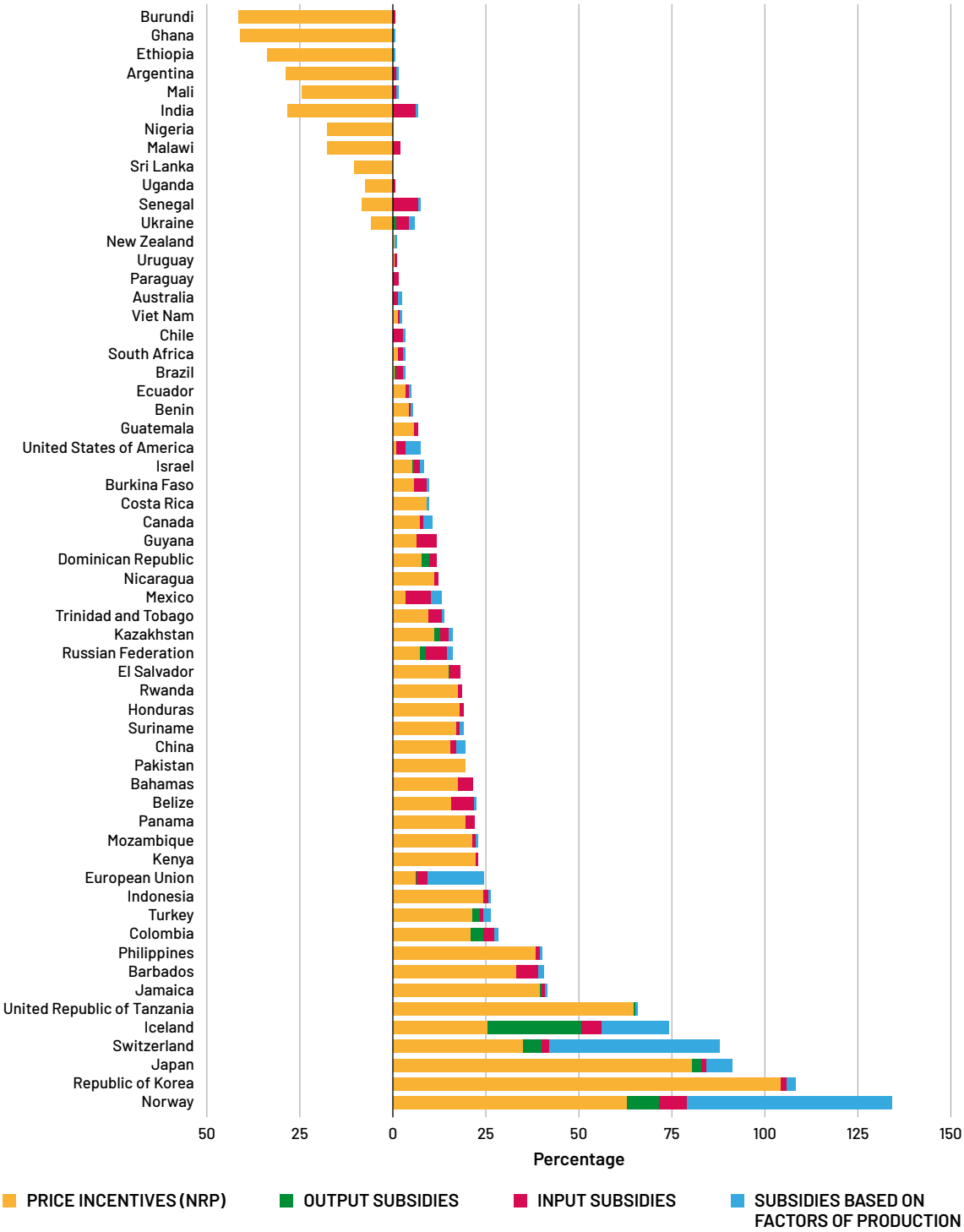


Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Despite the overall declining rates of assistance, most of the public support to individual farmers is mainly provided through price incentives, generally the most distorting type of support (as discussed in the previous section). Within the OECD group, some countries, such as the Republic of Korea, Japan and certain European Union member countries (i.e. Czechia, Iceland and Norway), support their agriculture sector more heavily than others, such as Australia and New Zealand (Figure 8).

▶ **FIGURE 8**

Nominal rate of assistance as a percentage of production value, by country and type of support (year 2013)



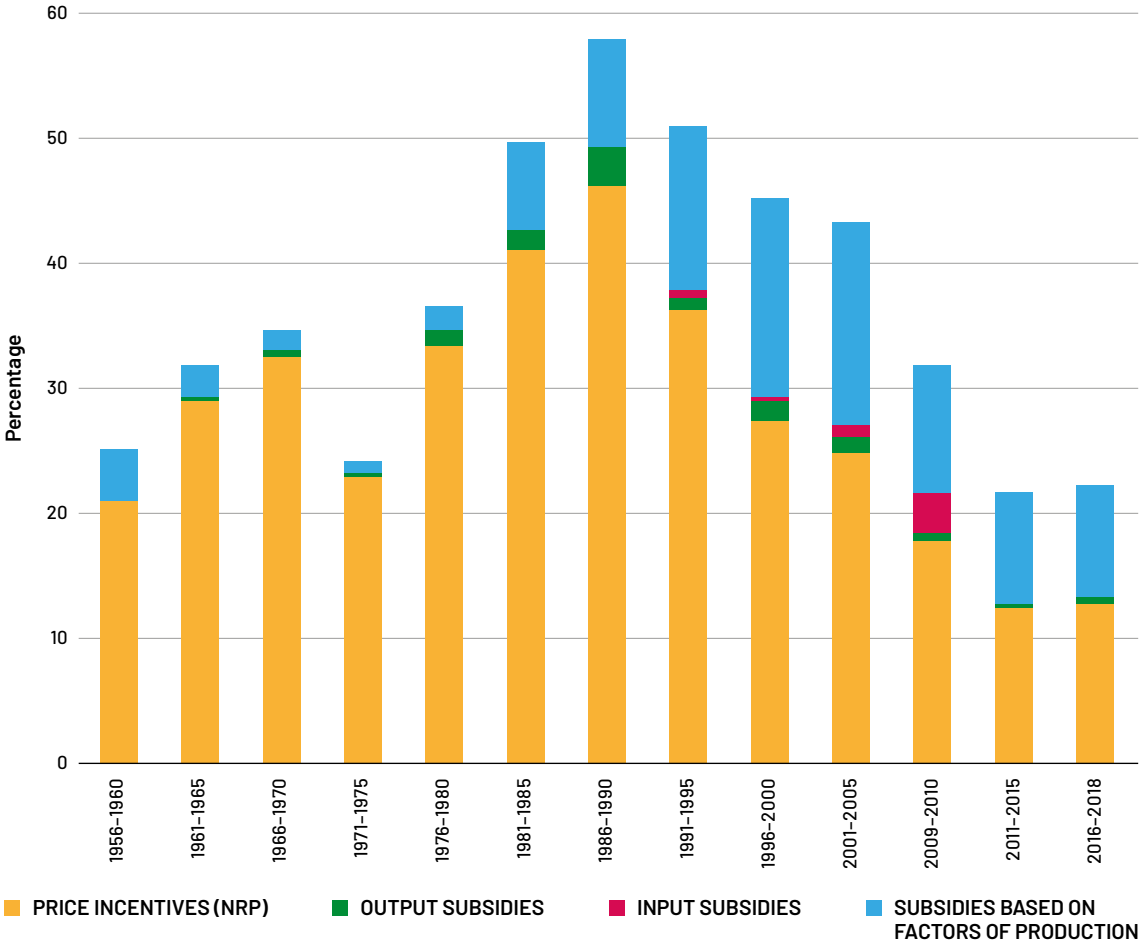
Notes: For Nigeria, Pakistan and Sri Lanka data on fiscal subsidies is not available, therefore the graph shows the NRP only. Data for Peru is not displayed, as the breakdown of the NRA (composition of fiscal subsidies) is not accurate and is in the process of being revised.

Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Declining support to agricultural producers in high-income countries until recently is part of a long-term trend that started at the end of the last century (Figure 9).[24] In the past, many now developed countries heavily supported their agriculture sector through price incentive measures, when they were at earlier stages of agricultural transformation.[25] Price incentive policies gained ground in the 1970s and 1980s, peaking in 1986 with the start of the WTO multilateral trade negotiations of the Uruguay Round that focused on the need to identify approaches that would allow OECD countries to start reducing support given through border and domestic support measures (Martin and Winters, 1996).

▶ FIGURE 9

Long-term nominal rate of assistance in high-income countries as a percentage of production value, by type of support



Source: Laborde and Mamun (forthcoming).

[24] The source of the NRAs presented in this section is Laborde and Mamun (forthcoming). The dataset builds on various sources of NRA historical estimates combined with the Ag-Incentives Consortium data. This entailed the "reclassification" of fiscal subsidy categories to consolidate the before and after 2005 data series. This has resulted in a different country coverage compared to the indicators presented before, as it only reports figures for countries common to both these sources (i.e. 54 countries covered in the years with the best coverage).

[25] Agricultural transformation is the process by which an agri-food system transforms over time from being subsistence-oriented and farm-centred into one that is more commercialized, productive, and off-farm centred (Timmer, 1988).

As a result, since the early 1990s, several countries have moved away from price incentives towards support less coupled to production (World Bank, 2018a). The NRP fell from its highest share in the late 1980s (almost 50 percent) to less than 15 percent in 2016–2018 (Figure 9). Subsidies based on factors of production, including decoupled subsidies, went up from 1 percent in the 1970s to almost 20 percent of agricultural production value in the early 2000s (Figure 9). Currently, agricultural support in high-income countries aims to protect farm income in contexts where farmers risk being marginalized, rather than boosting production and productivity. Larger shares of these subsidies are now linked to the provision of environmental and even social benefits, as discussed in more in detail in Chapter 4.

That said, the progress made by many high-income countries in shifting agricultural policies towards less distorting and harmful measures seems to have stalled in recent periods. Since 2016, for example, the level of producer support as a share of the production value has increased, mainly due to higher output subsidies and larger price incentives (visible in Figure 7).[26]

OECD analysis also indicates that, despite an increase in general sector services funding in nominal terms in the last two decades, as a share relative to the size of the sector, these transfers have declined from more than 7 percent of agricultural gross value-added in the early 2000s to less than 6 percent in 2017–2019 (OECD, 2020a). These expenditures, considered as the least distorting form of support, did not keep pace with the sector growth.

Middle-income countries: a mixed picture, but support rates increasing overall

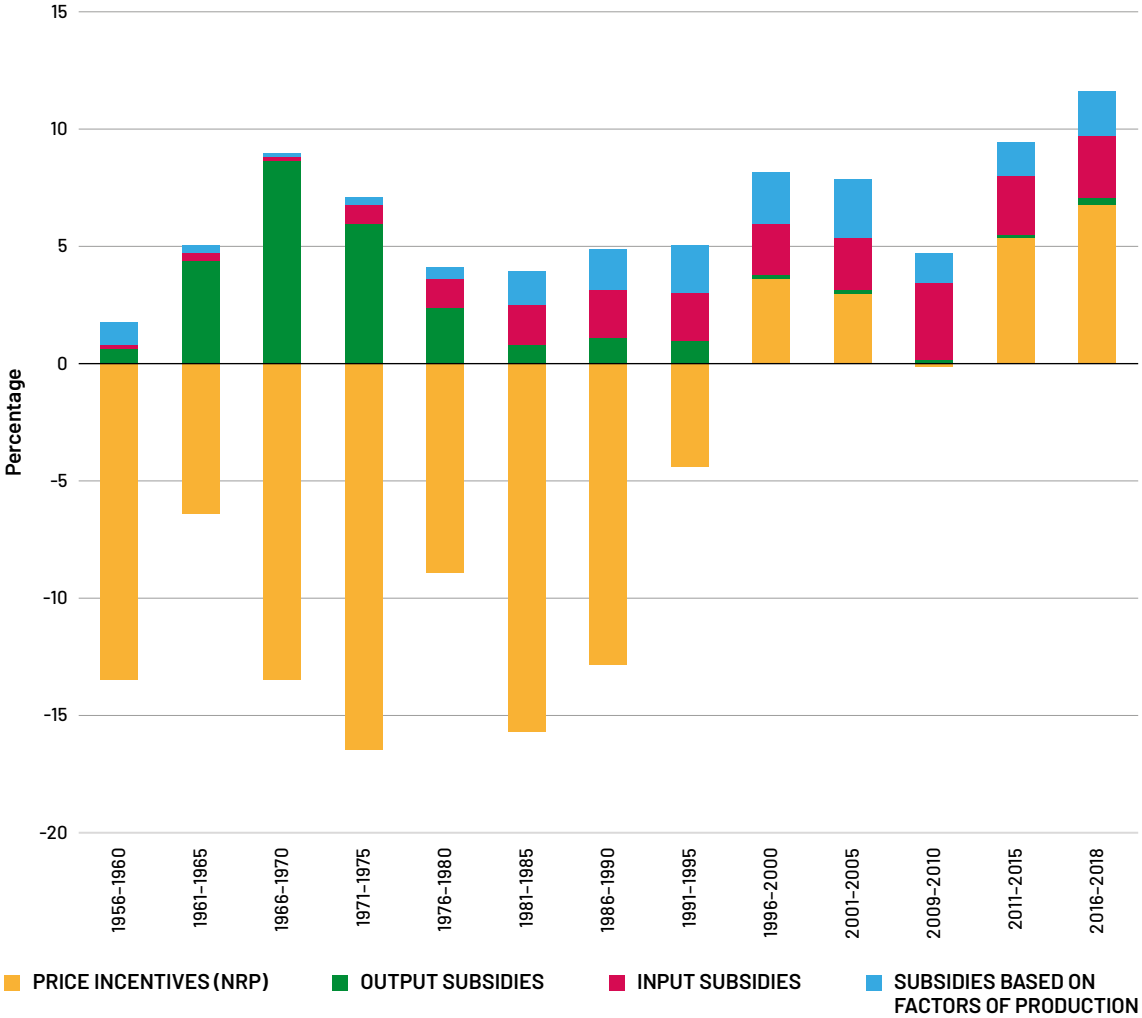
As mentioned above, the picture of agricultural support within middle-income countries is highly heterogeneous and thus requires a cautious interpretation, as it includes countries with very different support profiles. As visible in Figure 8, some countries such as China, Colombia, Turkey, Indonesia and the Philippines strongly support agricultural producers. Others, such as Argentina, Ghana or India, penalize the sector by implicitly depressing prices of agricultural products to protect the poorest consumers.

In middle-income countries as a whole, the shift from negative to positive assistance rates occurred at the end of the last century (Figure 10). Prior to this, these countries largely protected poor consumers by ensuring domestic prices remained low, implicitly penalizing the farming sector. Farmers, in turn, were supported mainly through subsidies linked to the volume of output produced or the inputs used. Since the late 1990s, agricultural support has increased significantly in the form of market-distorting policies that may ultimately jeopardize sustainability and food security in the medium to long term. Price incentives and other coupled support, especially input subsidies, now account for over 10 percent of agricultural production value. The average level of funding to general sector services relative to agricultural value-added in the middle-income countries monitored by the OECD has been always lower than that observed for the high-income countries. The share seems to have declined from 4.5 percent in early 2000 to 3 percent in most recent years (OECD, 2021a).

[26] Several natural disasters in 2017 and 2018 triggered the provision of extraordinary assistance to farmers in 2018 in European Union countries (OECD, 2019a), which may become more commonplace in the future due to climate change. In 2018, the United States of America announced a package of output subsides for producers of specific commodities in the context of its trade mitigation programmes, to assist farmers affected by the loss of traditional export markets due to recently imposed tariffs (OECD, 2019a).

▶ **FIGURE 10**

Long-term nominal rate of assistance in middle-income countries as a percentage of production value, by type of support



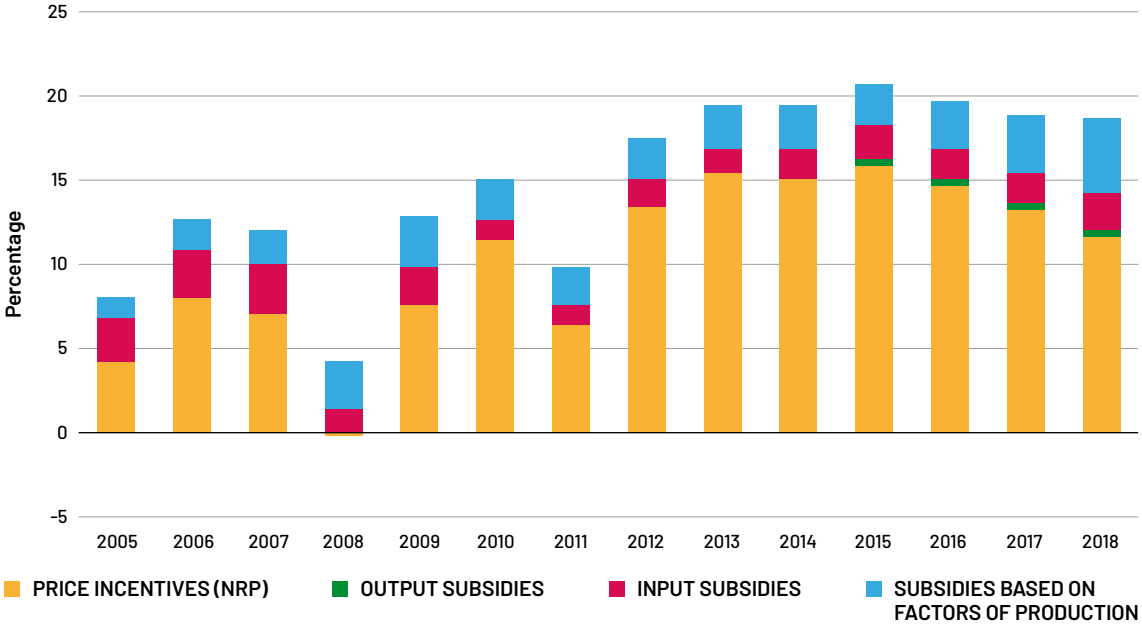
Source: Laborde and Mamun (forthcoming).

Two of the biggest countries in this group, China and India, have pursued different policy approaches to farmer support (Figure 11 and Figure 12). In China, the NRA turned positive in the early 1990s (see Chapter 4) and has followed an upward trend since then, driven by price incentives, especially for cereals. In contrast, the farming sector in India has been largely penalized over the last 20 years, due to the strong focus of Indian agricultural policy on protecting consumers by ensuring affordable food prices.

Coupled support in India, mostly in the form of input subsidies, was always very popular as a means of compensating farmers, to some extent, for the penalization they implicitly received through price disincentives. The negative NRP has narrowed sharply since 2015 (to about -10 percent of agricultural production value), but most of the fiscal subsidies to farmers in the country are still largely coupled to production, therefore acting as potentially harmful for the sustainability of food systems.

▶ **FIGURE 11**

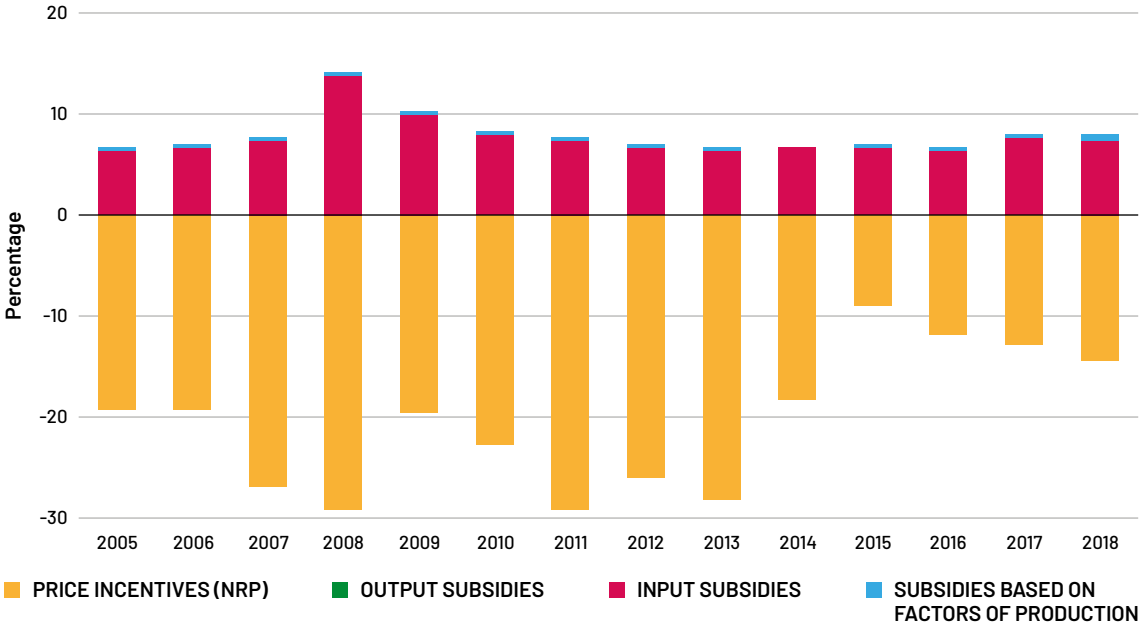
Nominal rate of assistance in China as a percentage of country production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

▶ **FIGURE 12**

Nominal rate of assistance in India as a percentage of country production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

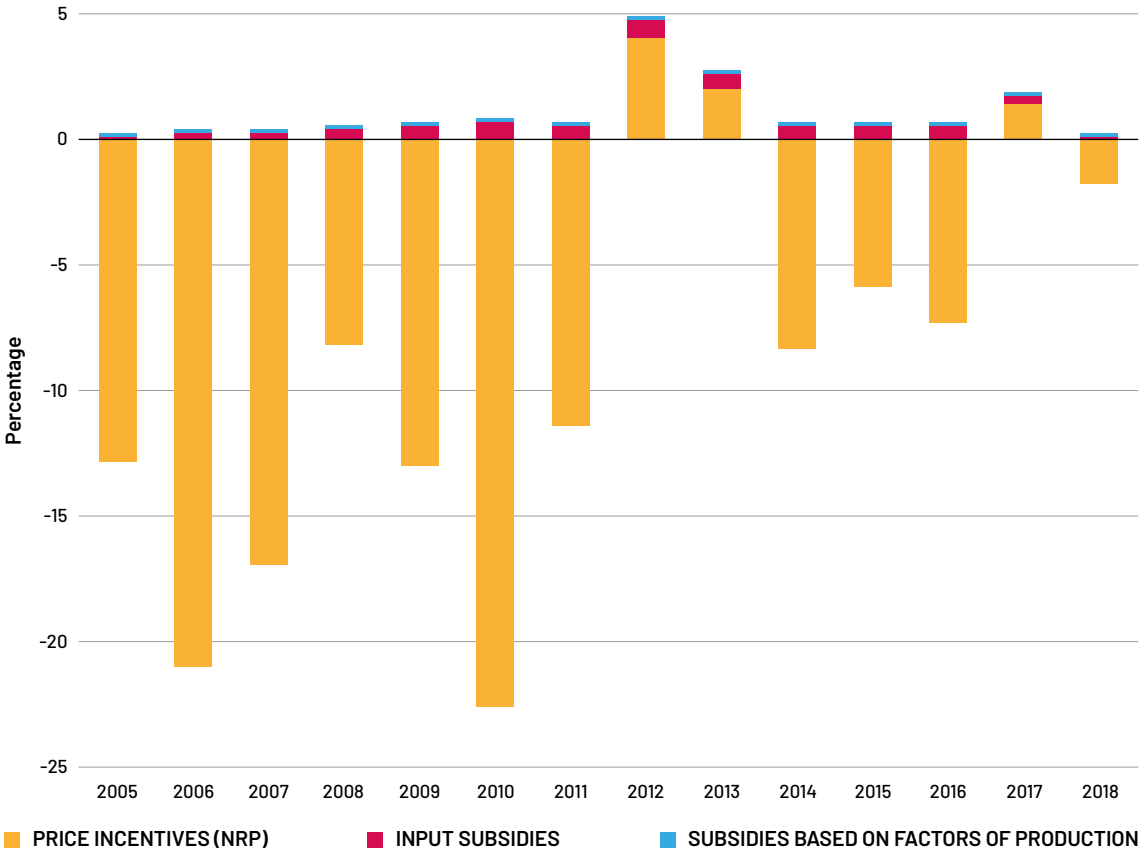
Low-income countries: persistent but decreasing penalization of agricultural producers

In low-income countries, almost all of which are found in sub-Saharan Africa, the aggregate NRA is negative in most of the years analysed (Figure 6), consistent with historic patterns in other developing countries (Baliño *et al.*, 2019). These countries have pursued policies to lower the cost of food for (poor) consumers but also to generate revenues for the government (for example, through export taxes on cash crops).

In terms of price incentives, a trend towards a more neutral stance (i.e. NRP close to zero or even slightly positive, as in 2012–2013) is emerging in these countries (Figure 13). Previously, however, their policies had disadvantaged the agriculture sector relative to the rest of the economy. Evidence suggests that, historically, agricultural transformation has succeeded when governments removed policies and addressed market failures that penalized the agriculture sector (Laborde *et al.*, 2019). Maintaining a policy mix that is disadvantageous for farmers – either through market-distorting policies or/and poor investments in public goods and general services – perpetuates subsistence farming practices, hinders growth in the sector and may discourage private investment in agriculture (Baliño *et al.*, 2019). All of these factors can hinder innovation, commercialization, profitability and the agricultural transformation process which is, in turn, central to creating healthier, more sustainable, equitable and efficient food systems.

▶ FIGURE 13

Nominal rate of assistance for low-income countries as a percentage of production value, by type of support



Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

It is important to recognize that the average rate of assistance for low-income countries also conceals very different rates of assistance for the agricultural export and import subsectors. In these contexts, import-competing commodities (such as staple foods) are often incentivized (which is reflected in a positive NRA), while export products are largely penalized (Anderson, 2009; Anderson, Rausser and Swinnen, 2013; Pernechele, Balié and Ghins, 2018). Nevertheless, the average negative NRP across the period means that producer prices were well below the international reference price. Fiscal support is minimal, given the significant budget constraints these countries usually face, and does not compensate for the implicit taxation of agricultural producers through price policies (Figure 13).

However, fiscal subsidies coupled to production, mainly on seeds and fertilizers, have gained in importance within this group of countries since the food price crisis, with the hope that they can help stimulate domestic food production while diminishing the reliance on food imports. Despite being modest compared to those provided by some middle- and high-income countries, input subsidies represent on average the largest share of public budgets allocated to agriculture in sub-Saharan Africa (Pernechele *et al.*, 2021).

This is the case in spite of the significant burden that these measures place on public finances and the growing concerns on the effectiveness of extensive input subsidy programmes. While under certain conditions input subsidies are a potentially useful tool to boost agricultural productivity, the cost and benefits of relying on them largely depend on country context. Several studies have found that poor targeting and inefficient distribution mechanisms, characterized by diversion and leakages, are the most problematic issues with such programmes (Pan and Christiansen, 2012; Goyal and Nash, 2017).

In low-income countries, governments continue to allocate limited expenditure and investments to general sector services, although some encouraging signs are seen in the composition of such expenditures in recent years. In some countries, infrastructural investments has been on the rise, especially for irrigation, while funding to land management and environment preservation has also increased (Pernechele *et al.*, 2021).

Support to specific commodities

The commodity, or sector, targeted by agricultural support and the intensity of this support also have an effect on the health, sustainability, equity and efficiency of food systems (see Figure 3). For example, given that most agricultural GHG emissions are from rice, milk and livestock production, with ruminant meat by far the most important source (Mamun, Martin and Tokgoz, 2019; Tubiello *et al.*, 2012, 2013), then in principle supporting the production of these commodities could be expected to have some potentially adverse effects on climate (see a more detailed discussion in Chapter 3). Agricultural emission intensities (emissions per unit of output) are substantially higher in developing countries compared to rich countries, although they have fallen far more rapidly in developing countries in the past quarter-century, with agricultural productivity increasing. However, rich countries and upper-middle-income countries consume more dairy and meat products per capita than poorer countries (Mamun, Martin and Tokgoz, 2019).

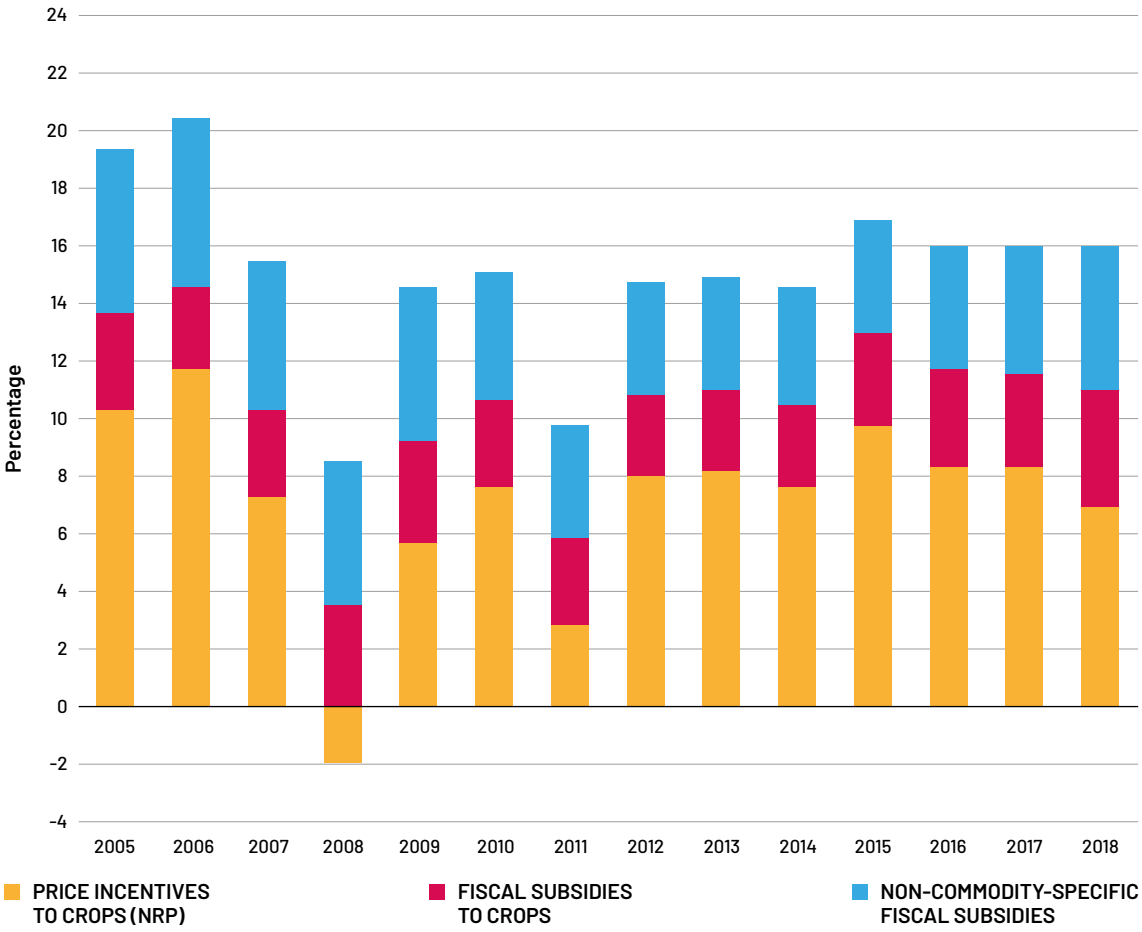
Marginally more support for crops than livestock

In aggregate terms, livestock prices were slightly more supported than crops prices, with the average NRP for the two subsectors at 7.6 percent and 7.2 percent, respectively, during 2005–2018 (Figure 14 and Figure 15). However, crops received relatively more fiscal subsidies. In particular, during the analysed period, the average amount of input subsidies targeting crop production was

three times higher than that of those allocated to livestock. However, it is worth acknowledging that, indirectly, the livestock sector is implicitly aided by support to crops that are used to feed livestock.[27]

▶ **FIGURE 14**

Nominal rate of assistance for crops, as a percentage of global production value



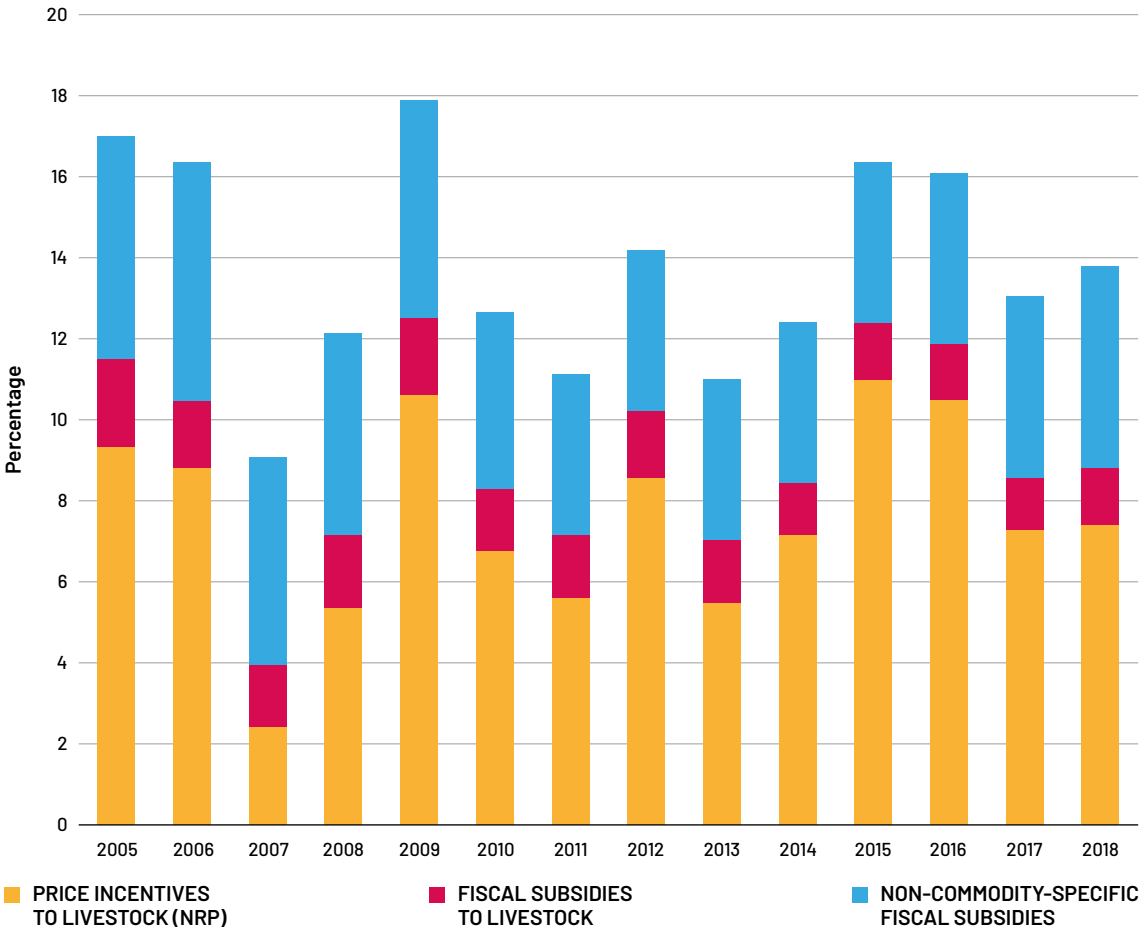
Notes: Non-commodity-specific fiscal subsidies are fiscal transfers that do not target a subsector or commodity in particular. This can be by design (directed at all products indiscriminately) or because of a lack of information to associate them with a specific product.

Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

[27] In the United States of America alone, for example, an estimated USD 248.8 billion pounds of maize, soybeans, sorghum, barley, oats and canola are used to feed livestock and poultry (Family Farm Action Alliance, 2020).

▶ **FIGURE 15**

Nominal rate of assistance for livestock, as a percentage of global production value



Notes: Non-commodity-specific fiscal subsidies are fiscal transfers that do not target a subsector or commodity in particular. This can be by design (directed at all products indiscriminately) or because of a lack of information to associate them with a specific product.

Source: Authors' own calculation based on data from Ag-Incentives (forthcoming).

Sugar, rice and animal products provided with strongest price incentives

As reported in Table 1, the production of sugar, rice and animal products benefited from the strongest price incentives, on average, during 2005–2016, while the production of more nutrient-rich fruits and vegetables, such as tomatoes and bananas, was penalized. Generally, strong price incentives for specific commodities may compromise the diversification of food production needed to ensure the availability of a wider range of nutritious foods, thus affecting the cost of some of the foods that make up healthy diets (FAO, IFAD, UNICEF, WFP and WHO, 2020).

According to OECD analysis (OECD, 2021a), in high-income countries, the highest rate of assistance goes to rice production, followed by sugar, sunflower seed and livestock products – with beef receiving the largest subsidies among meats. For middle-income (non-OECD) countries, rapeseed and sugar have relatively high rates of support, followed by cereals, namely maize and wheat, which are key food staples in many of these countries. Livestock products receiving the most support in middle-income countries are poultry, sheep and pork (OECD, 2021a).

Within both groups of countries (high- and middle-income), there is considerable variation across commodities, but the support for commodities with high GHG emissions appears to be much higher overall in developed countries than in developing countries (Laborde *et al.*, 2020).

In low-income countries, support is concentrated on staple foods (mainly maize and rice) and cattle through protectionary trade measures such as import tariffs and quotas, together with some large input subsidy programmes, although much smaller than those in high-income countries (Pernechele, Balié and Ghins, 2018). Since the food price crisis in 2007–2008, these policies have often been embedded in self-sufficiency and import substitution strategies that focus on protecting producers (i.e. price incentives) as a means of boosting supply and ensuring food security. As discussed earlier, high support for staple products may in turn penalize the production and affordability of more nutritious foods, such as fruits and vegetables, which form part of a healthy diet.

▶ TABLE 1

Nominal rate of protection (%) for the most and least supported products (weighted average, 2005–2018)

TEN MOST INCENTIVIZED PRODUCTS			TEN MOST PENALIZED PRODUCTS		
	COUNTRIES*	NRP		COUNTRIES*	NRP
Sugar	29	20.9	**Coffee**	17	-2.6
Rice	36	18.1	**Sunflower seed**	8	-3.8
Poultry meat	36	14.6	**Palm oil**	4	-4.1
Cotton	18	14.3	**Groundnuts**	9	-4.6
Pig meat	31	12.5	**Soybeans**	13	-4.9
Sheep meat	14	11.6	**Tomatoes**	8	-5.5
Bovine meat	38	10.5	**Cocoa beans**	4	-6.0
Wheat	26	5.1	**Tea**	7	-11.5
Maize	39	4.9	**Sorghum**	9	-17.4
Eggs	27	2.9	**Bananas**	12	-32.1

Note: * Number of countries that report an NRP for each product.

Source: Authors' own calculation based on data from Ag-Incentives (forthcoming). Data refer to the database released in July 2020.

2.5 CONCLUSION

This chapter's analysis of global agricultural producer support over time points to a strong historical reliance on measures conditional on certain characteristics of agricultural production such as the type of input used or the quantity of output produced. In particular, this so-called coupled support has been provided in the form of price distorting measures and fiscal subsidies, particularly in high-income countries. More recently, these measures have become more prominent across certain middle-income countries, shaping their production practices and systems. Low-income countries mostly penalize their farming sector by resorting to policies that keep domestic food prices low for consumers. The relatively limited fiscal subsidies provided to producers in low-income countries are mainly tied to production, without any requirements to reduce their negative externalities concerning the environment.

The way in which agricultural support has been changing over the years, by and large, has not been supportive of a transformation towards healthier, more sustainable, equitable and efficient food systems. Repurposing agricultural producer support is a measure that can be employed to drive that transformation, and providing further guidance to further this approach is one of the objectives of this report. It is important to note that how each country can best repurpose its agricultural producer support will ultimately depend on its own context; hence, what seems to be harmful support at the global or income-group level may not always be so for all countries.

However, some measures may be so harmful in some contexts that, as explained in Chapter 1, they need to be entirely phased out and/or reformed as part of a broader repurposing strategy.

The evidence presented within this chapter makes it possible to set out the general direction for repurposing agricultural producer support, which is contextualized more specifically in the following chapters. The general steps are as follows:

- **Phase out the most distorting and environmentally and socially harmful policies, such as price incentives or coupled subsidies.** This is important for the countries that provide the highest rates of support and the more developed countries, who have the largest carbon footprint. However, it is also critical for low-income countries to replace policies that disincentivize agricultural production and implicitly penalize farmers with a mix of policy alternatives that are the less distorting and harmful and that can accelerate agriculture and food systems transformation.
- **Repurpose support for high-emission or unhealthy products towards support that has environmental and health conditionalities and that promotes more sustainable food systems.** Measures and subsidies promoting the cultivation of high-emission crops or products that are harmful to nutrition and health, such as sugar, cereals or other products that are further processed into unhealthy foods (e.g. sugary drinks, cakes or cheap rapeseed oil), need to be scrutinized and reformed accordingly. At the same time, the use of decoupled subsidies, or fiscal subsidies with environmental conditionalities, in subsidy schemes should be endorsed. The design of agricultural policies and incentives should also be more nutrition-sensitive, contributing to the prevention of all forms of malnutrition as well as the promotion of healthy diets.
- **Repurpose fiscal support to protect consumers and ensure food security and nutrition, especially for the poorest.** This can be done through targeted subsidies and social protection mechanisms that ensure access to affordable nutritious foods that make up healthy diets, especially in low-income countries. This could also cushion the potential impact of price hikes stemming from the reduction of agricultural producer support (see Chapter 3). Investments in general sector services, such as roads or other post-production infrastructure, can also improve

access to and affordability of food for the population, especially the poor. Investments in agricultural R&D, even if their effects are not immediate, have also proven to be highly effective in reducing malnutrition: when their target is to raise productivity of nutritious foods, they can help reduce their cost and thus boost consumption, leading to an improvement in selected nutritional outcomes (FAO, IFAD, UNICEF, WFP and WHO, 2020). On the other hand, it is also key to encourage investment and/or reinvestment in traditional and indigenous crops, which are often more nutritious than staple crops, suitable to local conditions, resilient to pests and culturally accepted and appropriate (FAO, 2014; Akinola *et al.*, 2020).

- **Create fiscal space for agricultural support by tapping into new fiscal resources aimed at addressing climate change or stimulating the economy.** Given the potential synergies, these resources can achieve both their initial objective while also promoting more sustainable and equitable forms of support that provide relief to farmers upon compliance with "green" conditionalities and that trigger positive innovation and transformation in farming practices.

These are the general directions that need to be followed on the journey to repurposing global agricultural support. This will go a long way towards transforming our food systems to be healthier, more sustainable, equitable and efficient, while ensuring access to affordable healthy diets for all. The next step is to put these general directions into context and also understand that, in some cases, full or partial elimination of some support measures may be needed as part of a broader repurposing strategy. It is also important to understand the potential effects of such a strategy, particularly to minimize trade-offs and make the most of fiscal space available (see Chapter 3).

This transformation also entails considering countries' own characteristics and their capacity to make necessary reforms and finance agricultural support measures, in ways that do not have unintended consequences but rather drive the much-needed transformation in our food systems (see Chapter 4).

Farmer in a wheat field in the Aleppo Governorate, Syria.

3

COUNTING THE COST OF AGRICULTURAL SUPPORT ON NATURE, CLIMATE, NUTRITION, HEALTH AND EQUITY

KEY MESSAGES

- Global support to farmers is projected to reach almost USD 1.8 trillion in 2030. About 73 percent of this (USD 1.3 trillion) will be in the form of border measures, which affect trade and domestic market prices. The remaining 27 percent (USD 475 billion) will be in the form of fiscal subsidies to agricultural producers.
- Agricultural support that is harmful to nature, climate, nutrition and health should be removed or reduced. But to ensure a beneficial outcome overall, any fiscal savings should be repurposed towards agricultural support that is healthier, more sustainable and equitable, while also minimizing any potential trade-offs from the elimination of specific kinds of agricultural support.
- A scenario whereby all global agricultural support were to be removed by 2030, without being repurposed, would result in a 1.3 percent decrease in crop production and a 0.2 percent decrease in livestock production. Global farm employment would fall by 1.3 percent, and further still by 2.7 percent in emerging economies (BRIC countries).
- Eliminating border measures alone would increase crop and livestock production. However, this would also result in a shift towards more confined feeding operations, with less deforestation and land conversion for pasture, and an associated drop in global GHG emissions of 55.7 million tonnes CO_2 e by 2030. The impact on healthy diets is mixed, while the number of people undernourished would drop by 0.2 percentage points.

- Removing fiscal subsidies alone would reduce global agricultural production and result in less use of inputs and land (cropland and pasture), helping to preserve nature and cutting emissions by an estimated 11.3 million tonnes CO_2 e by 2030. However, this would likely increase diet costs and hurt farm incomes for consumers in developed and developing countries, especially female-headed households and poorer households dependent on subsidies.
- Because agricultural support is often based on production or inputs, such as area planted or number of livestock, support is unevenly distributed across the agriculture sector, with large farms being the major beneficiaries. When repurposing and reforming agricultural support, policymakers should ensure greater equity and access for all producers.

3.1 INTRODUCTION

From Chapter 2, we know that the size and function of agricultural producer support have changed over time, and that support is distributed widely and variously across commodities and country income groups. This chapter attempts to better understand the linkages (as well as their coherence, or lack thereof) between support policies and their impacts on nature, climate, nutrition, health and equity. This knowledge is used to inform the discussion of how to repurpose and reform agricultural support in Chapter 4 and the policy recommendations in Chapter 5.

As set out in Chapter 2, agricultural producer support measures, especially price incentives and coupled subsidies, can greatly influence which commodities are produced, the type and use of production inputs, and trade and marketing decisions, all of which have implications for nature, climate, food security and nutrition, health, equity and efficiency (see Figure 3 in Chapter 2). Despite a long-standing knowledge of these linkages, typically the negative impacts of support policies have been less well understood. In an effort to rectify this shortcoming, this chapter simulates the impacts of removing agricultural producer support on key socio-economic, environment, climate and nutrition indicators.

These simulations are based on the global computable general equilibrium (CGE) modelling framework, MIRAGRODEP, described in Laborde *et al.* (2020) of which further details are presented in Annex 2. They focus on the extreme, hypothetical case of **removing border measures and fiscal subsidies completely**. The importance of these simulations cannot be stressed enough, not least because it is only through concerted global action that changing the state of affairs of agricultural producer support will make a meaningful difference to transforming food systems.

As defined in Chapter 1, a broad repurposing strategy may imply reforms to partially or fully eliminate certain kinds of agricultural producer support that are deemed unsustainable, inequitable and inefficient. To offset any negative impacts from the removal of this support, any fiscal savings

may need to be directed towards support that is more sustainable, equitable and efficient. It is important therefore to estimate the impacts and potential trade-offs of eliminating agricultural support to form a "baseline" of understanding from which to inform broader repurposing and reform strategies. Arriving at this understanding, through the analysis of simulations of agricultural support removal, is the main goal this chapter. The model simulations should not then be interpreted as policy prescriptions. The simulations capture the complex implications and trade-offs associated with agricultural support as well as exposing potential adverse impacts on vulnerable populations, which help to inform the development of repurposing and reform strategies discussed in Chapter 4.

Including this introduction, Chapter 3 is organized into nine sections. Section 3.2 introduces the global CGE model used for the analysis, along with the six simulations selected to highlight scenarios of the impact of the removal of border controls and different types of fiscal subsidies on core indicators related to nature, climate, and food consumption and nutrition. Section 3.3 describes the impacts of the scenarios on the farm sector as well as impacts on employment, poverty and the prevalence of undernourishment (PoU). Section 3.4 analyses the impact of agricultural producer support policies on nature, highlighting how agricultural support is a key source of ecosystem degradation. As agriculture is a large contributor to global GHG emissions, Section 3.5 examines the impact of agricultural producer support on climate. The section explores how agricultural support policies influence crop and livestock production decisions and hence can have a large impact on GHG emissions. Section 3.6 discusses the nutritional consequences of agricultural support programmes through their influence on production decisions, which can potentially affect the relative costs of food and, accordingly, alter food consumption patterns. Section 3.7 discusses how the impacts of agricultural producer support can have important consequences for human health in terms of the risks associated with food production and food consumption as well as the harm to the environment. Section 3.8 examines agricultural support policies in the context of equity issues, including the distributional aspects of agricultural support. Last but not least, Section 3.9 summarizes the main conclusions.

3.2 THE MODELLING FRAMEWORK

The global CGE model used in this chapter (i.e. MIRAGRODEP) was initially developed to analyse the impacts of agricultural support policies on GHG emissions (Laborde *et al.*, 2020)[28] and was subsequently expanded for this report to analyse the impacts on nature, climate, food consumption and nutrition (Annex 2). As applied here, though, the modelling framework is more limited in its capacity to analyse the impacts of agricultural support on human health and the distributional or equity aspects of agricultural support. The analysis is however augmented, where appropriate, with qualitative assessments and insights drawn from other models, where relevant.

As for all models, the results are highly dependent on their underlying assumptions and are best interpreted as indicative of the likely effects, in a relative rather than absolute sense. Hence, in the presentation that follows, the emphasis is on the direction and relative magnitude of a given effect rather than the actual magnitude. Again, the focus is on the impacts of completely

[28] Laborde *et al.* (2020) found that eliminating subsidies would result in a decrease in global farm output in the range of 1 percent. The projected reduction of GHG emissions was only 0.6 percent, due to the fact that the most GHG-intensive products such as beef were projected to decline less than other products, and also because the relocation of production in certain instances resulted in an increase in emission intensity.

removing agricultural producer support measures, which not only helps to understand the implicit impacts of such change, but also the potential trade-offs that may be averted through fiscal repurposing strategies.

Chapter 2 traced the evolution of agricultural producer support from 2005 to 2018. In the analysis that follows, agricultural producer support levels are projected to 2030, based on 2018 border measures (which relate to the border measures that generate price incentives or disincentives in Chapter 2) and fiscal subsidies to agricultural producers such as input subsidies, output subsidies and subsidies based on factors of production.[29] The analysis here focuses on the differential impacts in developed economies, large emerging BRIC (Brazil, Russian Federation, India and China) economies, and non-BRIC developing economies.[30] Broadly speaking, the developed economies used in this chapter correspond to high-income countries in Chapter 2. However, BRIC and non-BRIC are used in this chapter (rather than middle- and low-income countries as in Chapter 2), given that BRIC countries represent the majority of current support outside of developed countries and therefore warrant analysis as a distinct group. For non-BRIC developing countries, support is very disparate.

The general equilibrium model was used to develop the "business-as-usual" baseline, which helps project agricultural producer support up to 2030. Under the baseline, border measures (import tariffs and duties, and export taxes and duties) are assumed to remain at their current rates of protection; all agricultural fiscal subsidies are held constant as a percent of the value of production. The subsequent simulations essentially change the assumptions of the baseline, by removing different agricultural producer measures.

Over USD 1.75 trillion in global support by 2030

Total agricultural producer support is projected to reach USD 1.759 trillion in 2030 (Table 2). Of that total, developed countries are projected to account for about 26 percent of the support, BRIC countries 60 percent, and non-BRIC developing countries 14 percent.

Of the total agricultural producer support, net support from **border measures** (import tariffs and duties, and export taxes and duties) are projected to account for 73 percent, while **fiscal subsidies** are projected at 27 percent.[31] However, fiscal subsidies are projected to account for a larger share of developed countries' agricultural producer support (43 percent), compared to only 22 percent in BRIC countries, and 16 percent in non-BRIC developing countries.

Subsidies based on factors of production include fiscal transfers to producers based on factors such as planted area but may be decoupled from actual production; these are mostly prevalent in developed countries where they are projected to account for 73 percent of total fiscal subsidies in 2030. **Input subsidies** are more common in developing countries. They are projected to account for almost 38 percent of total fiscal subsidies in BRIC economies by 2030 and 47 percent of fiscal subsidies in non-BRIC developing economies.

Lastly, about two-thirds of the projected global agricultural support in 2030 will be for crops, and one-third for livestock. In developed economies, total agricultural support is split fairly evenly between crops and livestock. In BRIC economies, support to crops accounts for about 73 percent of the projected total in 2030, while in non-BRIC developing economies, support to crops accounts for about 67 percent of projected total agricultural support.

[29] The methodology for projecting support levels for 2020–2030 is discussed further in Annex 2.

[30] These follow the World Bank country classifications used in the World Development Indicators database. Notably, the country categorizations differ from those used in Chapter 2, i.e. low-income countries, middle-income countries (or emerging economies) and high-income countries.

[31] The model assumes that general services support, such as public R&D spending, remains constant in real terms, such that productivity growth continues to follow historical trends over the near term (i.e. from 2020 to 2030).

▶ TABLE 2
Projected level of agricultural producer support in 2030

SUPPORT MEASURE	PROJECTED LEVEL OF SUPPORT IN 2030 (2020 USD BILLION)			
	WORLD	DEVELOPED COUNTRIES	BRIC COUNTRIES	NON-BRIC DEVELOPING COUNTRIES
Border measures	**1 286.6**	**262.4**	**814.3**	**209.9**
Import tariffs and duties	1 375.3	267.0	834.2	274.1
Export taxes and duties	-88.7	-4.7	-19.8	-64.2
Fiscal subsidies	**472.7**	**197.2**	**236.3**	**39.2**
Output subsidies	75.8	23.6	42.7	9.4
Input subsidies	137.5	30.2	88.9	18.4
Factors of production	259.4	143.3	104.7	11.3
Total agricultural support	**1 759.3**	**459.6**	**1 050.7**	**249.1**

Note: Totals do not necessarily add up, due to rounding.

Source: Authors' own calculations based on MIRAGRODEP model estimates.

Simulation scenarios. Six scenarios were defined and simulated to examine the impact of removing selected agricultural support on a variety of indicators related to aggregate income, nature, climate and nutrition (Table 3). Each scenario delineates a hypothetical case whereby a particular type of support measure is fully removed. The scenarios should not be interpreted as reflecting specific policy reform proposals; rather, they were chosen to illustrate the complicated interactions of those policies with various socio-economic, environment, climate and nutrition indicators, particularly to highlight important trade-offs that may inform broader repurposing strategies.

Because border measures provide such a large share of agricultural support, particularly in some developing countries, the first scenario considers the **removal of all border measures**, including tariffs and other import restrictions that provide price support to domestic producers by making foreign imports more costly.[32] The second scenario examines the **removal of all fiscal subsidies**, which support producers through transfer payments, sometimes tied to production or input use, or through more decoupled forms of fiscal support where payments are tied to factors of production, such as land. Scenarios 3, 4 and 5 are variants of Scenario 2, providing disaggregated evidence of the projected impact of removing specific types of fiscal subsidies. Scenario 3 examines removal of output subsidies only, i.e. transfer payments tied to production. Scenario 4 examines the removal of input subsidies (transfer payments based on input usage). Scenario 5 considers the impacts of removal of subsidies based on factors of production such as land. Scenario 6 analyses the total impact of removing both border measures and fiscal subsidies.

[32] Border measures also include export taxes and duties, though they are far smaller in magnitude than import tariffs (Table 2).

▶ **TABLE 3**
Scenarios used in simulations

	SCENARIO	DESCRIPTION
1.	**Border measures**	Removal of all border measures (import tariffs and duties; export taxes and duties)
2.	**Total fiscal subsidies**	Removal of all fiscal subsidies (output subsidies, input subsidies and subsidies based on factors of production)
3.	**Output subsidies**	Removal of output subsidies only
4.	**Input subsidies**	Removal of input subsidies only
5.	**Factors of production**	Removal of subsidies based on factors of production only
6.	**Total agricultural support**	Removal of all agricultural producer support (border measures plus fiscal subsidies)

Source: Author's own elaboration.

The scenarios assume policy changes begin in the year 2020 and continue through to 2030 (the "business-as-usual" baseline). Most of the reported results correspond to values in the year 2030 compared to the baseline[33] and for ease of comparison across indicators, the values are largely reported as the percent change from the baseline value (for list of indicators see Annex 2).

3.3 IMPACTS ON THE FARM SECTOR AND SELECTED SOCIAL INDICATORS

Price incentive support through border measures has markedly different impacts on the farm sector compared to fiscal subsidies. Border measures such as import tariffs and duties insulate domestic producers from world prices and competing foreign suppliers. This raises the prices for consumers either directly, through consumer-ready food like fruits and vegetables, or indirectly, through higher input prices for feedstuffs and foodstuffs like cereals or oilseeds, which raise the production costs of more processed foods such as meat or bread.[34] Because border measures have negative effects on trade, world prices tend to be lower, as global suppliers have fewer export markets (OECD, 2016b).

Fiscal subsidies typically increase producer returns without having direct impacts on market prices. More often, their impact is more indirect. If such measures are tied to production, they will tend to encourage more production of that commodity. Likewise, if tied to inputs such as fertilizers or seeds, such measures can result in higher yields and production. Producers gain through higher returns (with lower market prices offset by subsidies) while consumers gain through lower market prices, with the costs largely borne by the government. Where support is decoupled, this can have

[33] All other policies are held constant at 2018 levels.

[34] Likewise, export taxes and duties tend to decrease domestic prices by making prices more expensive for foreign buyers. Export taxes and duties are relatively small in magnitude compared to import tariffs (see Table 2) but their impact on a given commodity (for example, wheat) may be quite large, particularly when global supplies are tight.

marginal impacts on agricultural production, but may ultimately distort factor prices (for example, land values and rents for capital) as transfer payments from taxpayers to farmers are capitalized into asset values.[35]

How does removing agricultural producer support affect the farm sector?

Border measures set to account for 70 percent of all support by 2030

As seen in Table 2, border measures are projected to account for over 70 percent of total agricultural support by 2030. Hence removing this type of support would have significant impacts on the agriculture sector. Commodities which benefit from border measures (for example, sugar production in the United States of America) would see internal prices fall, which could result in an increase in domestic consumption. Any decreases in domestic production would be offset by foreign production, so ultimately domestic consumers would gain through lower prices.

Globally, the **removal of border measures** is projected to result in an increase in crop and livestock production of 0.22 percent and 0.21 percent respectively, but the increase belies great regional and country variation (Table 4 and Figure 16). For example, the European Free Trade Association countries,[36] who typically provide a large portion of agricultural support through border measures, would see crop and livestock production fall by 1.4 percent and 9.7 percent, respectively, if tariff support were eliminated (and producers were not compensated by increased transfer payments). Conversely, crop production is likely to increase in large exporting countries like Brazil, Ukraine and Viet Nam (up by 2.3 percent, 2.9 percent and 2.3 percent, respectively), as exports increase due to the elimination of border measures. Depending on where the border measures are applied, removal of the measures may result in a shift of resources to other enterprises. In the case of Canada, for example, livestock production (which includes the dairy and poultry sectors, which currently enjoy tariff protection) is projected to decline by 2.6 percent, while crop production is expected to increase by 1.4 percent, bolstered by increased grain and oilseed exports.

Removal of all fiscal subsidies (output subsidies, input subsidies and factor of production subsidies) is expected to reduce global crop production by 1.6 percent and lower livestock production by 0.46 percent in 2030 from baseline levels. These impacts are similar in magnitude to estimates found in the literature.[37] Not surprisingly, the effects on crop production are proportionately larger in the developed and BRIC economies, as subsidies to crop production in these economies account for a larger share of government support than in the non-BRIC developing economies (which tend to depend more on border measures to support producers). In the BRIC economies, over 90 percent of projected fiscal subsidies in 2030 go towards crop production. Removing all fiscal subsidies thus has a proportionately larger impact on the profitability of crop production, which can cause some producers to shift to livestock production. The model suggests that removal of fiscal subsidies will cause crop production in the BRIC economies to fall by over 2 percent, while livestock production will increase by 0.35 percent due to the shift away from crop production.

[35] In a recent paper, Batini *et al.* (2021) argue that, from a more macroeconomic perspective, the multiplier effect of agricultural subsidies to the greater economy is less than 1, implying that every United States dollar spent to support current agricultural practices returns less than 1 United States dollar cumulatively in the short and medium term. This contrasts with multiplier effects of spending on sustainable land uses, like ecosystem conservation, for which each United States dollar spent has been shown to be capable of returning 5–7 United States dollars in terms of additional economic activity (Waldron *et al.*, 2020; Batini *et al.*, 2021).

[36] Iceland, Liechtenstein, Norway and Switzerland.

[37] See, for example, Anderson, Martin and Valenzuela (2006); Laborde, Piñeiro and Glauber (2017); Laborde *et al.* (2020).

▶ TABLE 4

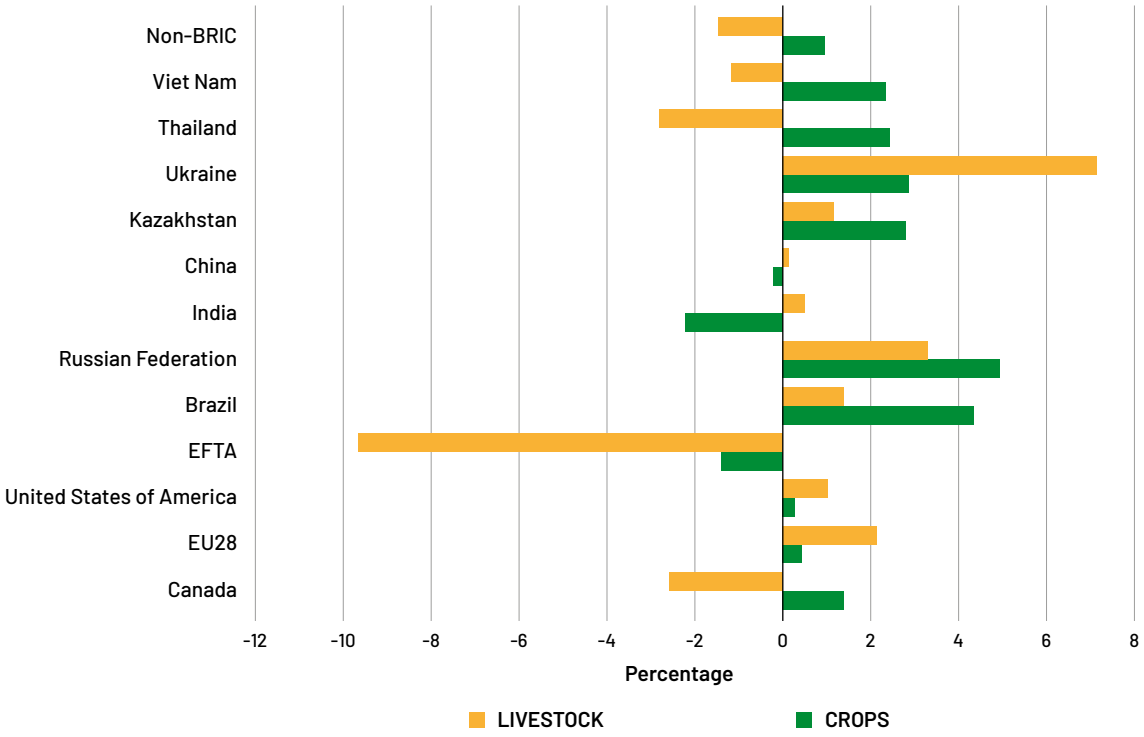
Impacts of removing agricultural producer support on the farm sector

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
Crop production	**0.22**	**-1.60**	**-0.39**	**-0.80**	**-0.43**	**-1.30**
Developed countries	-0.15	-2.35	-0.90	-0.40	-1.09	-2.28
BRIC countries	-0.12	-2.06	-0.32	-1.36	-0.38	-2.15
Non-BRIC developing countries	0.98	-0.39	-0.15	-0.17	-0.06	0.59
Livestock production	**0.21**	**-0.46**	**0.01**	**-0.13**	**-0.35**	**-0.19**
Developed countries	0.74	-1.22	-0.11	-0.26	-0.87	-0.37
BRIC countries	0.52	0.35	0.24	0.10	0.02	0.88
Non-BRIC developing countries	-1.49	-0.40	-0.16	-0.29	0.06	-1.80
Crop yields	**1.82**	**-1.09**	**-0.13**	**-0.50**	**-0.47**	**-1.34**
Developed countries	0.34	-2.05	-0.44	-0.41	-1.25	-2.48
BRIC countries	3.15	-1.05	0.11	-0.94	-0.22	-1.89
Non-BRIC developing countries	1.65	-0.29	-0.13	-0.10	-0.07	0.26
World prices	**0.84**	**1.35**	**0.61**	**-0.18**	**0.93**	**1.94**
National income	**0.08**	**0.00**	**0.01**	**-0.01**	**0.00**	**0.09**
Developed countries	0.07	0.02	0.01	0.00	0.01	0.08
BRIC countries	0.08	-0.01	0.02	-0.01	-0.02	0.09
Non-BRIC developing countries	0.14	-0.03	0.00	-0.03	0.01	0.12
Farm income	**0.19**	**-5.70**	**-0.81**	**-1.46**	**-3.58**	**-6.29**
Developed countries	0.11	-11.42	-1.57	-0.84	-9.27	-14.09
BRIC countries	-0.42	-5.59	-0.75	-2.24	-2.79	-5.98
Non-BRIC developing countries	1.33	-1.11	-0.28	-0.57	-0.27	0.14

Source: Authors' own calculations based on MIRAGRODEP model estimates.

▶ **FIGURE 16**

Projected percent change in production from 2030 baseline levels due to removal of border measures, selected countries



Notes: EFTA countries are Iceland, Liechtenstein, Norway and Switzerland. EU28 denotes the current 27 members of the European Union, plus the United Kingdom of Great Britain and Northern Ireland.

Source: Authors' own calculations based on MIRAGRODEP model estimates.

Removal of only input subsidies (such as fertilizer and chemical subsidies) has the largest proportional impact on the BRIC economies. Input subsidies are projected to account for over one-third of total fiscal subsidies in the BRIC economies by 2030 (Table 2). Removal of input subsidies is expected to result in a decrease in BRIC crop production by 1.3 percent from baseline levels in 2030. This decline is due largely to a 0.94 percent reduction in crop yields; however, as shown in the case of the Zero Budget Natural Farming initiative in Andhra Pradesh, India, such losses can be averted through the adoption of nature- and smallholder- friendly practices (discussed further in Chapter 4).[38]

Removal of only output subsidies and factor of production subsidies is expected to decrease global crop and livestock production. However, in the BRIC economies, some resources would be shifted to livestock production, which is expected to increase by 0.24 percent with the removal of output subsidies and by 0.02 percent with the removal of factor of production subsidies. As noted earlier, the majority of factor of production subsidies are in developed countries; eliminating those subsidies would cause crop and livestock production to drop by 1.09 percent and 0.87 percent, respectively.

[38] Recent evidence from Andhra Pradesh shows that removal of fertilizer and pesticides and conversion to 100-percent chemical-free agriculture (accounting for a shift to more nature- and smallholder-friendly practices) is resulting in more stable yields and fewer crop losses (Bharucha, Bermejo Mitjans and Pretty, 2020).

With no support at all, global crop production would fall by 1.3 percent and livestock by 0.2 percent, with rising prices in all but one scenario

Removing all agricultural support (border measures and fiscal subsidies) is expected to result in a 1.3 percent decrease in global crop production and 0.2 percent decrease in global livestock production. The declines in production from eliminating fiscal subsidies are offset somewhat by increased production from eliminating border measures, as this results in increased market access (and higher market prices). Again, it is important to note that the impacts are not uniform across countries or even groups of countries. Economies that are more highly dependent on subsidies and/or border protections tend to exhibit the largest impacts when those measures are removed.

Removal of agricultural support would result in an increase in world agricultural prices under all scenarios except one (whereby only input subsidies are removed). Input subsidies include subsidies for feedstuffs such as maize, which if removed would result in reduced demand and prices for feed grains and protein meals. Overall, these price declines offset small increases in the price of other commodities due to reduced input usage such as fertilizer.[39]

Removing all support would hurt farmers' income in developed countries the most

Eliminating agricultural support (fiscal subsidies plus border measures) would have large impacts on real farm income, particularly in developed economies (a decline of 14 percent) and in the BRIC economies (a decrease of almost 6 percent). Real farm income in non-BRIC developing economies is projected to increase by 0.14 percent. Declines in farm income have negligible impacts on national incomes in developed countries, where agriculture accounts for 1 to 2 percent of national GDP. The impacts on national incomes are small but proportionately larger in the BRIC and non-BRIC developing economies where agriculture accounts for a larger share of production.

How does removing agricultural producer support affect employment, poverty and the prevalence of undernourishment?

As shown in Table 5, **lower farm income results in decreased farm employment for most scenarios**. Removing fiscal subsidies and border measures causes global farm employment to drop by 1.27 percent. Most of the impact is due to the removal of fiscal subsidies, which results in a decline of 0.85 percent when considered in isolation. The impacts of removing subsides and border measures are felt particularly in the BRIC economies where the projected decline in farm employment from 2030 baseline levels is estimated to be 1.9 percent.[40] By contrast, non-BRIC economies remain largely unaffected (an increase of 0.14 percent) due to the relatively small amount of agricultural support provided in those economies.

Impact on female farmers

Globally, women comprise over 37 percent of the world's rural agricultural workforce, a share that rises to 48 percent for low-income countries, and their contribution is prominent in all agricultural subsectors (FAO, 2020b). While not directly measured in the model, removal of fiscal subsidies could adversely impact female-headed households, as they operate smaller farms than their male counterparts and may have fewer options for compensating income losses resulting from a loss in subsidies (FAO, 2011b).

[39] The world price index is based on traded agricultural commodities which means movements in prices for the major export commodities, such as maize, wheat and oilseeds, account for a larger impact on the index.

[40] Most of the decline in farm employment in the BRIC economies occurs in China and India. Farm employment actually increases in Brazil (for example, increasing 3.4 percent with the removal of border measures).

▶ TABLE 5

Impacts of removing agricultural producer support on farm employment, poverty and prevalence of undernourishment

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
Farm employment	**-0.44**	**-0.85**	**-0.15**	**-0.84**	**0.14**	**-1.27**
Developed countries	-1.63	-0.23	-0.19	-0.21	0.18	-1.91
BRIC countries	-0.55	-1.77	-0.24	-1.65	0.11	-2.72
Non-BRIC developing countries	0.29	-0.15	-0.08	-0.23	0.16	0.14
	PERCENTAGE POINT CHANGE IN SCENARIO COMPARED TO 2030 BASELINE LEVELS					
Percent of population in extreme poverty	**-0.07**	**0.02**	**0.00**	**0.03**	**0.00**	**-0.05**
Developed countries	-0.02	0.01	0.00	0.01	0.00	-0.01
BRIC countries	-0.03	0.02	0.00	0.02	0.00	0.00
Non-BRIC developing countries	-0.15	0.03	0.01	0.04	-0.01	-0.13
Prevalence of undernourishment	**-0.22**	**0.16**	**0.01**	**0.14**	**0.02**	**-0.10**
Developed countries	-0.10	0.02	0.01	0.01	0.01	-0.07
BRIC countries	-0.21	0.23	0.00	0.23	0.01	-0.04
Non-BRIC developing countries	-0.25	0.10	0.02	0.06	0.02	-0.17

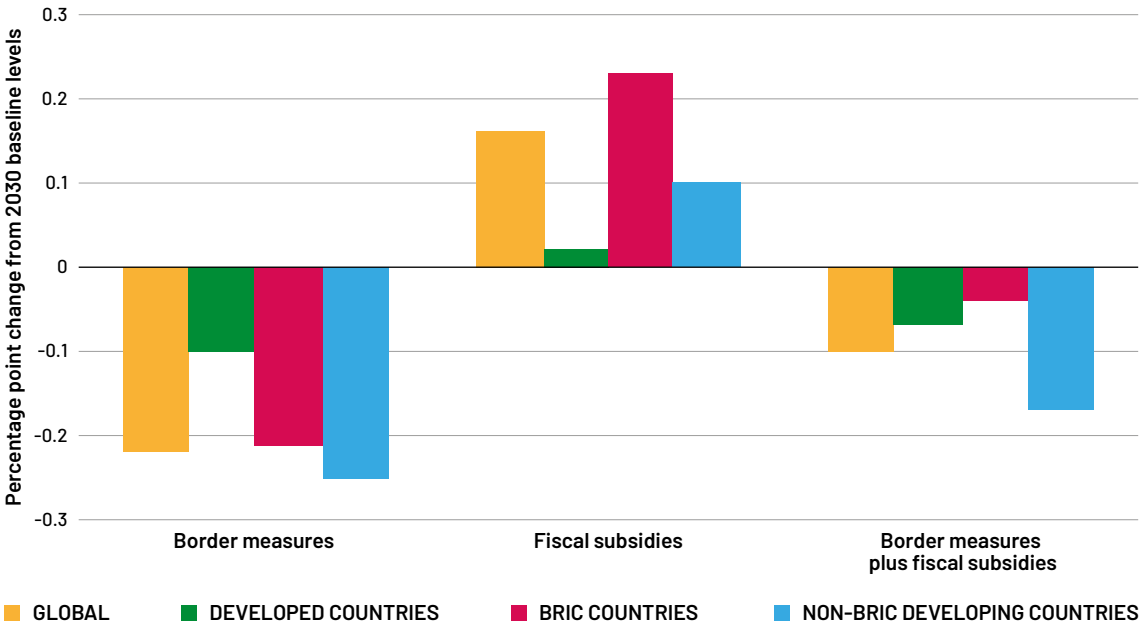
Source: Authors' own calculations based on MIRAGRODEP model estimates.

Figure 17 shows the impact of the removal of fiscal subsidies and border measures on the PoU.[41] At the global level, the percentage of the population that is undernourished parallels the percentage in extreme poverty and is expected to decline by 0.10 percentage points with the removal of border measures and fiscal subsidies. Again, the negative impacts of reduced subsidies on income are offset by the increased demand (and market prices) resulting from the removal of border measures. The impacts are more modest in BRIC economies because the income gains from the removal of border measures are somewhat offset by the removal of fiscal subsidies.

[41] The PoU is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal, active and healthy life (for more information see www.fao.org/sustainable-development-goals/indicators/211/en).

▶ **FIGURE 17**

Impacts of removing agricultural producer support on the prevalence of undernourishment



Source: Authors' own calculations based on MIRAGRODEP model estimates.

3.4 IMPACTS ON NATURE

Over the last three decades, analysts have increasingly identified agriculture as a significant source of harmful environmental pressures worldwide (DeBoe, 2020). This is reflected in two targets under United Nations SDG 2 "Zero Hunger" (UN, 2015):

- SDG 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.
- SDG 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.

In 2020, UN Member States decided to implement a Decade on Ecosystem Restoration to realize these benefits and to ensure that healthy ecosystems play a critical role towards achieving the SDGs by 2030.

The COVID-19 pandemic has brought home the necessity of better integration of natural resources and ecosystems with human food systems to increase the resilience, health and sustainability of food systems (Malapit *et al.*, 2020). Environmental degradation, in which food systems play a prominent role, is likely to increase the frequency and severity of natural disasters and may increase future pandemics, both of which cause shocks to food and health systems. Common agricultural practices often degrade ecosystem processes, such as regulation of soil

fertility and pests, and can contribute to greater reliance on external inputs, with potential for further damage. Poor people, particularly female-headed households, are heavily dependent on natural resources for their livelihoods and are often the most severely affected by environmental shocks and resource depletion.

Previous studies on the impacts of agricultural producer support on nature

Agricultural policies influence production patterns, farming practices and input use mainly by changing the relative costs and returns of using natural resources in agriculture, or by imposing direct restrictions on output and input use (Henderson and Lankoski, 2019). In its 2013 review of agricultural policies among its member countries, the OECD (2013) ranked policies over the period 2009–2011 by their potential environmental impact. This showed that only around 8 percent of agricultural policies were considered to be wholly environmental beneficial. The most potentially harmful types of support accounted for 50 percent of total agricultural support and included market price support measures and payments on commodity outputs or variable inputs, which did not impose environmental constraints on farming practices. Potentially less harmful measures accounted for 14 percent of total agricultural support in 2009–2011[42] and included a range of payments based on current cropped area or number of animals, historical entitlements, and fixed capital formation or on-farm services, where no constraints were imposed on farming practices. About 36 percent of agricultural support went to environmentally beneficial forms of support, but with 28 percent to support deemed only *partially* beneficial, including payments subject to environmental cross-compliance. The most beneficial forms of support, accounting for 8 percent, included payments that imposed environmental constraints on farming practices.

Policies that encourage land expansion for intensive agriculture cause severe harm

Based on a meta-analysis of research on the environmental impacts of agricultural policies, the OECD stresses the complexity of the relationship between policies and their impacts (DeBoe, 2020). Their analysis found that, in general, policies that incentivize expansion of agricultural areas or conversion of fallow or low-intensity agricultural land towards more intensive agricultural uses can cause severe environmental harm. Thus, market price support and other types of support coupled to output or input use can encourage intensification, which tends to have negative impacts on water quality (for example, through nitrogen runoff) or GHG emissions (see Section 3.5). However, such policies may have positive or negative impacts on certain kinds of biodiversity, such as soil microbiodiversity, depending on whether they promote crop diversity or monoculture, while, overall, policies incentivizing conversion, expansion and intensification largely contribute to negative impacts on land and marine biodiversity.

The same OECD study also points out that the impacts of policies must be viewed within a global framework, not in isolation. For example, the benefits of removing coupled subsidies from one crop could have adverse effects if the result is an intensification of production in other areas or a shift in crop or livestock production towards a more environmentally harmful mix of practices. Similarly, policies which encourage contraction of agricultural area such as conservation easements in one region could have negative environmental consequences globally if they result in increased market prices, which may lead to more environmentally harmful practices in other regions. For example, a removal of maize or soybean cropland in the United States of America through its Conservation Reserve Programme could result in higher global prices and encourage conversion of grasslands or forests to cropland in other regions (such as Brazil), resulting in a potential loss of biodiversity or increase in GHG emissions through deforestation (Searchinger *et al.*, 2020).

[42] As measured by the Producer Subsidy Equivalent (OECD, 2013).

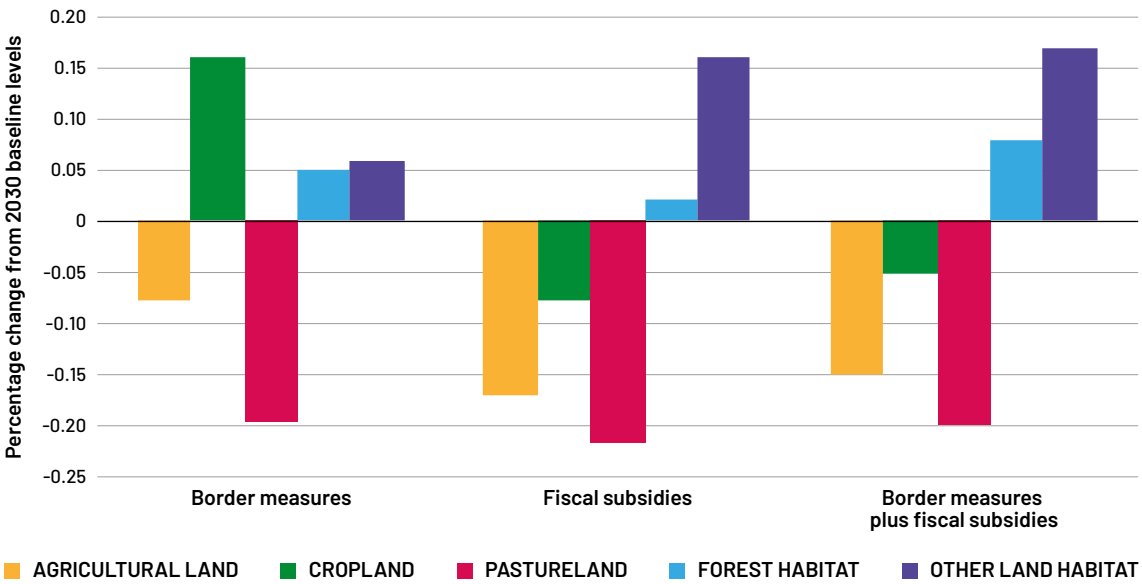
In their meta-analysis, the OECD found that the effectiveness of decoupled support depended mostly on how stringent the environmental conditions tied to the payments were, and less on the direct incentives stemming from the payments themselves (DeBoe, 2020). Decoupled payments were found to have a positive economic impact, while agro-environmental payments[43] generally had a neutral or small positive impact on economic performance. Importantly, their work found that there is limited evidence that existing mandatory conditions successfully mitigate the negative environmental impacts of agriculture. These findings point to the need for better policy design to deliver improved environmental performance without sacrificing economic performance.

Estimated impacts of agricultural support on nature

The results from the model simulations used in this report align with the OECD findings. Figure 18 shows the impact of removing agricultural support on land use. Removing all agricultural support (border measures and fiscal subsidies) is expected to cause cropland to decline by 0.05 percent and pastureland by 0.20 percent in 2030, while forest habitat and other land habitat are projected to increase by 0.08 percent and 0.17 percent, respectively.[44] If only border measures are removed, crop and livestock production increases (see Section 3.3). This results in an increase in cropland but a decrease in pastureland. Pastureland declines due to the fact that livestock production shifts marginally away from non-BRIC developing countries, where livestock production is characterized by grazing, to developed countries and BRIC countries, where livestock production is more characterized by concentrated feeding rather than pastureland. However, the impacts vary across countries (Table 6).

▶ FIGURE 18

Impacts of removing agricultural producer support on land use



Source: Authors' own calculations based on MIRAGRODEP model estimates.

[43] Agro-environmental payments are payments to farmers to farm in a way that protects and enhances biodiversity and landscape and improves the quality of water, soil and air.

[44] To put this in perspective, FAO estimates global cropland at 1.568 million ha and global forest land at 4.059 million ha in 2020 (FAO, 2020c). A 0.05 percent decrease in cropland implies a decline of 784 000 ha. Similarly, a 0.08 percent increase in forest land by 2030 implies that as much as 3 million ha of forest would normally be lost to cropland, pastureland and other uses under the "business-as-usual" scenario.

▶ TABLE 6

Impacts of removing agricultural producer support on environmental indicators

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
Agricultural land	**-0.08**	**-0.17**	**0.00**	**-0.13**	**-0.03**	**-0.15**
Developed countries	0.13	-0.06	0.00	0.00	-0.06	-0.03
BRIC countries	0.17	0.34	0.08	0.03	0.25	0.52
Non-BRIC developing countries	-0.35	-0.51	-0.04	-0.31	-0.14	-0.59
Cropland	**0.16**	**-0.08**	**-0.03**	**-0.06**	**0.01**	**-0.05**
Developed countries	0.06	0.04	-0.21	-0.04	0.28	-0.35
BRIC countries	0.21	-0.14	0.08	-0.09	-0.12	0.06
Non-BRIC developing countries	0.19	-0.11	0.01	-0.04	-0.08	0.08
Pastureland	**-0.20**	**-0.22**	**0.02**	**-0.17**	**-0.05**	**-0.20**
Developed countries	0.16	-0.11	0.10	0.01	-0.22	0.11
BRIC countries	0.14	0.72	0.08	0.12	0.54	0.88
Non-BRIC developing countries	-0.58	-0.68	-0.06	-0.42	-0.17	-0.86
Forest habitat	**0.05**	**0.02**	**0.01**	**0.02**	**0.00**	**0.08**
Developed countries	-0.06	0.00	0.01	0.00	0.00	-0.04
BRIC countries	-0.05	0.01	0.00	0.01	0.00	-0.03
Non-BRIC developing countries	0.28	0.05	0.01	0.05	0.00	0.33
Other land habitat	**0.06**	**0.16**	**0.03**	**0.15**	**0.07**	**0.17**
Developed countries	-0.06	-0.01	0.02	-0.01	-0.01	-0.05
BRIC countries	-0.03	0.01	0.00	0.01	0.01	0.01
Non-BRIC developing countries	0.30	0.51	0.06	0.47	0.24	0.59

▶ TABLE 6 (CONT.)

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
Chemical inputs per ha	**0.24**	**-0.53**	**-0.18**	**-0.40**	**0.06**	**-0.22**
Developed countries	0.07	-0.49	-0.15	-0.26	-0.10	-0.22
BRIC countries	0.01	-0.67	-0.20	-0.58	0.12	-0.64
Non-BRIC developing countries	0.91	-0.21	-0.29	-0.12	0.20	0.67
Biodiversity index	**-0.02**	**0.09**	**0.02**	**0.07**	**0.02**	**0.10**
Developed countries	-0.06	-0.01	0.08	0.01	-010	0.09
BRIC countries	-0.10	0.05	-0.03	0.04	0.05	-0.03
Non-BRIC developing countries	0.13	0.22	0.02	0.19	0.11	0.28

Source: Authors' own calculations based on MIRAGRODEP model estimates.

As set out before in Section 3.3, removing fiscal subsidies in the BRIC economies results in a shift of resources from crop to livestock production. As a consequence, pastureland is expected to increase in the BRIC economies by 0.72 percent at the expense of cropland (which declines by 0.14 percent), unlike forests or other natural land habitats (which actually increase 0.01 percent over baseline levels). By 2030, forest land is expected to increase by about 0.5 percent over the baseline throughout much of Africa (with the exception of Southern Africa) since land devoted to agricultural production declines as livestock production shifts to South America and developed economies, such as the United States of America. The impacts of agricultural subsidies on land use change are consistent with the findings of Lubowski *et al.* (2006), Searchinger *et al.* (2020) and Laborde *et al.* (2020). The impact of land use change on GHG emissions is discussed in more detail in Section 3.5.

Removing border measures would see a rise in chemical use, whereas removing fiscal subsidies would see a drop

Removal of border measures is expected to increase chemical input use per hectare.[45] Global input use is estimated to increase 0.24 percent from baseline levels in 2030. Much of that increase is expected to come from large exporting countries which are projected to increase crop production because of improved market access due to the removal of border measures.

[45] Per hectare chemical input use is drawn from regional input/output tables described in Laborde, Robichaud and Tokgaz (2013). Inputs include both fertilizer and pesticides.

By contrast, removing fiscal subsidies is expected to reduce chemical input usage by 0.53 percent from baseline levels.[46] As anticipated, removal of input subsidies has the largest proportional impact on chemical input usage, particularly in the BRIC economies where per hectare chemical usage is expected to decline by 0.58 percent. As outlined in the OECD (2013) report, reduced chemical usage can have beneficial impacts on water quality and other environmental externalities. As discussed further in Chapter 4, reduced input use does not necessarily have to come at the expense of yield growth, particularly when subsidies may lead to overuse.

Lastly, removal of all agricultural support (border measures and fiscal subsidies) is estimated to decrease per hectare chemical input use by 0.22 percent globally. Overall, chemical usage in developed countries is estimated to decline by 0.22 percent and 0.64 percent in the BRIC countries. Chemical input use is estimated to increase by 0.67 percent in non-BRIC countries largely due to the estimated 0.91 percent increase in input use from the removal of border measures alone.

To assess impacts on biodiversity, a biodiversity index was constructed based on land use changes in cropland, forest habitat and other land habitat (Soto-Navarro *et al.*, 2020).[47] Removal of border measures is estimated to result in a small decrease (-0.02 percent) in the global biodiversity index. Most of that decline is due to increased cropland and a concomitant decrease in forest habitat in developed and BRIC countries. Because of the estimated increase in forest and other land habitat in non-BRIC developing countries, the biodiversity index is anticipated to increase by 0.13 percent, on average, in those countries. Removal of fiscal subsidies is estimated to increase the biodiversity index by 0.09 percent due to increases in forest and other land habitat in BRIC and non-BRIC developing countries. Increased cropland in developed countries results in a relatively small (0.01 percent) decline in the biodiversity index among those countries.

The removal of input subsidies for chemicals is projected to have an average positive impact on the biodiversity index. Most of the impact is estimated to occur in non-BRIC developing countries where a removal of input subsidies is estimated to increase the biodiversity index by 0.19 percent from baseline levels. This is due largely to the estimated increase in forest and non-forest land habitat in non-BRIC developing estimated to occur due to the removal of input subsidies.

Finally, removal of both border measures and fiscal subsidies is estimated to increase the global biodiversity index by 0.10 percent compared to baseline levels. In non-BRIC economies, less forest and other land habitats would be converted to pastureland which would improve biodiversity in those countries over baseline levels. Cropland is estimated to decline in developed economies which means less input usage and improved water quality.

Overall, the results suggest that the removal of fiscal subsidies will have limited impacts on biodiversity. The small impacts are not surprising given the relatively small impacts on contributing factors such as land use change and input usage.

[46] From the FAOSTAT database, total chemical input usage averaged about 120 kg/ha from 2016 to 2018. A 0.53 percent decline implies a decrease of about 0.6 kg/ha (FAO, 2021b).

[47] The index was calculated as the geometric mean of the three land categories where land use in each category was normalized to one in the baseline. Positive changes in cropland were treated as a negative to reflect the negative impact of crop production on biodiversity due to increased input usage, such as pesticides and herbicides. For example, if cropland increased by 0.03 percent (i.e. 1.0003 compared to the baseline value of 1.0000), the reciprocal was used in the index (1/1.0003 = 0.99971). A positive change in the biodiversity index thus indicates that removal of a measure is expected to have a positive effect on biodiversity. Because baseline values of the index have been normalized to equal 1.0, changes in the index can be interpreted as percent changes from the baseline values.

3.5 IMPACTS ON CLIMATE

Agriculture and climate change are linked in a mutually influencing relationship. Agriculture is one of the main contributors to climate change through GHG emissions from different sources such as enteric fermentation, manure on pastureland, synthetic fertilizers, rice cultivation, burning crop residue and land use change. At the same time, agricultural producers are particularly vulnerable to climate change as agricultural productivity and farmers' livelihoods are adversely affected by higher temperatures, greater variability in precipitation patterns, rising sea levels, and more frequent extreme weather events such as drought, heavy rainfall and flooding.[48]

Previous studies on the impacts of agricultural producer support on climate

The impact of agricultural support on GHG emissions depends on multiple factors including the commodity in question, where it is produced and the methods of its cultivation. For example, Mamun, Martin and Tokgoz (2019) show that production-related emission levels for the same commodities differ substantially between rich and poor countries and, also, within those groups. As seen in Chapter 2, in recent years support levels have declined in developed countries but increased in developing countries. Removal of support levels can have both negative and positive effects as production can shift between countries. Laborde *et al.* (2020) point out that removing border measures can decrease domestic production of a commodity but increase global production as consumption rises due to lower prices. Thus, GHG emissions may fall in the country where the border measures were removed, but rise worldwide because of increased global production. Searchinger *et al.* (2020) show that those impacts may be even more consequential if indirect land use change (ILUC) caused by changes in policies results in deforestation or conversion of pastureland to cropland. Agricultural support measures can also have positive, negative or neutral impacts on both climate mitigation and adaptation, regardless of the source of financing, instrument used, or perceived economic impacts (Ilicic *et al.*, 2021).

The literature suggests that support to variable input use is associated with lower agricultural productivity in the long run (despite potential positive short-term effects), with reduced environmental sustainability and reduced capacity for climate change adaptation and mitigation. By reducing the cost of a specific input, this form of support provides farmers with a strong incentive to increase its use beyond optimal levels (Henderson and Lankoski, 2019) if no restrictions are in place. Overuse of certain inputs such as fertilizers leads to soil degradation, with adverse implications for productivity and adaptive capacity, as well as an increase in GHG emissions, hindering mitigation efforts. Jayne *et al.* (2018) report that this form of support in Africa had either no effect or resulted in a reduction of smallholders' use of climate-smart agriculture practices.

Estimated impacts of agricultural producer support on climate

Consistent with the existing literature, the model simulations show that removing agricultural support is projected to reduce overall GHG emissions. Figure 19 shows the projected changes in GHG emissions in 2030 due to the removal of various agricultural support measures. The changes in GHG emissions are related to changes in crop and livestock production (primarily affecting NO_2 and methane emissions), changes in energy use associated with crop and livestock production, and land use change effects such as deforestation or the conversion of pastureland to cropland.

The **removal of all border measures and fiscal subsidies** is estimated to reduce GHG emissions in 2030 by 78.4 million tonnes CO_2 e. Most of that reduction can be attributed to the removal

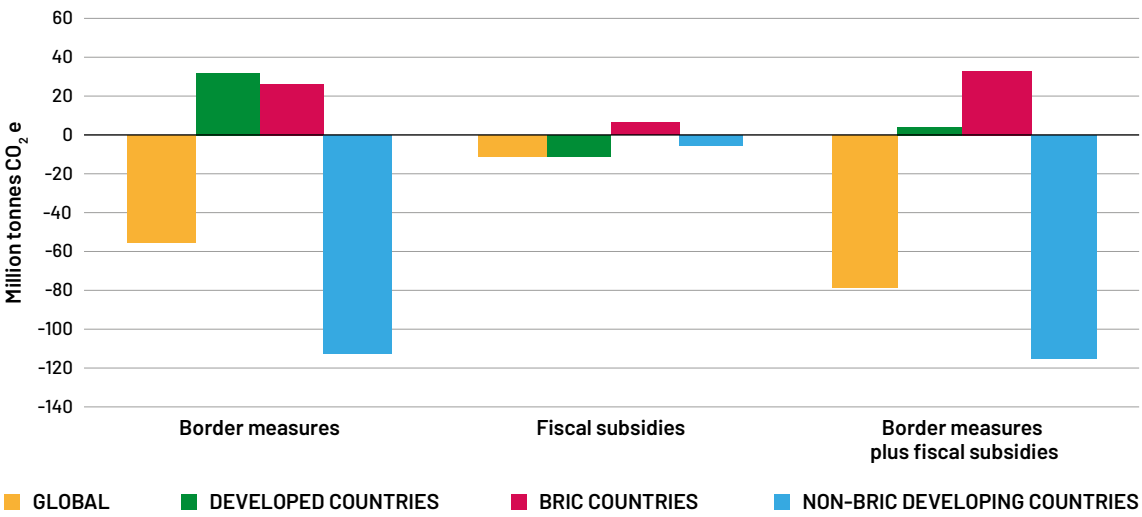
[48] However, the impact of climate change on gender is not the same (Muttarak, 2016). Women are increasingly seen as more vulnerable than men to the impacts of climate change, mainly because they represent the majority of the world's poor and are proportionally more dependent on threatened natural resources.

of border measures, particularly in non-BRIC developing countries, where GHG reductions are estimated to be 113.1 million tonnes CO_2 e. The reduction in GHG emissions in non-BRIC developing countries is due primarily to the shift away from livestock production to crop production, which is less GHG-intensive. GHG emissions are actually projected to increase in developed countries and BRIC economies as livestock production shifts from non-BRIC developing countries to less GHG-intensive production systems in developed and BRIC countries. As discussed above, crop production in developed countries is estimated to fall with a removal of border measures, which offsets some of the GHG emission increase due to increased livestock production.

The **removal of fiscal subsidies only** is expected to decrease global GHG emissions from agricultural production (including emissions from energy use in agricultural production) in 2030 by 11.3 million tonnes CO_2 e (Figure 19), equivalent to 0.30 percent under baseline levels (Table 7). Energy use is projected to fall by 0.87 percent, reflecting the declines in global crop and livestock production due to the elimination of subsidies. Most of the reductions occur in developed countries and in non-BRIC developing countries. GHG emissions in BRIC countries are projected to increase marginally (by 0.2 percent) due to increased methane emissions related to the projected 0.35 percent increase in livestock.

▶ FIGURE 19

Estimated changes in GHG emissions in 2030 due to removal of agricultural producer support



Source: Authors' own calculations based on MIRAGRODEP model estimates.

GHG emissions in BRIC countries would increase by more than one-quarter through indirect land use change if agricultural support were removed

In addition to the direct GHG emissions from agriculture, the model simulations estimate the impacts of the **removal of agricultural support on GHG emissions from ILUC**, i.e. emissions that occur through deforestation and the conversion of pastureland to cropland. The removal of both border measures and fiscal subsidies is expected to reduce cumulative global emissions from ILUC by 3.9 percent in 2030 due to the decrease in forest land being converted to agricultural use. Most of that reduction is projected to come from the removal of border measures (down 3.4 percent from baseline levels). In BRIC economies, however, emissions from ILUC are projected to increase sharply (27.3 percent). This is because, as shown in Table 6, removal of border measures is expected to increase crop and livestock production in BRIC economies, resulting in a net loss of 0.5 percent of forest land.

Removal of fiscal subsidies only is projected to reduce cumulative global GHG emissions from ILUC by 0.18 percent; eliminating input subsidies alone is projected to reduce these emissions by 0.6 percent.

▶ TABLE 7

Impacts of removing agricultural producer support on climate indicators

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
GHG emissions from agricultural production	**-0.22**	**-0.30**	**0.09**	**-0.16**	**-0.24**	**-0.60**
Developed countries	1.41	-0.82	0.57	-0.33	-1.11	0.01
BRIC countries	0.49	0.07	-0.03	-0.02	0.13	0.59
Non-BRIC developing countries	-2.03	-0.33	-0.10	-0.19	-0.05	-2.24
GHG emissions from energy use in agriculture	**0.16**	**-0.87**	**-0.18**	**-0.26**	**-0.43**	**-0.65**
Developed countries	0.46	-1.47	-0.23	-0.26	-1.00	-0.90
BRIC countries	-0.08	-0.54	-0.15	-0.30	-0.10	-0.59
Non-BRIC developing countries	0.16	-0.47	-0.19	-0.14	-0.14	-0.27
GHG emissions from land use change	**-3.38**	**-0.18**	**-0.45**	**-0.60**	**0.28**	**-3.89**
Developed countries	2.79	0.68	-0.94	0.02	0.84	1.80
BRIC countries	28.45	-1.55	0.67	-4.09	-2.59	27.33
Non-BRIC developing countries	-8.10	-0.41	-0.34	-0.62	0.24	-8.39
	CHANGE FROM 2030 LEVELS IN THOUSAND TONNES OF CO_2 E					
Total GHG emissions	**-55 651**	**-11 342**	**1 487**	**-15 769**	**-2 724**	**-78 383**
Developed countries	31 415	-11 651	6 638	-5 836	-16 427	3 876
BRIC countries	26 080	6 424	-1 456	-1 432	8 001	32 951
Non-BRIC developing countries	-113 146	-6 115	-4 695	-8 500	5 703	-115 209

Note: Totals do not necessarily add up, due to rounding.

Source: Authors' own calculations based on MIRAGRODEP model estimates.

3.6 IMPACTS ON FOOD CONSUMPTION AND NUTRITION

This section addresses the impact of agricultural producer support policies on nutritional indicators. *The State of Food Security and Nutrition 2021* (FAO, IFAD, UNICEF, WFP and WHO, 2021) shows that healthy diets are unaffordable for approximately 3 billion people. This indicates that the cost of nutritious foods is high relative to people's incomes. Worryingly, more than 1.5 billion people cannot even afford a diet that meets the required levels of essential nutrients.[49] After remaining virtually unchanged for five years, the PoU increased 1.5 percentage points in 2020 – reaching a level of around 9.9 percent, heightening the challenge of achieving the Zero Hunger target by 2030 (FAO, IFAD, UNICEF, WFP and WHO, 2021). Recent research on the impacts of the COVID-19 pandemic suggests that the number of people who could not afford a healthy diet could rise by 267.6 million between 2020 and 2022 due to the pandemic (Ruel and Brouwer, 2021). Access to the nutritious foods that make up a healthy diet is critical for people's health and sustainable development, and therefore food systems must be transformed to ensure healthy diets are affordable to all. Policies in support of agricultural production have a role to play in this transformation, and should be coherent with other policies to create healthy food environments such as nutrition labelling, healthy public food procurement and service, food reformulation, food fortification, taxes on unhealthy foods and beverages, and marketing restriction as part of a food systems approach (OECD, 2021b).

Previous studies on the impacts of agricultural producer support on food consumption and nutrition

For practical reasons, the MIRAGRODEP modelling framework used in this chapter covers dairy, vegetable oils, sugar, fruits and vegetables, although not all of these have unequivocal nutrition and health impacts. Fruits and vegetables, being sources of vitamins and minerals, dietary fibre and a host of beneficial non-nutrient substances, are important components of a healthy diet, of which the World Health Organization (WHO) suggests consuming more than 400 g per day (WHO, 2020). Vegetable oil, with a few exceptions, largely consists of unsaturated fat, and should be the preferred fat while aiming to achieve a total fat intake of less than 30 percent of total energy intake, while also eliminating the use of industrially produced trans fats (WHO, 2015a). Dairy may contribute to a healthy diet for children (after being weaned from breastfeeding) and for adults, where this is part of the food culture. However, commercially produced dairy products may not be economically accessible to vulnerable populations and, as a result, agricultural producer support policies are often poorly targeted to achieve desired nutritional outcomes where they might be needed most.[50]

Agricultural support impacts nutrition through its impacts on income (i.e. increased income from increased farm employment) and on relative prices. Border measures tend to increase domestic prices by insulating consumers from cheaper foreign supplies. On the other hand, to the extent that fiscal subsidies distort domestic production, prices of those commodities can decrease. Income effects are often proportionately larger in poorer households simply because poorer families tend to spend a larger share of their disposable income on food. In richer households, the impact of increased income on food consumption may be relatively negligible. By contrast,

[49] Globally, the world is not on track to achieve targets for any of the nutrition indicators by 2030. The current rate of progress on child stunting, exclusive breastfeeding and low birthweight is insufficient, and progress on child overweight, child wasting, anaemia in women of reproductive age and adult obesity is stalled or the situation is worsening (FAO, IFAD, UNICEF, WFP and WHO, 2021).

[50] One exception might be school milk programmes. These are most common in the European region, but sometimes include sweetened or whole milk which contributes to increased intake of sugars and saturated fat (WHO, 2018). However, those type of programmes are typically based on consumer subsidies, not producer subsidies.

additional income in a poor household results in larger expenditures on food, increasing the quantity and often the types of foods consumed.[51] The relative responsiveness of food consumption to changes in prices depends on consumer tastes and preferences. Generally, food demand is characterized as relatively less responsive to price changes compared to the demand of other consumption items. However, consumers will switch to other food choices, particularly if they are close substitutes (other starches, for example).

Increases in agricultural productivity over the past 75 years have gone hand in hand with decreases in real food prices (Alston and Pardey, 2014). For example, Alston, Pardey and Rao (2020) found that investment in CGIAR[52] research – mainly through its contributions to enhancing yields of staple food crops – yielded high returns (i.e. a benefit-cost ratio of 10:1), with additional benefits for poor people in terms of greater food abundance, cheaper food, reduced rates of hunger and poverty, and a smaller geographical footprint from agriculture.

A study by Alston, MacEwan and Okrent (2016) investigated the effects of public investment in agricultural R&D on food prices, per capita calorie consumption, adult body weight, obesity, public healthcare expenditures related to obesity, and consumer welfare. They found that, in the United States of America, a 10 percent increase in annual public investment in agricultural R&D in the latter half of the twentieth century would have caused a modest increase in the average daily calorie consumption of American adults, resulting in small increases in public healthcare expenditures related to obesity. On the other hand, such an increase in spending would have also generated very substantial consumer benefits (in terms of lower costs) and net national benefits, given the very large benefit-cost ratios for agricultural R&D. The authors conclude that current policy objectives of revising agricultural R&D priorities to prevent obesity are likely to be comparatively less optimal if those efforts reduce productivity. Moreover, because it often takes decades to reap the benefits of R&D, such an approach would likely be ineffective over the immediate horizon (Alston, MacEwan and Okrent, 2016).

As income has grown, food costs have declined relative to the costs of other consumer expenditures, making food in principle more affordable. But, as Giner and Brooks (2019) point out, along with other aspects of economic development, this growth in income may also have played a role in provoking some of the patterns of consumption that are resulting in rising levels of overweight and obesity, and of poor nutrition more generally (including increased purchases of nutrient-poor energy-dense processed foods, and of meals away from home).

Early work by Bennett (1941) and more recently, Seale, Regmi and Bernstein (2003), found that consumers in wealthier countries spend a greater share of their total food budget on meat and dairy products than do consumers in low-income countries.[53] Conversely, in low-income countries, less nutritious staple food products such as breads and cereals account for the largest share, 27 percent, of consumers' total food budget compared with 12 percent in wealthier countries. They also found that consumers in low-income countries make greater adjustments in their household spending on food when incomes and/or prices change. For example, when household incomes increase by 10 percent, a consumer in the United Republic of Tanzania or the Philippines

[51] As Du *et al.* (2004) point out, changing diets due to increased income do not necessarily correlate with better nutritional outcomes.

[52] CGIAR (formerly the Consultative Group for International Agricultural Research) is a global partnership that unites international organizations engaged in research about food security. CGIAR research aims to reduce rural poverty, increase food security, improve human health and nutrition, and sustainable management of natural resources. It is carried out at 15 centers (CGIAR Consortium of International Agricultural Research Centers) that collaborate with partners from national and regional research institutes, civil society organizations, academia, development organizations, and the private sector (see www.cgiar.org).

[53] This positive relationship between per capita meat and dairy consumption and per capita income is recognized in the baseline model used by the OECD and FAO in their annual Agricultural Outlook reports (OECD and FAO, 2021).

will typically increase spending on food by 8 and 6.5 percent respectively, compared to 1 percent in the United States of America (Seale, Regmi and Bernstein, 2003).[54]

Border measures actually raise consumer prices

Agricultural producer support programmes are often criticized for promoting a "cheap food policy" that results in obesity and other unhealthy dietary outcomes (Tillotson 2004; Franck, Grandi and Eisenberg, 2013). The "cheap food policy" argument has been challenged on several grounds (Miller and Coble, 2007; Alston, Sumner and Vosti, 2006, 2008; Beghin and Jensen, 2008; Okrent and Alston, 2012; Rickard, Okrent and Alston, 2013). Moreover, as pointed out in many of these studies, agricultural support provided through border measures actually *raises* consumer prices by insulating domestic consumers from world prices.

In a comprehensive analysis of subsidies and taxes on per capita consumption in the United States of America, Okrent and Alston (2012) found that eliminating farm subsidies – including direct subsidies on grains and indirect subsidies from trade barriers on dairy, sugar, and fruit and vegetable commodities – would have a very limited impact on calorie consumption, and hence, obesity.[55] Agricultural producer support has a limited impact on retail prices for two fundamental reasons. First, many income support policies are decoupled from production and hence likely have small impacts on the amount of land allocated to one crop or another (Babcock, 2006; Goodwin and Mishra, 2006). Second, the farm value[56] of what a consumer purchases is typically quite small and depends on how much processing and marketing costs occur between the farm gate and the shop shelf. This is true even for relatively "unprocessed" foods such as fresh oranges or pears, at least in most developed economies; although in general, the more highly processed and marketed product, the lower the farm value (Canning, 2011). In least-developed economies, where the farm value of food is higher than in developed economies, agricultural support prices may have more significant impacts on food prices.

Estimated impacts of agricultural support on food consumption and nutrition

Consistent with findings in the literature, the results of the model simulations show that the elimination of agricultural producer support is projected to have disparate effects on global per capita consumption of various food groups, depending on the type of support and economic classification of the country (Figure 20).

Removal of border measures results in an increased consumption of (previously) protected commodities in importing countries as prices in these countries fall.[57] On the other hand, prices in exporting countries (for example, Brazil) rise due to the increased demand, and, as a result of this, consumption in exporting countries falls. Per capita consumption of highly protected commodities such as sugar shows large increases (Figure 20a). An increase in per capita sugar consumption would run counter to WHO recommendations to reduce intake of free sugars.[58] The simulations do not specify the form of consumption to this level of detail, however.

[54] The impact of food price increases on consumption depends on the responsiveness of demand to a price increase of a specific product (own-price elasticity) as well as price increases in substitute and complementary products (cross-price elasticity). Production and commodity price impacts are often muted when it comes to food choices because the farm value of a commodity is often a small portion of the total retail food cost, and consumer demand may be relatively unresponsive (inelastic) to changes in price.

[55] The authors conclude that if the goal of policymakers is simply to reduce obesity in the United States of America, the more efficient policy would be to tax calories rather than eliminating subsidies (Okrent and Alston, 2012).

[56] The farm value is the cost of purchasing the raw commodity at the farm. It does not reflect further processing, transportation, and other marketing costs that are incurred before the transformed food product is purchased by consumers.

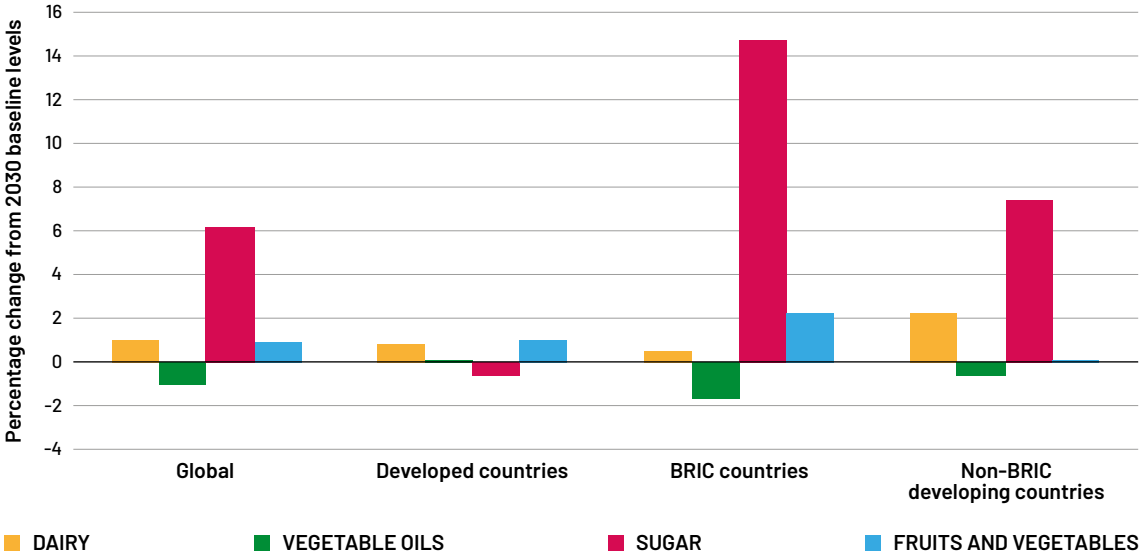
[57] Interaction of trade and nutrition policy is discussed in Friel, Schram and Townsend (2020).

[58] Free sugars include monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

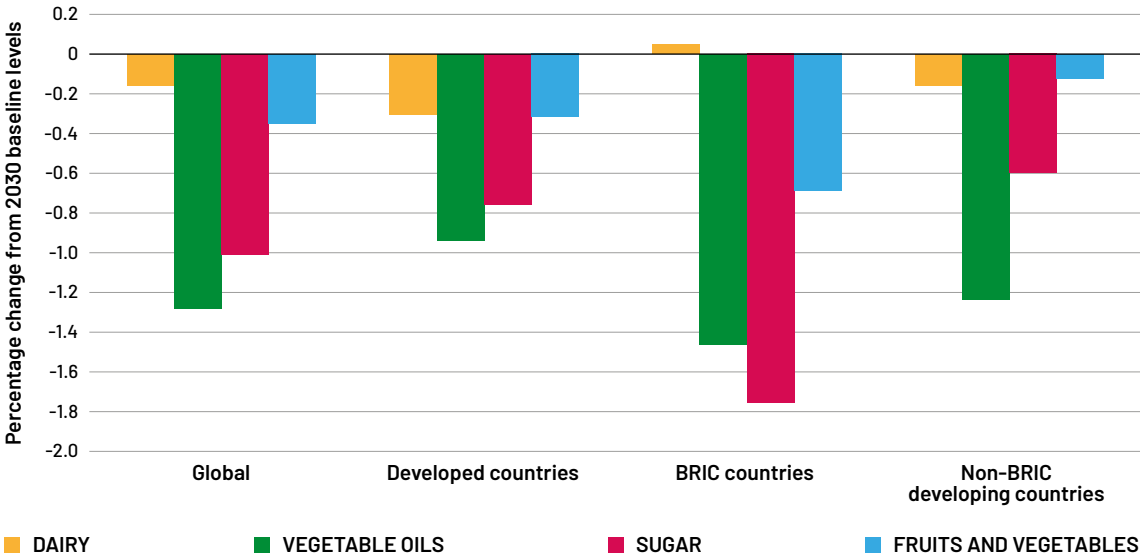
▶ **FIGURE 20**

Impacts of removing agricultural support on per capita consumption of various food items

a. Impacts of removing border measures



b. Impacts of removing fiscal subsidies



Source: Authors' own calculations based on MIRAGRODEP model estimates.

Removal of border support measures increases income in non-BRIC developing countries (see Table 4) which leads to an increase in per capita consumption of certain food groups there as well, such as dairy and sugar (Table 8). Per capita consumption of vegetable oils such as soybean oil, however, would likely fall as increased trade in those commodities (and with livestock production shifting to developed countries, where soybean meal is a major feed additive) increases prices for those products. The results suggest that per capita consumption of fruit and vegetables in the non-BRIC developing countries would be largely unaffected.

▶ TABLE 8

Impacts of removing agricultural producer support on food consumption and affordability

ITEM	BORDER MEASURES	FISCAL SUBSIDIES				ALL SUPPORT
		TOTAL	OUTPUT SUBSIDIES	INPUT SUBSIDIES	FACTORS OF PRODUCTION	
	PERCENT CHANGE FROM 2030 LEVELS					
Dairy consumption	**0.97**	**-0.16**	**-0.06**	**0.02**	**-0.12**	**0.94**
Developed countries	0.81	-0.31	-0.08	-0.11	-0.12	0.72
BRIC countries	0.47	0.05	-0.04	0.22	-0.13	0.58
Non-BRIC developing countries	2.25	-0.17	0.01	-0.05	-0.11	2.14
Vegetable oil consumption	**-1.02**	**-1.28**	**-0.53**	**-0.27**	**-0.49**	**-2.19**
Developed countries	0.01	-0.94	-0.51	0.08	-0.52	-0.75
BRIC countries	-1.68	-1.47	-0.49	-0.51	-0.49	-3.07
Non-BRIC developing countries	-0.60	-1.24	-0.69	-0.10	-0.46	-1.72
Sugar consumption	**6.09**	**-1.01**	**-0.21**	**-0.65**	**-0.14**	**5.16**
Developed countries	-0.69	-0.76	-0.36	-0.32	-0.09	-1.38
BRIC countries	14.68	-1.76	-0.10	-1.61	-0.05	13.08
Non-BRIC developing countries	7.39	-0.61	-0.10	-0.18	-0.33	6.79
Fruit and vegetable consumption	**0.95**	**-0.36**	**-0.04**	**-0.08**	**-0.32**	**0.63**
Developed countries	0.97	-0.32	0.05	0.08	-0.45	0.76
BRIC countries	2.22	-0.69	0.12	-0.47	-0.34	1.46
Non-BRIC developing countries	0.02	-0.12	-0.03	0.09	-0.19	-0.08
	PERCENTAGE POINT CHANGE IN SCENARIO COMPARED TO 2030 BASELINE LEVELS					
Affordability of a healthy diet	**0.17**	**0.10**	**0.08**	**0.11**	**0.06**	**0.22**
Developed countries	0.05	-0.01	0.00	0.00	-0.01	0.05
BRIC countries	0.19	0.26	0.19	0.25	0.14	0.35
Non-BRIC developing countries	0.21	-0.01	0.00	0.02	0.00	0.18

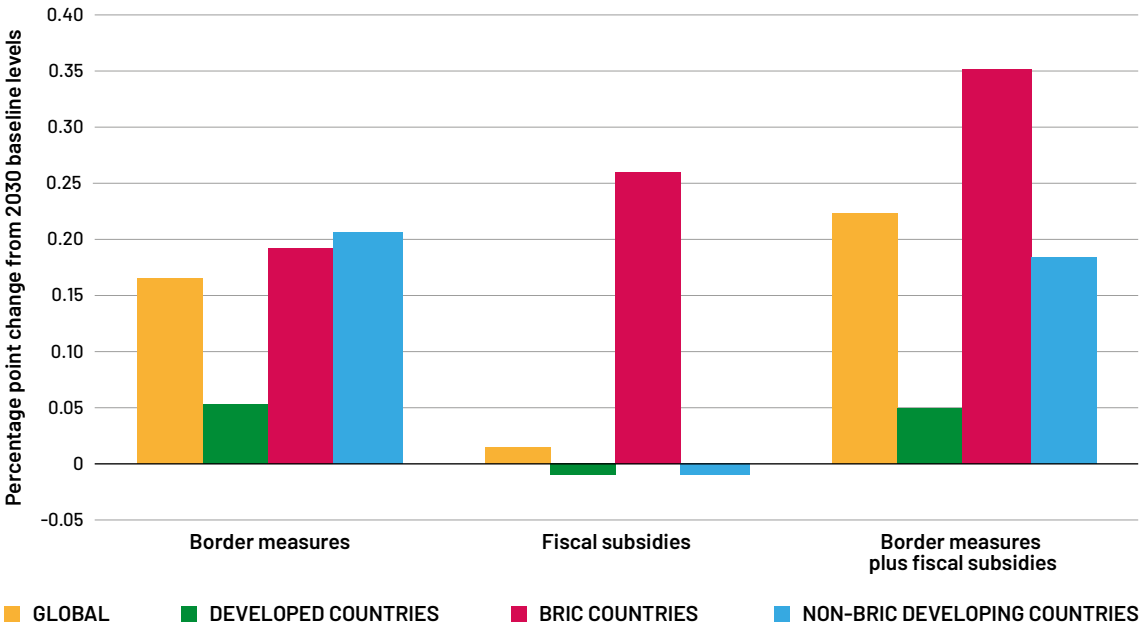
Source: Authors' own calculations based on MIRAGRODEP model estimates.

Removal of fiscal subsidies, if not compensated, largely has a negative income effect on farmers (and consequently on farm employment) which contributes to lower per capita food consumption for the products considered here. Per capita consumption levels of vegetable oils and sugar are projected to fall the most, falling 1.28 percent and 1.01 percent respectively from baseline 2030 levels (Table 8). Consumption effects tend to be more pronounced in BRIC countries, except for dairy (dairy consumption increases in these countries due to the shift to livestock production caused by the removal of input subsidies; dairy prices fall, which offsets income losses). In addition, as shown in Figure 17, the change in the PoU is also higher for BRIC countries.

Generally, the results of the model suggest that removal of agricultural producer support has a modest positive effect on the affordability of healthy diets (Figure 21).[59] As predicted, the results are smaller in developed countries where incomes are higher, and the proportion of the population that cannot afford a healthy diet is smaller. For non-BRIC countries, removal of border measures results in a 0.21 percentage point increase, but removing fiscal subsidies has a small negative impact.

▶ FIGURE 21

Increase in the percentage of population who can afford a healthy diet due to removal of agricultural producer support



Source: Authors' own calculations based on MIRAGRODEP model estimates.

It is important to note that these changes must be interpreted as only indicative of what would occur due to changes in income and relative prices, as many other factors affect dietary choices. What the results do suggest, however, is that policies that negatively affect income could have negative effects on per capita food consumption, particularly among low-income households, and therefore these impacts need to be taken into account when designing strategies to repurpose agricultural producer support.

[59] For a discussion of the affordability of the EAT-Lancet healthy diet, see Hirvonen *et al.* (2020). The EAT-Lancet Commission diet consists of a large amount of vegetables, fruits, whole grains, legumes, nuts and unsaturated oils, some seafood and poultry, and little to no red meat, processed meat, added sugar, refined grains, and starchy vegetables (Willett *et al.*, 2019).

Moreover, the complex interactions between policies need to be considered. For example, the substitution of high fructose corn syrup (HFCS) for sugar in the 1980s in the United States of America was driven largely by high global sugar prices compounded by high tariff barriers, and not by corn policies, which at the time included supply control provisions and price supports which kept corn prices high (Glauber, Sumner and Wilde, 2017).[60] Similarly, policies like ethanol mandates under the country's Renewable Fuel Standard have raised the price of corn and corn products such as HFCS. These cross-commodity effects need to be taken into account when trying to understand effects and designing policies (Glauber and Effland, 2016).

3.7 IMPACTS ON HEALTH

This section reviews the direct and indirect channels via which current agricultural support can impact human health. While the impacts of agricultural support on health are not directly modelled, inferences are drawn from the simulations and related to findings in the empirical literature. While the impacts of eliminating fiscal subsidies are relatively small, if uncompensated, they could have important adverse impacts on household incomes of the most vulnerable.[61] However, there are significant mutual benefits for the environment and health associated with removing the types of agricultural support that encourage the overuse of agrochemicals and unsustainable farming practices (Jones *et al.*, 2013).

The potential health impacts of current publicly supported agricultural practices can be grouped into three categories: production health risks; consumption health risks; and health risks linked to the impact of agriculture on the natural environment.

Production health risks

In addition to hazards from heavy machinery, equipment and noise, agriculture poses specific direct chemical and biological security risks to farmers, through the use of agrochemicals (fertilizers and pesticides). Exposure to agrochemicals causes harm to farmers via poisoning, affecting internal organs or systems or inflicting external injuries as irritants.[62] Some pesticides, like organophospates for example, are highly toxic to humans and even small amounts can cause severe symptoms, such as convulsions, coma and even death. Others are less toxic, but overexposure to them also can be detrimental (Damalas and Koutroubas, 2016; Jayaraj, Megha and Sreedev, 2016). Land conversion for agriculture is also linked to ecosystem degradation which can present additional health risks including emergence of infectious disease, but also degradation of ecosystem processes that further exacerbate the problem (Myers *et al.*, 2013).

Glyphosate – one of the most widely used herbicides globally, especially since the introduction of glyphosate-tolerant genetically modified crops – has raised concerns about its impact on health and the environment (Nicolopoulou-Stamati *et al.*, 2016). Agricultural support measures that encourage the (over)use of agrochemicals increase health risks associated with agricultural production. From a biological security perspective, individuals associated with highly mechanized/intensive livestock production face an increased risk of catching zoonotic diseases[63]

[60] Importantly, the switch to HFCS was also driven by food technology innovations which improved the manufacturing quality, making it easier to use HFCS in food processing.

[61] This may be particularly true for female-headed households which tend to have fewer mitigation options (for example drawing on savings, finding off-farm employment) than male-headed households.

[62] The WHO estimated the burden of selected chemicals (including agrochemicals) at 1.6 million lives in 2016 (UNEP, 2019b).

[63] Agriculturally acquired zoonoses include infections that are naturally transmitted from vertebrate animals to humans (e.g. rabies), and those common to animals and humans because they have jumped species (e.g. Salmonella, influenza and SARS-CoV-1 and -2).

(LeJeune and Kersting, 2010). Hence the health impacts of incentivizing such production practices should be taken into consideration.[64]

Consumption health risks

The escalating global risks posed to the human population by consuming unhealthy food is discussed in Section 3.6. In addition, foodborne diseases due to consumption of unsafe food is a risk. Agrochemicals used in production can enter the food chain via the soil and water, causing health problems (UNEP, 2019b; WHO, 2015a).

Environmental health risks

Agrochemicals, agricultural waste and emissions from crop and animal agriculture can impact the natural environment and by extension human health by contaminating air, degrading water quality or by altering organisms that are necessary to produce food. For example, chemical inputs and antibiotics that run off from farms can contaminate and/or degrade water bodies, affecting drinking water quality (UNEP, 2019b).

Some 2.1 billion people worldwide lack access to safe water, and a total of 2.7 billion find water scarce for at least one month of the year (UNICEF and WHO, 2017; Hoekstra *et al.*, 2012; UNEP, 2020c). While agriculture is just one of many contributing factors to water scarcity and quality, large-scale crop and animal agriculture production consumes more water than any other source, affecting water quantity. There is also a risk that antimicrobial agents used in food production may help develop and transmit antimicrobial-resistant bacteria into the environment (FAO and WHO, 2019).

The increased clustering and growth in the confinement of animals has led to growing environmental problems in many communities. First, the accumulation of manure in individual areas can overwhelm the absorptive capacity of the soil, causing runoff or leaching into the groundwater and overflow from storage units. Second, emissions from decomposing manure and livestock digestive processes produce air pollutants like gaseous ammonia that affect ambient air quality. It has been estimated that where confined animal operations are located, about 30 percent of particular matter (PM10 and PM2.5) is produced by livestock emissions (Carnevale, Pisoni and Volta, 2010; Behera *et al.*, 2013). Last, in large-scale confined animal feeding operations, excessive amounts of toxic heavy metals like copper and zinc are fed as supplements to pigs and chickens, to promote growth and prevent disease (Bhargava *et al.*, 2012; Hejna *et al.*, 2019). Other metals present in animal waste can include cadmium, lead, mercury and arsenic. These metals also accumulate in soil when animal waste is sprayed on farm fields and can contaminate water supplies, causing health problems in humans (e.g. copper toxicity can cause gastrointestinal and liver disorders).

3.8 IMPACTS ON EQUITY

The distributional impacts of agricultural producer support at the farm level are not explicitly modelled in the analysis presented in this chapter. As with the previous section on health, a more qualitative approach has been taken.

[64] Agricultural support policies by themselves are a blunt instrument for addressing these problems, however. Other policy instruments (e.g. banning certain dangerous pesticides, biosafety regulations) are more direct and likely more effective means of addressing these issues.

Equity considerations are covered under UN SDG 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.

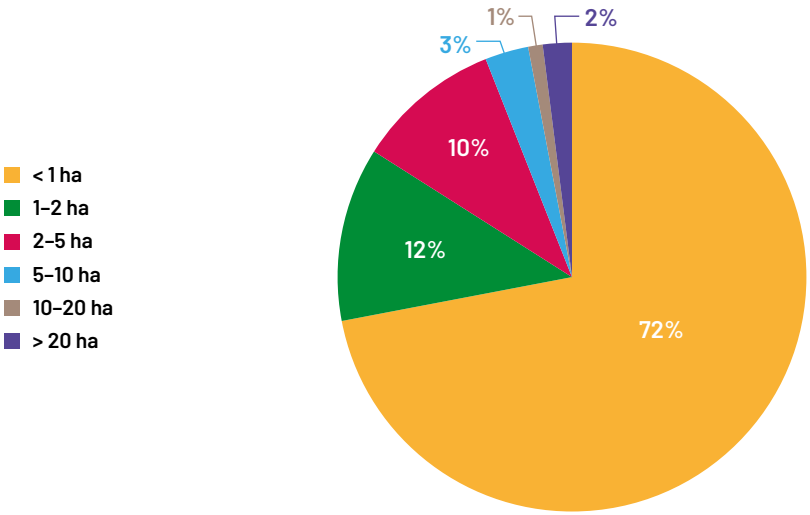
Data from Chapter 2 shows how agricultural support is inequitably distributed across countries, with most agricultural support, particularly fiscal subsidies, concentrated among developed economies and large emerging economies such as China. Non-BRIC developing economies tend to provide agricultural support in the form of border measures, which means producers gain through higher prices (at the expense of domestic consumers) rather than through income support such as input or output subsidies.

Evidence suggests that support to agriculture may be inequitably distributed across the sector in favour of larger farms, particularly in developed countries such as Canada and the United States of America and in the European Union (Moreddu, 2011). This is often because agricultural support is generally tied to production, or factors of production like land. A comprehensive examination of changes in farmland distribution over time also points to an increased concentration of farmland among large farms as economies grow (Lowder, Sánchez and Bertini, 2021). Female-headed farm households tend to benefit less from fiscal subsidies than male-headed households because compared to their male counterparts, women operate smaller farms – on average only one-half to two-thirds as large (FAO, 2011c).

Figure 22 shows the global distribution of farms by size of farm (Lowder, Skoet and Rainey, 2016). About 72 percent of farms were less than 1 ha. Only 3 percent of farms were 10 ha or larger.

▶ FIGURE 22

Global distribution of farms by farm size



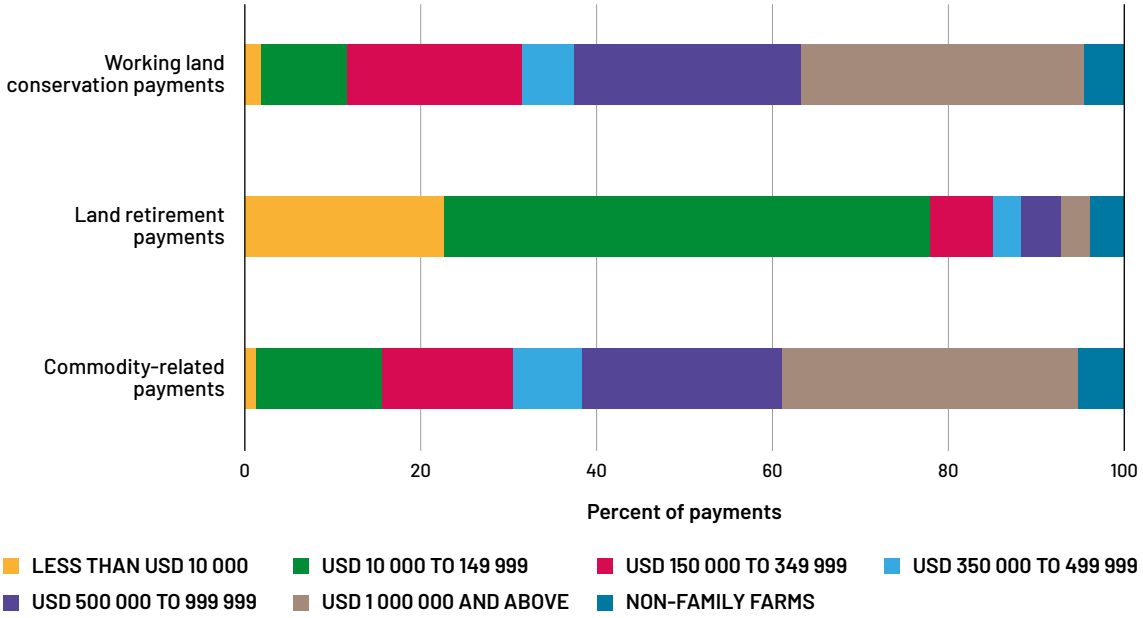
Source: Lowder, Skoet and Rainey (2016).

An analysis in the European Union showed that EUR 24 billion a year in subsidies goes towards supporting the incomes of the richest farming regions with relatively low levels of farm employment, when EUR 20 billion could instead be spent to meet the Union's biodiversity target with additional social benefits (Scown, Brady and Nicholas, 2020).

In their study of the United States of America, McFadden and Hoppe (2017) found that roughly 85 percent of commodity-related programme payments were concentrated in farms with sales exceeding USD 150 000 (Figure 23). Large farms (sales in excess of USD 1 million) accounted for about 41 percent of agricultural production in 2015, and received about one-third of commodity payments.[65] Further, half of farm payments (subsidies) in 2015 went to farm households with annual incomes over USD 146 126. For context, the median income of households in 2015 was USD 56 516. Insurance indemnity payments follow a similar trend but with more inter-year variability. By contrast, conservation easement payments were more concentrated in the lower sales brackets, with almost 78 percent paid to farms with sales less than USD 150 000 in 2015 (McFadden and Hoppe, 2017).

▶ FIGURE 23

Distribution of farm payments in the United States of America by type of programme, 2015



Source: McFadden and Hoppe (2017).

Research on the impacts of farm programme subsidies on market structure in the United States of America have found little evidence to suggest that payments have contributed to concentration (MacDonald, Korb and Hoppe, 2013; Sumner, 2014; MacDonald, Hoppe and Newton, 2018). Most of these studies point out that farm concentration has increased in the country as much for non-subsidized crops and livestock as for those crops eligible for subsidies. Instead, the majority of studies point to labour-saving technologies and geographical conditions which have enabled farmers to expand their operations by taking advantage of economies of scale. However, MacDonald, Hoppe and Newton (2018) point out that the risk-reducing aspect of payments may encourage some farms to adopt labour-saving technologies, which may then encourage expansion (and concentration) over the longer term.

[65] In the United States of America, commodity-related programme payments are restricted to major row crops and dairy production. Fruits and vegetables and livestock and poultry production are largely excluded from these programmes (Glauber and Effland, 2016).

It has been long recognized that many of the benefits of agricultural programmes get capitalized into fixed assets like land (Floyd, 1965; Alston and James, 2002; Varaccca *et al.*, 2021). Thus, it is landowners who often benefit most from agricultural programmes. Tenants tend to reap few of the benefits, as these are offset by higher land rents. Moreover, rising land values make it difficult for new entrants to break into farming, which is why in developed economies like Canada, the United States of America or those of the European Union, many of the agricultural land transfers are within families who are able to expand their holdings when land becomes available.

Brooks (2012) simulated the distributional implications of agricultural policies in six developing countries (Bangladesh, Ghana, Guatemala, Malawi, Nicaragua and Viet Nam). The results of simulations for all six country models showed that no untargeted agricultural policy intervention is pro-poor within the rural economy. They found that while agricultural policy instruments are less efficient at raising rural incomes than direct payments, the degree of inefficiency of some market interventions, notably input subsidies, is not inevitably as high as observed in developed OECD countries. In general, the results show that direct payments are the most efficient way of boosting incomes in the short term, while public investments, which should also have broader long-term pay-offs, have short- to medium-term impacts that are pro-poor.

3.9 CONCLUSION

The modelling results in this chapter provide an indication of the likely impacts of removing all agricultural producer support. Not only is this analysis useful to understand the impact of agricultural producer support as such, it serves also to identify potential trade-offs that can be minimized and opportunities for improving the design and effectiveness of agricultural producer support measures that are well aligned with the transformation of food systems. However, given the complex interactions between policy objectives and impacts, which differ across the various agricultural producer support measures and regions/countries, repurposing and reform efforts need to be systematically assessed (as discussed in Chapter 4) to ensure policy coherence and to capitalize on potential synergies.

The results from the empirical literature and simulation results presented in this chapter suggest that measures that have large positive impacts on input use, land use change, and forest and other land habitats are good candidates for repurposing. The analysis clearly illustrates how the impacts of border measures and fiscal subsidies cannot be viewed in isolation, and that the complex interactions with crop and livestock production choices must also be well considered. The likely global impacts of removing agricultural producer support on the agriculture sector, nature, climate, nutrition, health and equity are summarized in Table 9, with some important regional differences discussed below.

Impacts on the farm sector and social indicators

Removing border measures tends to decrease domestic prices in countries with substantial border protection, but global prices rise as the demand for imports increases. As a result, both crop production and livestock production increase, although the analysis suggests that there is much regional variation, with developed and BRIC countries likely to see increases in livestock production, while non-BRIC developing countries see large increases in crop production. By contrast, removal of fiscal subsidies (while maintaining border measures) results in decreases in crop and livestock production and a fall in farm incomes if farmers are not compensated. The removal of these subsidies has a proportionally larger impact in BRIC and non-BRIC developing

countries, in terms of income, poverty and PoU, due to the size of the agriculture sector relative to the national economy, the level of agricultural support (particularly in the case of BRIC countries) and the share of the population that is vulnerable (i.e. that has relatively low income). The impacts of removing subsidies in developed countries on national income and poverty is minimal, as they account for such a small share of national income.

Nature and climate (GHG emissions)

Removing border measures is estimated to result in an increase in total cropland. However, because livestock shifts from non-BRIC economies where grazing is more prevalent to developed and BRIC economies where confined feeding operations often predominate, the level of pastureland falls; there is less deforestation and conversion of pastureland, particularly in non-BRIC developing economies; and there are fewer GHG emissions. Globally, eliminating border measures is estimated to reduce GHG emissions by 55.7 million tonnes CO_2 e.

Removing fiscal subsidies also reduces both cropland and pastureland, preserving forest habitat and other land habitat compared to baseline levels. However, BRIC countries see some increase in pastureland as some agricultural resources shift from crop production to livestock. In developed countries the story is more complicated, as eliminating subsidies results in some production being shifted to developing countries where productivity levels may be lower, such that more land is put into agricultural production at the expense of forest habitat. Globally, the impact of eliminating fiscal subsidies on GHG emissions is much less than that of eliminating border measures – a change of only about 11.3 million tonnes CO_2 e from baseline levels. Eliminating both border measures and fiscal subsidies is estimated to reduce GHG emissions by 78.4 million tonnes CO_2 e in 2030.

Food consumption and nutrition

The projected impact of **removing all border measures** on food consumption and nutrition is mixed. Globally, per capita consumption of dairy, sugar, and fruits and vegetables is expected to rise, as these food groups tend to be highly protected and a removal of border measures would make them more affordable. The health consequences of those impacts are also mixed. For example, increasing the consumption of sugar is bad for health, increasing the consumption of fruits and vegetables is good for health, and increasing the consumption of dairy may be either good or bad, depending on both the product (sugary, full fat) and the consumer (for example, it could contribute to early weaning from breastfeeding in young children). Per capita consumption of vegetable oils such as soybean oil would likely fall as increased trade in those commodities is expected to increase their price. The health consequences of decreased vegetable oil consumption may be positive or negative depending on the context and what kinds of food products these oils are used for (e.g. a move away from highly processed, energy-dense foods of minimal nutritional value would be positive), as well as what they are being replaced with by households. As for the **removal of fiscal subsidies**, the resulting loss of income means that per capita consumption falls for most food groups, unless compensation measures are in place.

Health

Removal of border measures tends to increase global farm income and, as a result, the percent of the world's population that is undernourished declines by 0.2 percentage points. Conversely, the **removal of fiscal subsidies** tends to decrease farm income which, if not compensated, would push a small portion of the population in developing countries into extreme poverty, thus increasing the PoU. In terms of other health consequences, the removal of input subsidies would decrease the use of fertilizers and pesticides. From the literature review in Section 3.7,

overuse of pesticides and other chemical inputs has been shown to have harmful health consequences, but our model does not explicitly examine that linkage. Similarly, the effects on food consumption in Section 3.6 are not explicitly linked to health consequences.

Equity

Though not modelled in this study, **removal of fiscal subsidies** would likely have a negligible impact on existing farm structures in many countries, at least in the short term, because the amount paid per unit produced tends to be the same regardless of the size of the operation, and hence does not favour large farms over small farms. Over the longer term, elimination of subsidies could help reduce land prices, thus making it easier for newly entering farmers to purchase or rent land and take advantage of economies of scale through larger production.

▶ **TABLE 9**

Overview of global impacts from removing agricultural producer support

	PRICE	PRODUCTION	FARM INCOME/ EMPLOYMENT	NATURE (LAND USE)	GHG EMISSIONS	NUTRITION AND HEALTH	EQUITY
Removal of border measures	Decrease in domestic prices. Increase in global prices by 0.7 percent.	Increase in crop and livestock production. Shifts of livestock production from non-BRIC developing countries to developed and BRIC countries. Shift of crop production from developed to developing economies.	Increase in global farm income by 0.2 percent; farm employment falls in developed economies (-1.6 percent) and in BRIC economies (-0.6 percent) but rises in non-BRIC developing economies (+0.3 percent).	Increase in global cropland by 0.16 percent. Decrease in global pastureland by 0.20 percent. Decrease in input use by 0.3 percent.	Reduction in GHG emissions by 55.7 million tonnes CO_2 e.	Increase in consumption of highly protected products such as dairy, sugar, and fruits and vegetables. Decrease in consumption of vegetable oils such as soybean, due to increase in trade and price. Decline in PoU by 0.2 percent due to increase in incomes.	Negligible impact on existing farm structures in many countries, at least in the short term.
Removal of fiscal subsidies	Increase in global prices by 1.4 percent.	Decreases in both crop and livestock production.	Fall in farm incomes (-5.7 percent) if no compensation put in place. Fall in farm employment as well (-0.9 percent).	Reduction in both cropland and pastureland. Decline in input use by 0.5 percent due to loss of input subsidies.	Reduction in GHG emissions by 11.3 million tonnes CO_2 e.	Drop in per capita consumption of food due to decline in income. Increase in PoU by 0.16 percent due to decline in farm income.	Negligible impact on existing farm structures in many countries, at least in the short term.

Source: Authors' own calculations based on MIRAGRODEP model estimates.

Farmer holding seedlings.

4

A STEP-BY-STEP GUIDE TO REALIZE THE BENEFITS OF REPURPOSING AGRICULTURAL PRODUCER SUPPORT FOR HEALTHIER, MORE SUSTAINABLE, EQUITABLE AND EFFICIENT FOOD SYSTEMS

KEY MESSAGES

- Current agricultural producer support is largely unsustainable and inefficient, and by leaving certain sectors of society in the food supply chain behind, is driving inequality. Global action is needed to repurpose and reform current agricultural producer support in ways that can improve policy coherence and create synergies across various development objectives, while supporting food systems to become healthier, more sustainable, equitable and efficient.
- While there are economic, social and environmental benefits from repurposing support, there will be winners and losers. Repurposing agricultural producer support policies must include mitigation of negative short-term impacts, especially for the most vulnerable.
- General approaches for repurposing agricultural producer support emerge from the evidence at the global level and for country groups, but there is no one-size-fits-all optimal repurposing strategy. A range of factors and country-specific circumstances will define which agricultural producer support measures are most conducive to healthier, more sustainable, equitable and efficient food systems.

- Governments can follow a six-step approach to develop a repurposing strategy that includes reforming selected current support measures: 1. measuring the support provided; 2. understanding the positive and negative impacts of the support provided; 3. identifying repurposing options; 4. forecasting the impacts of the new repurposing strategy; 5. reviewing and refining the proposed strategy and detailing its implementation plan; 6. monitoring and refining the implemented strategy on an ongoing basis.
- A transparent, multistakeholder, customized and evidence-based approach is required to define and devise a repurposing strategy. Transparency and inclusive consultations are paramount to address institutional bottlenecks and confront the vested interests that could hinder the effective implementation of the strategy and the realization of the many benefits it would create.

4.1 INTRODUCTION

This fourth chapter examines the extent to which repurposing agricultural producer support can accelerate the transition to healthier, more sustainable, equitable and efficient food systems, in line with other efforts towards achieving the SDGs. Indeed, this chapter builds on the information provided in Chapter 2 (which set out the scale and type of support currently provided) and Chapter 3 (which focused on the current impacts of support, and modelled the likely generalized effects of removing core support mechanisms for the period 2020–2030), but it also leverages several studies and reports on the economic, social and environmental sustainability of food systems.

In the context of policy formulation, repurposing and reforming are two distinct but complementary policy processes required to move towards a healthier, more sustainable, equitable and efficient agriculture sector. As noted in Chapter 1, repurposing is defined as the reduction of measures that promote certain activities deemed inefficient, unsustainable and/or inequitable, in order to replace them with measures that promote other activities deemed the opposite. Thus, agricultural producer support is not eliminated, but reconfigured. In this way, repurposing will always imply policy reforms, because (in line with the OECD definition) changes to the formal "rules of the game" – including laws, regulations and institutions – will be needed for fully or partially removing certain kinds of harmful support, and/or for allotting fiscal resources to forms of support that will help improve the efficiency, equity and sustainability of food systems and achieve better health outcomes. Thus, policy reform will always be part of a broader repurposing strategy that supports food systems transformation and the achievement of development objectives of various stakeholders.

The following questions are addressed in this chapter:

- What opportunities are available for repurposing?
- What outcomes can be expected from repurposing across environmental, social and economic dimensions?
- What steps should be followed to create a new agricultural producer support strategy that repurposes funding for healthier, more sustainable, equitable and efficient food systems?
- What obstacles can be expected in the transition to these new food systems, and how can they be overcome?

The chapter further discusses how repurposing agricultural producer support can also trigger a paradigm shift towards sustainability and equity.

Broadly speaking, as discussed since the beginning in Chapter 1, the existing approach to agricultural producer support encourages food systems that are not designed to produce the nutritious and diverse food that we all need to live a healthy life. On top of that, the food that is being produced is not accessible to all, leaving millions of people behind, and in most cases the food comes from unsustainable farming practices.

Any repurposing strategy must be carefully designed to optimize the use of resources and achieve better nutrition and health outcomes, with the goal to create healthier and more nutritious food products at prices accessible to vulnerable populations, without any negative impacts on nature. The strategy design must also take into account that the impacts of agricultural producer support can reach well beyond the agriculture sector, thus making repurposing a driving force for a wider food systems transformation. Since past and current support have been harmful for nature, efforts are required both to stop biodiversity loss as well as to restore ecosystems. As an example, reforming harmful subsidies in the agriculture sector can provide a portion of the resources needed for other development objectives (Deutz *et al.*, 2020), create fiscal space, and mobilize public resources needed for ecosystem restoration. These benefits can trigger a paradigm shift through behavioural change at multiple levels across the food systems, moving beyond a "do-no-harm" approach to reverse current trends. Indeed, this should be at the heart of any agricultural support repurposing strategy.

4.2 THE NEED FOR A SYSTEMIC AND EVIDENCE-BASED APPROACH TO AGRICULTURAL PRODUCER SUPPORT

As illustrated earlier in Chapter 3, agricultural producer support leads to various systemic outcomes. The decisions farmers make at the local level are based on a number of factors such as the cost of production inputs and profit expectations. As a result, support measures that subsidize specific production inputs will influence decisions on what production inputs to use and what land management practices to adopt (see also Chapter 2, Figure 3). At the national level, policies to promote or restrict trade often determine what crops will be produced and their import or export destination, as local decisions are influenced by expectations of market access and revenue generation. Finally, at the international level, cost dynamics determine the competitiveness of countries and producers, which in in most cases require economies of scale and cost minimization strategies to succeed.[66]

[66] There are exceptions. For instance, a premium may be placed on "terroir" or artisanal production.

The complexity of food systems requires farmers, for example, to weigh up the many factors affecting production (such as soil productivity and climate change) and revenue generation, as these are determined by market demand, access to markets and prices. International dynamics add to this complexity, making it even harder to navigate, especially for small producers. By contrast, farmers' decisions on how to take advantage of agricultural producer support may seem straightforward. For example, a price incentive or fertilizer subsidy that reduces costs, or the decision to invest in a crop supported by a trade agreement to guarantee access to markets (e.g. export) and reduce risks, are both likely to be perceived as worthwhile from the farmer's perspective. However, a focus on the benefits of support to farmers risks losing sight of the potential social and environmental side effects, which originate at the local level but then spread to national and international levels.

An uneven playing field: inequalities on the rise

Overall, inequality has risen over time (FAO, 2017) in terms of access to markets, access to natural (e.g. clean water) and financial resources, and income. Support provided to unsustainable production methods and unhealthy food products creates simultaneous health, economic and environmental crises. Ultimately, these crises will have a global reach because (i) commodity markets and food markets are internationally connected through supply chains; and (ii) solving the crises calls for a global effort and coordinated policy solutions. The mounting evidence on the negative side effects generated by current production practices, markets and structure of the agri-food value chain[67] highlights the urgent need to repurpose agricultural producer support so as to ensure it is aligned with positive outcomes while minimizing harmful side effects (FAO, 2017; OECD, 2021b; TEEB, 2018).

As highlighted in Chapters 2 and 3, agricultural producer support has both positive and negative outcomes depending on the perspective. Examples of positive impacts, when considering outcomes on production, include improved productivity from the use of fertilizers and pesticides and from mechanization, which has led to economies of scale (associated with the use of larger plots of land and monocropping), thus creating employment and generating income. This has contributed to poverty reduction and improved access to food, as well as freeing up labour for other economic activities. This, however, ignores the extent to which these benefits will not continue to be accrued over time, as they may certainly exhibit diminishing marginal returns. Furthermore, from an ecological perspective, the heavy use of chemical fertilizers and pesticides has led to the deterioration of soil, creating even more reliance on external production inputs, and causing water pollution and human health impacts.

This highlights the importance of taking a systemic approach to avoid the emergence of negative side effects, one that takes into account the outcomes of current support and the potential benefits of reforming and repurposing agricultural producer support. This is particularly important when side effects impact negatively on production and affect the economic resilience of farmers. For instance, the use of chemical fertilizers boosts productivity but, by deteriorating soils, it increases vulnerability to climate change and hence may lead to a reduction in soil productivity and production in the medium and longer term (Zhang *et al.*, 2018).

[67] Concentration in agricultural production related to economies of scale supports concentration in agri-food value chains. Agri-food value chains tends to be dominated by large global companies, with an unequal distribution of benefits to small (local) companies.

Systemic and evidence-based approaches should be embedded in development planning

A systemic approach considers outcomes across sectors (e.g. agriculture, water, forests, energy, health), economic actors (e.g. private and public sector, citizens), dimensions of development (i.e. social, economic and environmental), time horizons (e.g. short, medium and long term) and spatial scales (e.g. different locations and geographical scales). Without a holistic analysis, it will not be possible to determine whether **a direct reform and reallocation approach** will suffice (i.e. limited to the reallocation of an existing support) or a more **enhanced repurposing approach** (involving additional resources on top of the reallocated amount and/or a revised strategy for implementation) is needed to address the systemic challenges faced by the agriculture sector and society. Repurposing agricultural producer support should not be planned in isolation, but rather embedded in development planning and overall fiscal reform, taking into consideration the best way to repurpose such support and the resources needed to reach development goals. In this respect, a systemic approach is needed to inform policymaking in other sectors as well, given the high degree of interconnections existing, for instance, between agriculture and health, water, land use and economic development.

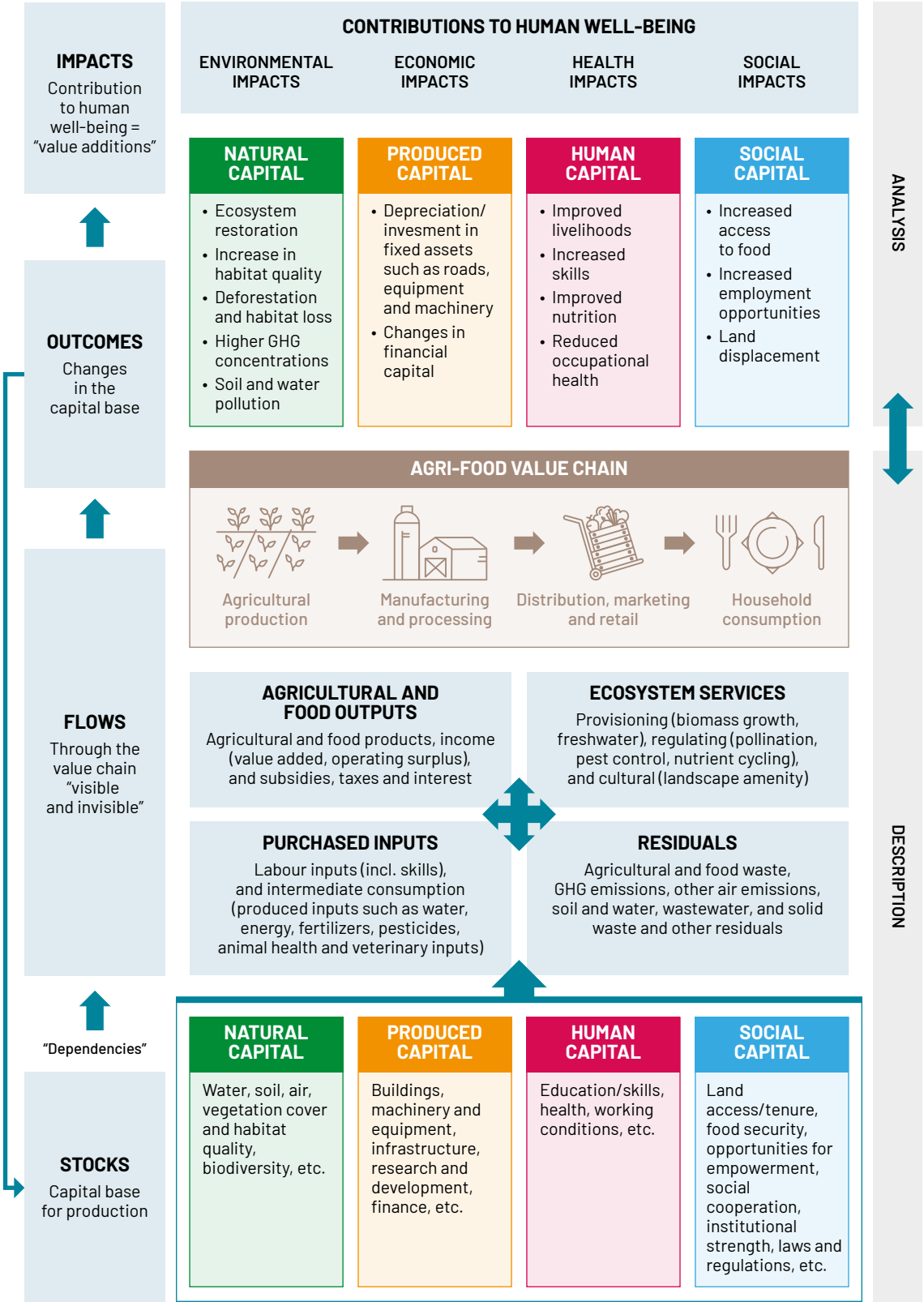
Several reports have highlighted the issue and the need for a more integrated approach. The Economics of Ecosystems and Biodiversity (TEEB) initiative, in its AgriFood Evaluation Framework (TEEB, 2018), states that the majority of the current assessment of food systems ignore a number of important relationships that agricultural, ecological and food systems have with the economy, society, human health and the environment. TEEB proposes a framework that includes four underlying dimensions (stocks, flows, outcomes and impacts) and summarizes the interactions within food systems via four main contributions to human well-being (environmental, economic, health and social impacts) (Figure 24). Reaching beyond the boundaries of the food sector, the TEEB framework highlights that a better performing agriculture sector supports a variety of other sectors and activities thanks to improvements in natural, social and human capital. Agricultural support measures can therefore be an enabler of progress and sustainability in other sectors, in addition to supporting progress towards reaching many SDGs.

The need for more country-specific evidence

While repurposing is possible, it is a challenging process. Not least because the dynamics and impacts of agricultural producer support differ from country to country. Similarly, attempts to repurpose such support may take different paths and speeds and affect different stakeholders very differently. A customized approach is needed to understand the impacts of current agricultural producer support in a given context, as well as to plan an effective repurposing strategy. The evidence at global level and by country income group presented in Chapters 2 and 3 is an important starting point, but specific country examples are also needed to illustrate how the process will play out within countries. Unfortunately, doing this is often hampered by data constraints.

The case of **Malawi** serves as an example of the potential opportunity for large-scale repurposing of agricultural producer support through the freeing up of resources that can be invested in more sustainable equitable and efficient forms of support, as detailed in Box 6.

▶ FIGURE 24
Overview of the TEEB AgriFood Evaluation Framework



Source: TEEB, 2018.

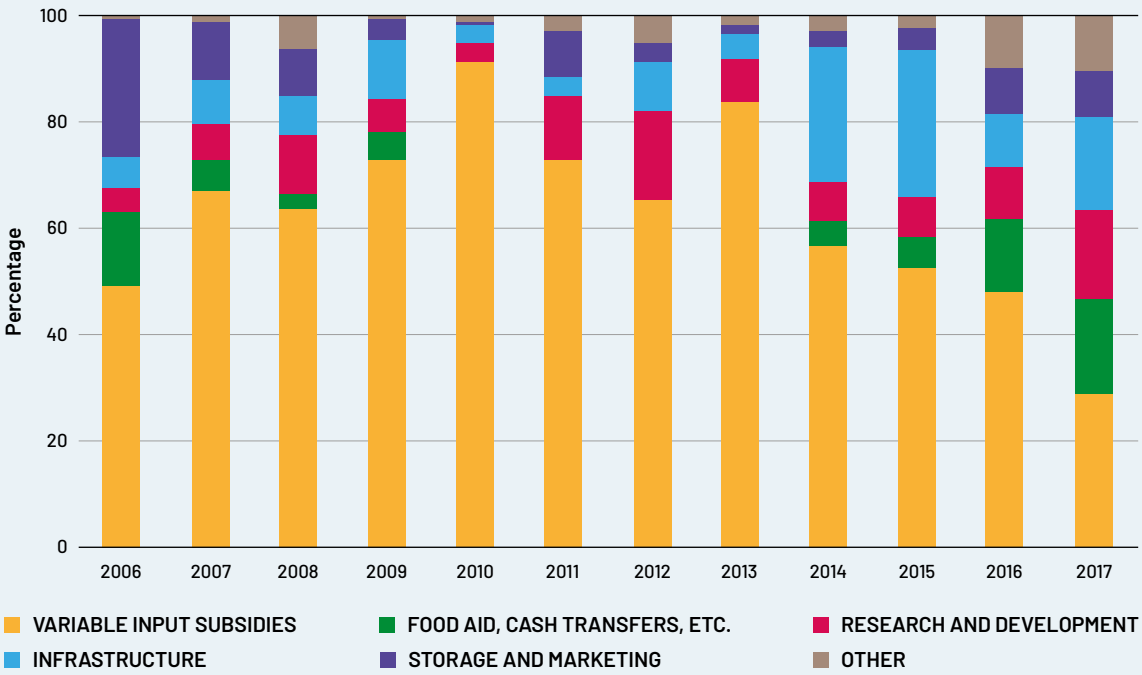
▶ BOX 6

Reforming the Farm Input Subsidy Programme in Malawi: improving efficiency and shifting fiscal support towards resilience measures

The Farm Input Subsidy Programme (FISP) reintroduced agricultural input subsidies in Malawi during the 2005/06 cropping season, after they had been abolished in the 1990s. Its main aim was to provide fertilizers and seed subsidies for maize, targeting poor smallholder farmers through vouchers. Prior to this, inputs for other crops were subsidized, such as fertilizers for tobacco (until 2008/09), legume seeds, cotton seeds and chemicals in certain cropping seasons. Evidence suggests that the FISP has had positive effects on maize productivity thanks to increased fertilizer use. Studies show an increase in maize yields of up to 500 kg/ha and higher production after the first year of implementation (from 1.2 million tonnes in 2004/05 to 2.6 million tonnes in 2005/06), reaching a record production level of 3.7 million tonnes during 2011/12 (Schiesari, Mockshell and Zeller, 2017). At the same time, the programme accounted on average for 60 percent of the total budget for food and agriculture (Figure A), and 8 percent of Malawi's total budget, during 2005–2017. Its total cost increased nominally until 2016, mainly driven by the devaluation of the national currency and the subsequent hyperinflation starting in 2012. These factors raised the cost of inputs, almost all of which are imported.

FIGURE A

Breakdown of spending in the food and agriculture sector in Malawi



Source: Pernechele *et al.*, 2021. ▼

▶ BOX 6 (CONT.)

Cost-cutting efficiency measures and shifting spending priorities

To tackle the humanitarian crisis brought on by weather-related shocks in 2015 and 2015, as well as the fiscal constraints caused by the rising cost of imports and interest on debt repayment, the government has been determined to rationalize public spending. Efficiency-enhancing reforms of the FISP promoted since 2015/16 have included fixed prices for delivering subsidized fertilizers, increased farmer contribution and, most importantly, the involvement of the private sector in importing and selling subsidized fertilizers (Chirwa, Muvula and Matita, 2016). The latter seems to have contributed significantly to reducing programme costs, especially during the 2016/17 season. In 2017, the FISP budget was halved – dropping to 27 percent of food and agricultural spending – which made room for increased maize procurement for food aid to address the humanitarian crisis. While some challenges persist in the FISP implementation, particularly on beneficiary targeting (see Chirwa, Muvula and Matita, 2016; Asfaw *et al.*, 2017), these cuts – approximately MWK 31.2 billion (USD 42.6 million) – seem to have created fiscal space for increased spending on other sectoral investments. The fiscal savings have mainly been redirected towards public goods, such as irrigation, agricultural research and technology transfer, as well as social protection measures, for example in cash-for-work/food programmes. These measures are better aligned with the top priority objective for the sector in all sub-Saharan Africa countries: namely, enhancing the resilience and capacities of farmers to cope with the negative externalities generated by harmful agricultural producer support in developed and emerging economies.

Source: Authors' adaptation from Pernechele *et al.* (2021).

Extending the analysis of Chapter 2 helps to see how, at the country level, agricultural producer support, measured by the NRA, has been changing.[68] In Brazil, China, the European Union and the United States of America, the trend has been to shift away from price incentives (created through border measures, e.g. import tariffs and export subsidies), which are the most distorting type of agricultural producer support, towards policies better aligned with sustainable food systems, namely decoupled subsidies and funding for general sector services (see Chapter 2).

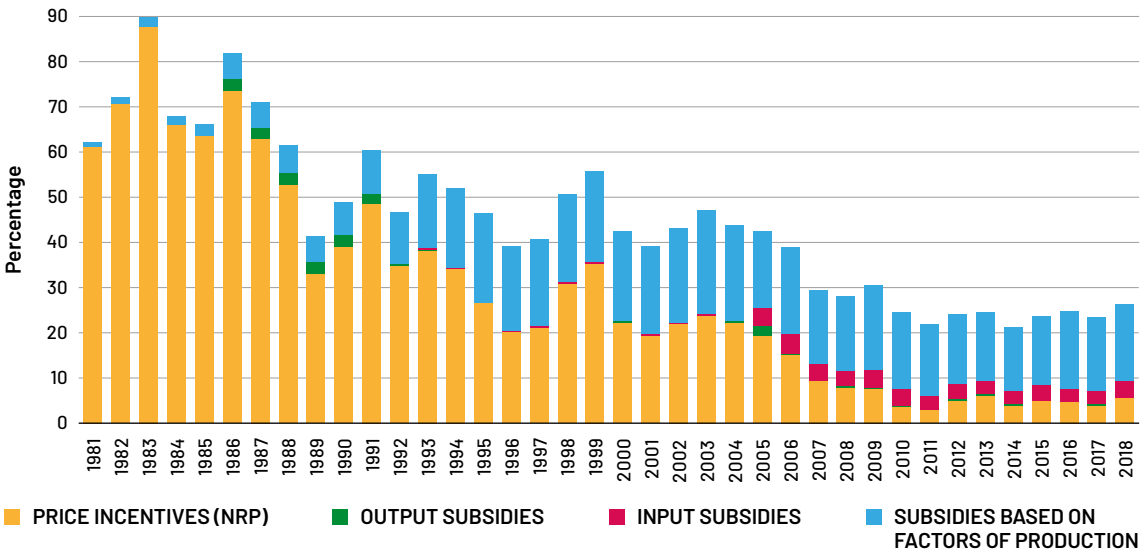
In the **European Union**, price incentives and, to a lesser extent, coupled subsidies dominated agricultural policy until the early 2000s (Figure 25). Since then, price incentives, as measured by the NRP defined in Chapter 2, have dropped dramatically as a share of production value (Figure 25), while subsidies decoupled from production or conditional on mandatory environmental constraints, have risen sharply and now account for half of the total budget support to farmers (OECD, 2021a; World Bank, 2018a). Decoupled subsidies in 2018 accounted for 17 percent of the total value of production, representing 75 percent of the fiscal subsidies provided to farmers in the bloc. During the last decade, the NRP reached its historical minimum and did not surpass 5 percent. This was driven mainly by the major reforms to the European Union Common Agricultural Policy (CAP) that started

[68] The same dataset and methodology and indicators used for Chapter 2 are being used here to provide a more nuanced picture of agricultural producer support trends at country level. The nominal rate of assistance (NRA) indicator measures, as share of the production value, the level of assistance or support to farmers arising from price incentives generated by trade and market policies (measured by the nominal rate of protection – NRP) as well as fiscal subsidies of various types.

in 1992.[69] The European Union accelerated reforms in 2003 with more decoupling, an increase in country-level funding for rural development, and more direct farm payments (World Bank, 2020).

▶ FIGURE 25

Nominal rate of assistance as a percentage of country production value in the European Union, 1981–2018



Source: Laborde and Mamun, forthcoming.

Although characterized by lower levels of agricultural producer support than in the European Union, the **United States of America** has also seen its levels of distorting support fall sharply over the last two decades. Price incentives reached their lowest point during 2008–2014, when the NRP was lower than 2 percent in all years; in 2018 they were still half of what they had been at the beginning of the century (NRP at 4 percent of production value in 2018 compared to 9 percent in 2001). Fiscal subsidies to farmers rose dramatically during the period of low world prices beginning in 1998, but started to decline from 2007 (Figure 26). The decreasing NRAs, now at 14 percent down from about 25 percent in 1999–2002, are consistent with trends in most developed countries (see Chapter 2) and were driven by rising environmental concerns over the negative effects of coupled subsidies; and in recent years, higher world commodity prices (OECD, 2020a).[70]

Fiscal subsidies decoupled from production also declined in the United States of America and, according to some recent analyses, both public and private investment in agricultural R&D rose significantly in the last decade (World Bank, 2020). In addition, funding for natural resources conservation, including land retirement, grew by 80 percent over the 2012–2016 period, compared to 1997–2002 (World Bank, 2020).[71] Since 2014, notably in 2018 and 2019, and also more recently in the context of COVID-19 relief packages (CRS, 2020), agricultural producer support has

[69] The vast majority of government support for agriculture in the bloc comes through the CAP, which currently costs USD 60 billion per year (2014–2016 average) and represents approximately 40 percent of the entire European Union budget (World Bank, 2020).

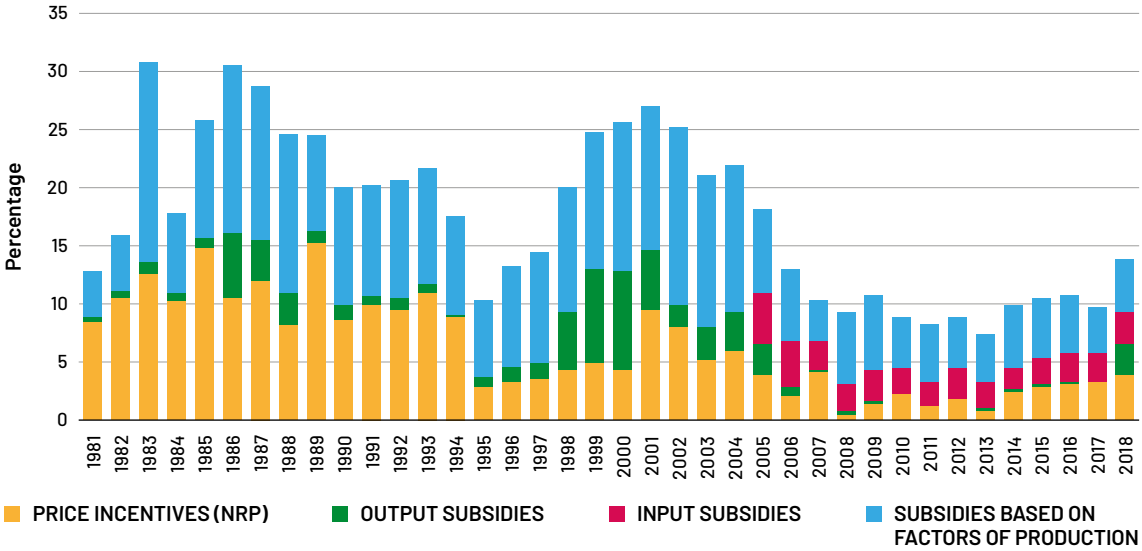
[70] Soaring international prices widen the gap between domestic producer price and its international equivalent, thus lowering price incentives (or generating price disincentives), the level of domestic protection (or support) being equal.

[71] Funding for conservation flows through multiple programmes in the United States of America, but recently it has grown particularly through the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP) and the Conservation Security Program (CSP) (World Bank, 2020).

been increasing, as seen in the higher price incentives (mainly for sugar and dairy products) and ad hoc subsidies aimed at sustaining farmers' incomes through the Market Facilitation Programme, in particular for major export commodities impacted by retaliatory tariffs applied by China and other countries (OECD, 2020a).

▶ FIGURE 26

Nominal rate of assistance as a percentage of country production value in the United States of America, 1981–2018



Source: Laborde and Mamun, forthcoming.

In **China**, the NRA turned positive in 1994 and has followed an upward trend since then, mostly through border measures (Figure 27). Roughly half of the price incentives in 2015 were provided to key food staples, like maize, pork, rice and wheat (OECD, 2018). Historically, fiscal subsidies to farmers were small relative to price incentives, but these have expanded since 2005 (Figure 27). In 2018, subsidies based on factors of production accounted for 4 percent of the total value of production. A rising share of these are being decoupled from production, as the country recently undertook some important reforms to rebalance its policies towards measures promoting long-term productivity growth and sustainability (OECD, 2020a).

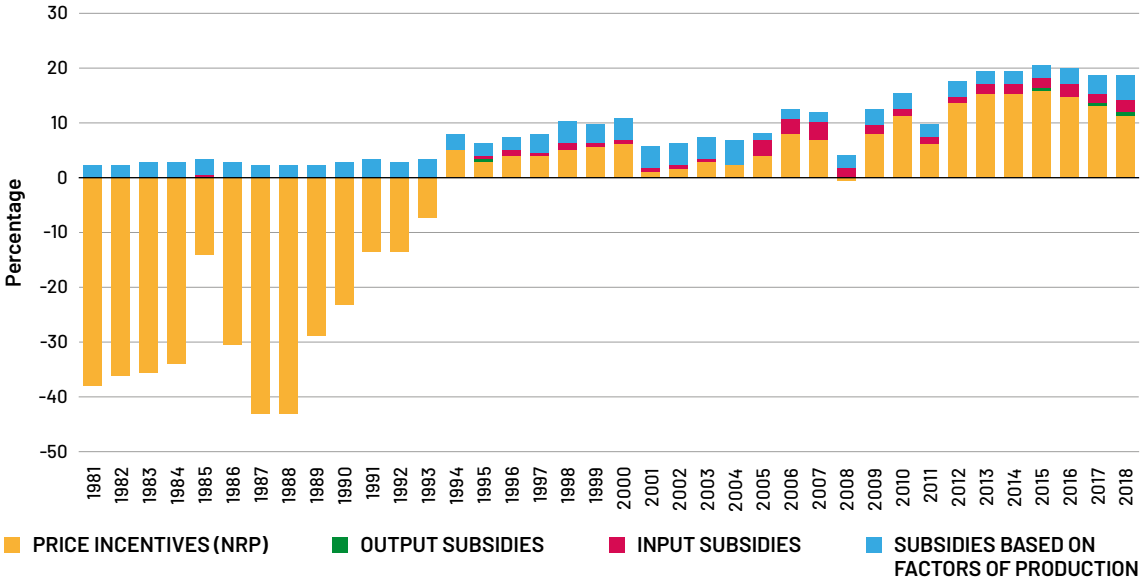
The replacement of price incentives for key crops by direct payments based on area planted increased significantly in the last decade. The most recent reform of the maize purchasing and storage system towards direct payments has eased the cost burden of public stockholding that still represents the largest share of expenditure in general services support (OECD, 2020a). This may have freed up resources for investments in other essential areas, such as for general sector services that rose greatly over 2005–2018.

Some emerging economies in Latin America such as **Brazil** have also started to shift their support away from price-distorting interventions and towards decoupled subsidies and provision of public goods and services. Brazil started to implement price incentive policies in early the 2000s (Figure 28), with the NRP reaching 9 percent in 2009. Since then, the share of this type of support has fallen, also driven by the introduction of environmental constraints for payments based on input use (OECD, 2020a). Currently, producer prices are aligned with world market prices; more importantly, government expenditures on agricultural innovation systems represent over 90 percent of spending on general services for agriculture (OECD, 2020a). Brazil has also developed

specific credit programmes to promote sustainable agricultural practices. These include credit for crop-livestock-forest integration and agroforestry systems, the restoration of degraded land and pastureland, and the implementation of organic agriculture and livestock production systems (OECD, 2020a).

▶ FIGURE 27

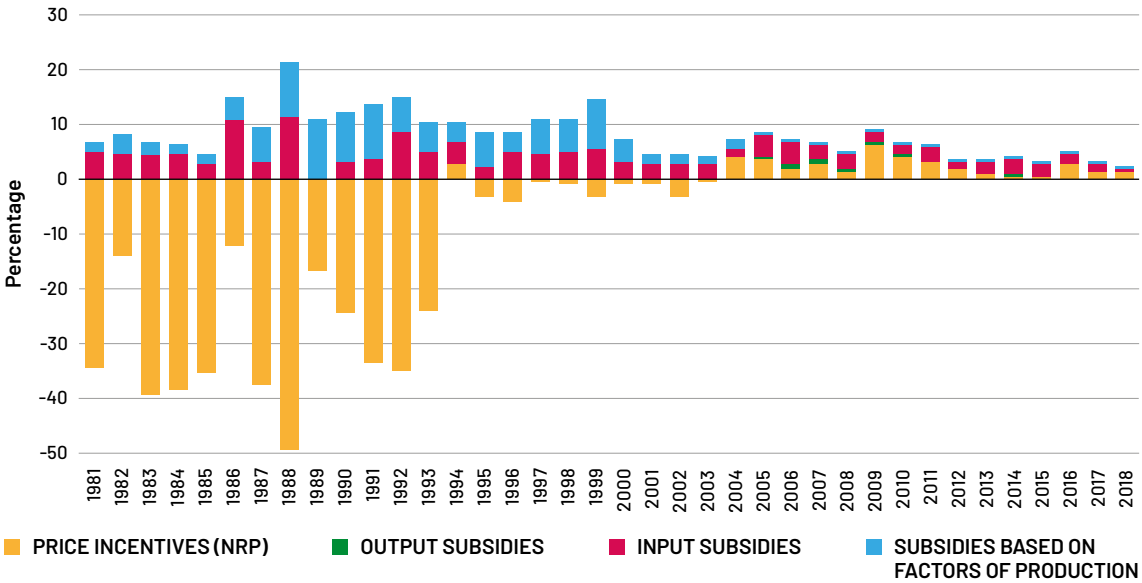
Nominal rate of assistance as a percentage of country production value in China, 1981–2018



Source: Laborde and Mamun, forthcoming.

▶ FIGURE 28

Nominal rate of assistance as a percentage of country production value in Brazil, 1981–2018



Source: Laborde and Mamun, forthcoming.

Momentum is slowing for repurposing efforts

As indicated above, positive trends and repurposing examples have emerged in the last decades, triggered by various factors. These include: multilateral trade agreements, in particular the outcome of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), advocating for the removal of trade distortions at the global scale; growing environmental concern and commitment to reduce GHG emissions and adopt climate-smart farming practices; and structural transformation in various countries shaping a more efficient and liberalised agriculture sector led by private investment. However, reform efforts of some of the world's largest agricultural producing countries seem to have slowed recently. The increase in the most distorting type of support in recent years is proof that the commitment to reform and repurposing is still fragile, and can be easily "compromised". Factors that influence decisions on the extent and type of support provided include international market dynamics (price fluctuations); the erosion of trade agreement commitments; existing power relations that influence decision-making towards creating benefits for selected interest groups; and climate shocks affecting the farming sector and putting production at risk, or shocks affecting economic performance and income, such as the ongoing global pandemic. On the other hand, these same dynamics highlight the importance of implementing effective and efficient support measures that maximize value for money, especially during times of crisis.

4.3 IDENTIFYING THE POSITIVE IMPACTS OF REFORMING AND REPURPOSING AGRICULTURAL PRODUCER SUPPORT

Agricultural producer support measures influence the decisions and actions of various actors in the sector. In order to better assess the extent to which repurposing agricultural producer support can generate positive outcomes, a clear understanding is required of how it will affect the choices (i.e. behaviour) not only of farmers and producers who are closest to this type of support, but also food processors, traders and ultimately consumers who may be indirectly affected by it. This of course implies looking at the socio-economic and environmental outcomes.

It is important to consider vulnerable groups when formulating any new repurposing strategy. A gender perspective, for example, is required when studying the potential outcomes of policy interventions in the agriculture sector. Women are heavily involved in production activities, but are not as involved in making decisions related to what inputs or practices to use, or what crops to grow (FAO, 2020b). Therefore, it is important that the outcomes of repurposing are assessed in relation to the extent to which a gendered perspective is considered when formulating the repurposing strategy. Below we list a broad range of possible positive outcomes from repurposing. This analysis assumes that the role of women is actively taken into account in the formulation of the repurposing strategy (see Section 4.4) to increase policy effectiveness.

In analysing specifically the behaviour of farmers and producers, the following three considerations should be kept in mind:

1. The support provided to farmers and other actors in the food supply chain is one of many factors affecting their behaviour, choices, productivity and revenue. Other factors include market dynamics (e.g. demand and commodity prices); the monopsonistic buying power of a few large players in the sector; natural resource endowment (e.g. soil type, water availability and land productivity); weather conditions (e.g. seasonality of rainfall, climate change impacts and extremes); availability of infrastructure (e.g. roads to reach markets quickly and effectively, food storage facilities); access to production inputs and their affordability (e.g. fertilizers and pesticides, mechanization of production); and knowledge (e.g. of sustainable practices, such as no-tillage agriculture).

2. Repurposing support has to be clearly defined in order to assess how it may affect the choices of food systems actors. Repurposing comprises two key policy actions: a reduction in the funding allocated to certain activities (e.g. environmentally harmful subsidy removal), and the increase of funding allocated to other activities (e.g. incentives for the adoption of sustainable land management practices). In the context of this report, which places sustainable development at the centre of policymaking, a better use of available resources is aimed at simultaneously improving the economic performance of the agriculture sector as well as societal outcomes, via improvements in social and environmental sustainability.
3. Repurposing does not have to be limited to the same amount as the resources becoming available from reforming existing support (e.g. in the context of subsidy reform, repurposing does not necessarily consist in the reallocation of the same amount of the subsidy savings generated by the reform). The amount of funding allocated to repurposing may be higher or lower than the current level of support, depending on the context (IISD and IFRPI, 2020). A repurposing strategy should consider the desired performance of the agriculture sector and its contribution to sustainable development at local level, e.g. via an equitable approach (leaving no one behind, including gender considerations). The strategy should also be in line with national and international targets, the SDGs, and biodiversity conservation and green recovery objectives.

Repurposing policies can have direct effects on choice of production inputs and methods, choice of crops and livestock, and land use. The outcomes of these choices are discussed next, considering direct, indirect and induced outcomes, across the three dimensions of sustainable development.

- **Choice of production inputs:** Repurposed support to sustainable agriculture and farming practices can influence choices related to the purchase and use of production inputs. Examples include the choice of seeds (e.g. climate-resilient seeds); the use of organic fertilizers and biological pest control instead of synthetic fertilizers and pesticides; or the choice of grass and oilseed versus grain for feeding livestock.
- **Choice of production methods:** Depending on the production practices and infrastructure chosen, repurposed agricultural producer support can stimulate the adoption of technology and infrastructure that improves the efficient use of natural resources. For example, farmers may be incentivized to invest in drip irrigation to save water and support the ecosystems their production relies on, or to switch from diesel- to solar-powered water pumps, replacing fossil fuel use with renewable energy. As not all water risks can be addressed by farmers alone, a repurposed agricultural producer support strategy can help address current water constraints that affect productivity and lead to unsustainable exploitation of water resources. This may include a range of options – from entirely rainfed to fully irrigated conditions, to supporting livestock, forestry and fisheries, to interacting with important ecosystems (FAO, 2020d). Agricultural support in the form of investments, information and support to farmers to overcome constraints to the adoption of more sustainable water management practices is key.
- **Choice of crops and livestock:** Repurposed agricultural producer support could influence decisions of what crops to grow (e.g. cassava and cowpeas vs rice) and what livestock to raise (e.g. indigenous animals and/or commercial livestock breeds), based on expected climate impacts (increased resilience, both environmental and economic) or based on nutrition or health considerations (increasing human resilience or improving dietary quality, e.g. by encouraging production of micronutrient-rich varieties or staples commonly consumed by vulnerable populations to minimize the risk of undernutrition, and discouraging production of unhealthy food commodities such as sugar or palm oil). Crop rotations and cover crops could also be encouraged, such as producing cassava and cowpeas instead of monocropping with only rice

(as indicated above), generating stable revenues throughout the year and considerably improving water efficiency and climate resilience.

- **Land use:** a repurposed agricultural producer support strategy aimed at sustainability could stimulate the conservation of highly biodiverse land and the restoration of degraded land for agricultural production, encourage the introduction of agroforestry, or maximize land productivity based on local soil characteristics and climate. Land governance would play an important role, giving farmers the rationale to invest in land they own, or for which they have held the right of use for decades. This approach to land use would stimulate investments and generate benefits for farmers, reducing costs (thanks to the contribution provided by ecosystem services) and increasing revenues (due to higher climate resilience), resulting in improved economic outcomes.

Many positive outcomes can be expected from changes in the type and application of production inputs, crops and livestock and land and water use, across social, economic and environmental indicators. The potential direct and indirect outcomes are outlined below, with associated examples. Even though (as mentioned in Chapter 1) this report focuses on crops and livestock farming, for which land use is essential, one must not forget the importance of water management as part of a repurposing strategy that has sustainability concerns at its centre.

Direct impacts for production include improved land productivity, which could emerge immediately or after a period of time depending on soil conditions and crops grown, leading to increased production accompanied by higher revenues. Improved economic performance may also emerge from reduced costs (e.g. lower reliance on production inputs purchased from third parties, such as fertilizer, water or animal feed) and from improved access to markets that may provide a premium price for sustainable production. Higher market access would be provided through the "levelled playing field" created by the use of sustainable practices, while greater equality would result from the reduced capital intensity of production that often leaves smallholders to play only a marginal role in the sector.

Indirect and induced beneficial (societal) impacts can be derived from the changes in decision-making triggered by repurposing agricultural producer support, as detailed further below.

- A change towards sustainable production inputs and practices can lead to reduced air and water pollution and improved ecosystem conditions and ecosystem services, and hence result in better human health and equity (e.g. increasing access to natural resources for rural communities). Examples are presented in Box 7.
- A move to sustainable agricultural practices through the efficient use of natural resources can reduce competition for natural resources and thus reduce their depletion. At the same time, this can increase equitable access to natural resources, as higher quantities become available, and improve the affordability of production inputs and food due to reduced scarcity and higher levels of local production. Coffee production in Viet Nam (Cassou, 2018), is an example of how a shift to sustainable agricultural practices, supported by credit to farmers, has reaped financial and environmental benefits while protecting livelihoods (Box 8). Several other positive outcomes may emerge, such as improved nutrition and sanitation in the case of water availability. In fact, managing water scarcity is a vehicle through which agricultural producer support may contribute to the efficiency and sustainability of food systems. As noted in Chapter 2, border measures in particular, which relate to international trade in a given country, can affect import and exports flows through the imposition of tariffs, duties, taxes or subsidies. A repurposing strategy may incentivize trade that supports a better management of scarce water resources (Box 8).

▶ **BOX 7**

Promoting sustainable production inputs and practices through policy reform

Environmental Land Management scheme tests and trials, United Kingdom of Great Britain and Northern Ireland (GOV.UK, 2020)

The Environmental Land Management scheme is one of the main pillars of the new agricultural policy in the United Kingdom of Great Britain and Northern Ireland. The scheme, which is founded on the principle of "public money for public goods", aims to achieve the goals of the 25 Year Environment Plan and its commitment to reach net zero emissions by 2050. The scheme allows farmers and other stakeholders to receive economic compensation for delivering public environmental goods such as clean air and water, protection from environmental hazards, conservation and climate change adaptation. The Department for Environment, Food and Rural Affairs started tests in 2018 involving almost 3 000 farmers and other stakeholders.

Reforming fiscal subsidies to support biodiversity (OECD, 2017)

The main goal of the reform of the Swiss Agricultural Policy (AP 2014–2017) was to remove direct payments for intensive livestock farming to meet policy goals, including on biodiversity protection. The reform included transition payments to ease the negative economic impacts on farmers. The reform was developed through consultations with key stakeholders, such as the farmers' union, non-governmental organizations and economic institutions. An impact assessment was performed to estimate the benefits under four scenarios: (a) business-as-usual; (b) implementation of the Federal Council AP 2014–2017 proposal; (c) adaptation of the AP 2014–2017 scenario to meet demands from farmers; and (d) adaptation of the AP 2014–2017 scenario to meet demands from conservation groups. Scenario b was found to produce better results than the business-as-usual scenario across nearly all indicators. For example, incomes would increase by 13 percent, while livestock would decline by 10 percent, decreasing pollution from nitrates and phosphate and GHG emissions. Despite a decline in the total number of livestock, the total calories produced would increase by 3 percent due to higher dairy yields and a shift toward arable farming (i.e. from lower feed imports).

Environmentally Friendly Direct Payment Program in Republic of Korea (Chang-Gill and Soo, 2015)

In 1999, the Government of the Republic of Korea introduced the Environmentally Friendly Direct Payment Program (EFDPP), which offers subsidies in the form of direct payments for farmers to switch to environmentally friendly farming. The main goal of the EFDPP was to tackle environmental degradation by reducing the amount of agrochemicals. The EFDPP compensated farmers for any associated decrease in their income during a three-year transitional period, as well as providing a subsidy for compliance with the programme. Overall, KRW 178 billion (USD 135 million) was spent on the programme from 1999 to 2010, which covered more than 425 000 ha, representing a subsidy of KRW 483 000 (USD 400) per ha on average. Each household received a subsidy of between KRW 500 000 (USD 420) and KRW 600 000 (USD 500).

▶ **BOX 8**

The impact of sustainable food systems on resource use for coffee production in Viet Nam

The majority of the existing coffee growing area in Viet Nam was planted between the 1990s and early 2000s in the Central Highlands. Typically, coffee plantations can generate high yields for approximately 25 years and in 2015, it was estimated that at least one-third of the coffee growing area was in need of renewal (more than 210 000 hectares) in order to maintain productivity. However, financing replanting was difficult for farmers given that they had experienced a decline in yields and lower revenues over a three- to five-year period. The Vietnamese Government, recognizing the financial constraints of farmers and the urgency of supporting greener farming practices to reduce groundwater extraction and the use of fertilizers, established a credit support programme for farmers. Credit was conditional on farmers participating in training sessions on environmentally friendly production methods, as well as on planting on suitable lands. Farmers also gained access to higher quality planting material and to credit for improved irrigation efficiency tools. By the end of 2017, more than 9 000 hectares of farmlands had received support from the programme. Participating farmers experienced an increase of 23 percent of their profits compared to earlier years (Cassou, 2018).

The potential role of trade in managing water scarcity*

A repurposing strategy should aim at maximizing the effectiveness of production, considering both the requirements and availability of production inputs. Water is a key production input for farmers, often determining what crops they grow as well as the revenues they can generate. Trade plays an important role in how effectively water is utilized (FAO, 2020d). In an optimal scenario, water-rich countries would produce and export water-intensive products, while water-scarce countries would prioritize the production of less water-intensive products for domestic consumption. This scenario is formulated using the concept of virtual water, "the volume of water required to produce a food product, which is thus virtually embedded in the product" (Hoekstra, 2003). On the other hand, a similar scenario could be envisaged for trade between countries with higher water productivity and those with lower productivity, with the goal to save water at the regional or global level for other uses (FAO, 2020d). The current amount of "water saved" through trade is about 5 percent of global agricultural water use (Chapagain, Hoekstra and Savenije, 2006; Hoekstra, 2010), but this value could increase if a more systematic and coordinated approach is used worldwide. Currently, regions that alleviate water scarcity through international trade include parts of Asia, Northern Africa, Eastern Africa, Western Africa and Central America (Yano *et al.*, 2016). On the other hand, there are regions that produce and export food grown in areas where aquifers are rapidly being depleted, raising concerns about possible food shortages going forward. China, the Islamic Republic of Iran, Mexico and the United States of America both produce food in, and import food from, areas that may experience water scarcity in the near future (Dalin *et al.*, 2017).

* This subsection of the box draws extensively from FAO (2020d, Box 8).

- A change in the choice of crops can result in multiple benefits. For example, crop diversification (as opposed to monocropping) leads to climate resilience and reduces economic vulnerability, possibly leading to higher income generation, especially in cases where vulnerability to climate

change is high due to flooding, drought, and variable rainy seasons. It also improves food self-sufficiency and dietary diversification, which are linked to improved nutrition, less food waste, and potentially lower costs for households that rely on local production. Box 9 provides examples of how agricultural policy has been used to diversify agriculture in the **European Union** and **Senegal**.

▶ BOX 9
Repurposing agricultural producer support to diversify agriculture

Crop diversification has been incentivized through the reform of the Common Agricultural Policy (CAP) in the **European Union** (Bellmann, 2019; European Commission, 2020). Under Pillar I (of CAP 2014–2020), the European Union introduced direct payments to farmers in exchange for improvements such as growing at least 2–3 crops simultaneously to ensure diversification, keeping permanent grassland area at 2014 levels, and establishing ecological set-asides such as afforested areas. In addition, Pillar II includes voluntary schemes such as organic farming premiums or animal welfare interventions, and encourages diversification by making less profitable activities more economically attractive and hence worth pursuing, in light of their positive (but often intangible) benefits on the environment and society.

Since 2000, **Senegal**'s agricultural policies have been premised on supporting a move from smallholder and family agriculture towards industrial, commercial and competitive agriculture. Price support measures and fiscal subsidies on variable inputs and on-farm capital inputs were revamped following the 2007–2008 world food price crisis, when an input subsidy scheme was reintroduced within the framework of the cereal (mainly rice) self-sufficiency policy (Baborska, forthcoming). In 2014, more ambitious policies for the agriculture sector were introduced under Senegal's new flagship programme, the *Programme d'accélération de la cadence de l'agriculture sénégalaise* (PRACAS). One of its main objectives is to accelerate agricultural diversification away from groundnut production, which then accounted for around 40 percent of cultivated land and had long dominated the rural economy (Heumesser and Kray, 2018).

Key drivers behind this diversification effort were the decline in world demand for groundnuts – a vital product for farmers' incomes and food security in Senegal – which resulted in significant losses for domestic producers and rising concerns over natural resource degradation, such as soil depletion (Kray *et al.*, 2018). The priority commodities for diversification under PRACAS are rice, onions, and off-season fruits and vegetables. The horticultural sector, in particular, has expanded rapidly in the last decade, with Senegal moving into the production of niche products such as tomatoes, butternut, peppers and sweet potatoes, which have become major export products, especially for European markets (World Bank, 2018b). Input subsidies and price interventions remain a key part of Senegal's agriculture policy, but now target a broader spectrum of agricultural crops beyond groundnuts. Budget transfers specific to rice, fruits and vegetables and other cereals, such as maize and millet, have increased significantly in recent years (Baborska, forthcoming). Another strategic axis of PRACAS focuses on knowledge-generating activities, as well as training and extension. Public expenditure on these services, along with those targeting the provision of agricultural infrastructure (such as roads and irrigation) have also increased since 2010, while input subsidies have declined (Baborska, forthcoming). In this sense, the Senegalese experience represents a good practice, whose effects are yet to be fully assessed, of reforming input subsidies and public spending in favour of agricultural production diversification.

- Optimizing land use, in addition to increasing land productivity, can lead to reduced deforestation, improved ecosystem conditions and the provision of ecosystem services (e.g. water provision and water regulation that mitigates the risk of floods) as well as health impacts. Examples from South Africa and China are presented in Box 10.

▶ BOX 10

Sustainable land use practices in South Africa and China

In **South Africa**, the land of the Mgundeni community hosts important ecosystems such as wetlands. Ezemvelo KwaZulu-Natal (EKZNW) and the World Wide Fund for Nature (WWF) have worked with the community since 2005, when the community's land first qualified as a natural reserve, to identify sustainable economic opportunities. The community decided to prioritize responsible livestock farming, resulting in the adoption of grazing management practices that minimize the impacts on local biodiversity. This has fostered the economic prosperity of the community and the long-term protection of their land. The community has also received training on livestock and wetland management, invasive species control activities and advanced grazing programmes (WWF, 2021).
In **China**, the Conversion of Cropland to Forest Program (CCFP) was one of the main reforestation initiatives put in place after the country's severe floods of 1998. The first round of the CCFP ran from 1999 to 2014, with a second round starting in 2014. The programme was implemented between the catchments of the Yangtze and Yellow rivers, targeting lands on slopes higher than 25 °N. Afforestation was expected to reduce the risk posed by soil erosion, desertification and floods. The programme also aimed to alleviate poverty, and became one of the largest rural development programmes in China. The main instrument of the CCFP was a subsidy programme that compensated families for lost income due to the conversion of agricultural land to forest. Surveys indicate that voluntary participation in the programme was higher than 80 percent. By 2014 the programme had led to the reforestation of more than 28 million ha, including more than 9 million ha of cropland and more than 16 million ha of barren land and wasteland. Phase 1 was implemented in 25 provinces, involving 32 million rural households and 124 million people (Zhang *et al.*, 2017), with total investments exceeding USD 50 billion, 88 percent of which was funded by the central government and 12 percent by local governments.

An additional compelling example of the multiple direct and indirect benefits possible through repurposing of agricultural policies is seen in the positive results of Zero Budget Natural Farming in Andhra Pradesh, India (Box 11).

▶ **BOX 11**

Impacts of Zero Budget Natural Farming – Andhra Pradesh, India

In 2016 the Indian state of Andhra Pradesh decided to centre its agricultural and rural development policy on Zero Budget Natural Farming (ZBNF), through a training programme on ZBNF practices offered to the state's 6 million farmers. As an alternative to conventional farming, ZBNF supports the adoption of chemical-free agriculture and requires no external investments, as it is based on traditional farming methods. The initial success of ZBNF has encouraged its uptake by policymakers in other Indian states and at the national level.

ZBNF aims to reduce input costs, preserve ecosystem services and biodiversity on farms, strengthen resilience of crops to climate change, enhance soil fertility and improve incomes (Galab *et al.*, 2019). It is a bottom-up transition strategy where smallholders, including tenant farmers and poor farmers, along with women, are key stakeholders in the process of transition to agro-ecology practices.

The data indicates there are multiple benefits from the adoption of ZBNF. For example, almost 90 percent of surveyed farmers reported an increase in yields and a decline in costs, thereby improving livelihoods. The table below summarizes differences in yields, cost of cultivation and income between ZBNF and non-ZBNF methods across a sample of rainfed crops (678 pairs).

Results also show benefits for biodiversity between ZBNF and non-ZBNF: for example, around 232 earthworms per square meter were found in ZBNF fields, compared with 32 in non-ZBNF fields (Bharucha, Bermejo Mitjans and Pretty, 2020). Anecdotal evidence also indicates enhanced status for women in their communities, as they are able to act as master farmers and transfer knowledge about ZBNF to new farmers and villages (Tripathi *et al.*, 2018).

TABLE A

Key indicators for Zero Budget Natural Farming (ZBNF) versus non-ZBNF methods

	ZBNF COMPARED WITH NON-ZBNF	ZBNF ACTUAL	NON-ZBNF	SIGNIFICANCE
Yields (tonne/ha)	+16.5%	4.80	4.12	$P < 0.001$
Cost of cultivation (INR thousands)	-23.7%	22.9	30.0	$P < 0.0005$
Gross income (INR thousands)	+14.2%	80.6	70.6	$P < 0.001$
Net income (INR thousands)	+50.0%	54.0	36.0	$P < 0.01$

Source: Bharucha, Bermejo Mitjans and Pretty, 2020.

The local government aims to scale up ZBNF to cover all six million farmers and eight million hectares of agricultural land in the state by 2024. It has been assessed that if ZBNF covered 25 percent of the total crop area in Andhra Pradesh, USD 70 million would be saved in fertilizer subsidies every year. If the adoption rate were increased to 75 percent, the savings would exceed USD 200 million annually, while full adoption would result in subsidy savings of USD 300 million per year (Gupta, Saurabh and Hem, 2020).

4.4 HOW DO WE CREATE A REPURPOSING AGRICULTURAL PRODUCER SUPPORT STRATEGY?

Given the many potential benefits of repurposing agricultural producer support, the next problem to solve is how to create a strategy that can generate a paradigm shift. Underpinned by stronger and more effective action on climate change mitigation and adaptation and ecosystem restoration, this paradigm shift would result in increased economic resilience, improved nutrition and human health and greater equity, thus empowering smallholders, tenant farmers, women and marginalized communities. This section presents a step-by-step guide for countries to repurpose agricultural producer support in ways that take into account country differences and the complexity of food systems.

Setting policy objectives

Before an agricultural producer support strategy that is coherent with healthy, sustainable, equitable and efficient food systems can be developed, the overall goals of such systems need to be identified. This process should involve an assessment of the role the agriculture sector plays in local, national and global sustainable development and also a shared understanding of the repercussions these goals have for other sectors and systems. Practically speaking, food systems influence (directly or indirectly) all SDGs and can enable development in many different ways depending on the country context considered (TEEB, 2018).

Below, four overarching and interconnected goals offer guidance in analysing the proposed agricultural repurposing strategy.[72] These goals can help to identify trade-offs emerging from existing agricultural producer support (Gadhok *et al.*, 2020), and place policy coherence at the centre of a repurposing strategy going forward. Later, these trade-offs can be addressed, and policy coherence strengthened, with the use of the six-step process described in the next section.

- **Goal 1: Healthy and affordable diets** – the attainment of affordable healthy diets for all, in line with national, evidence-based dietary recommendations.
- **Goal 2: Social equity** – the creation of equitable food systems that directly provide sustainable livelihoods for farmers and all producers, with improved gender equality, while also benefiting other downstream actors of the food supply chain.
- **Goal 3: Environmental health** – the universal adoption of farming methods that are compatible with available biocapacity and planetary boundaries (i.e. states of planetary processes and systems, such as a stable climate system or biosphere integrity, that provide the conditions for sustainable life on Earth).
- **Goal 4: Economic profitability** – sustainable agriculture that is economically viable (i.e. that makes economic sense when all social costs and benefits have been factored in), with equal opportunities for all economic players in the agri-food value chain (Piñeiro *et al.*, 2020).

As stressed throughout this report, agricultural producer support policies need to recognize the connection between managing food demand and food supply, on one hand, and protecting sufficiently large areas of the planet (e.g. at least 50 percent as stated by Dinerstein *et al.* (2019)) to stabilize the climate and preserve natural resources for Earth's habitability – including access to healthy food and clean water, air and soil – for current and future generations (Dinerstein *et al.*, 2019).

[72] These align with other food systems transformation goals. For example, IFPRI (2021) sets out five food systems transformation goals: health, resilience, efficiency, sustainability and inclusiveness. Walters *et al.* (2016) also set out five general goals that must be addressed by sustainable production systems: supplying human needs, enhancing the environment and natural resource base, increasing efficiency of resource use, improving economic viability of farming, and enhancing quality of life for producers and society.

A six-step guide for repurposing and reforming agricultural producer support

This section provides a six-step guide for decision makers, policy analysts and researchers on the formulation of a strategy for repurposing support to the agriculture sector. The proposed steps are (see Figure 29):

1. Estimate the support already provided.
2. Identify and estimate the impact of the support provided.
3. Design the approach for repurposing agricultural producer support, including identifying needed reforms.
4. Estimate the future impact of the repurposing strategy.
5. Review and refine the repurposing strategy, prior to implementation.
6. Monitor the outcomes of the new agricultural producer support.

The guide starts with the estimation of the support already provided (Step 1) and how it is allocated to the sector (Step 2). The estimation of the support provided is not a trivial task, because support can be direct (i.e. located in the government budget) or indirect (e.g. via foregone tax revenues). Given the various options available to provide support and the heterogeneity of the sector, the estimation of direct support is often based on ten or more budget lines, so there is no single aggregate value being estimated on a regular basis. Moreover, when support is provided in an indirect way it is more complicated to estimate. In fact, there is no accounting being done on a regular basis of the amount of public revenue that is foregone, and so this estimation has to be generated so as to inform the repurposing process.

Step 3 and Step 5 represent the main actions in the formulation, finalization and implementation of the repurposing strategy. In Step 3 the identification of reforms takes place, while in Step 5 the formal adoption of new laws, enactment of regulations and implementation of required changes to institutions is undertaken. The other steps inform the decision-making process, by providing the needed evidence, *ex ante* and *ex post*, for the creation of an effective support strategy.

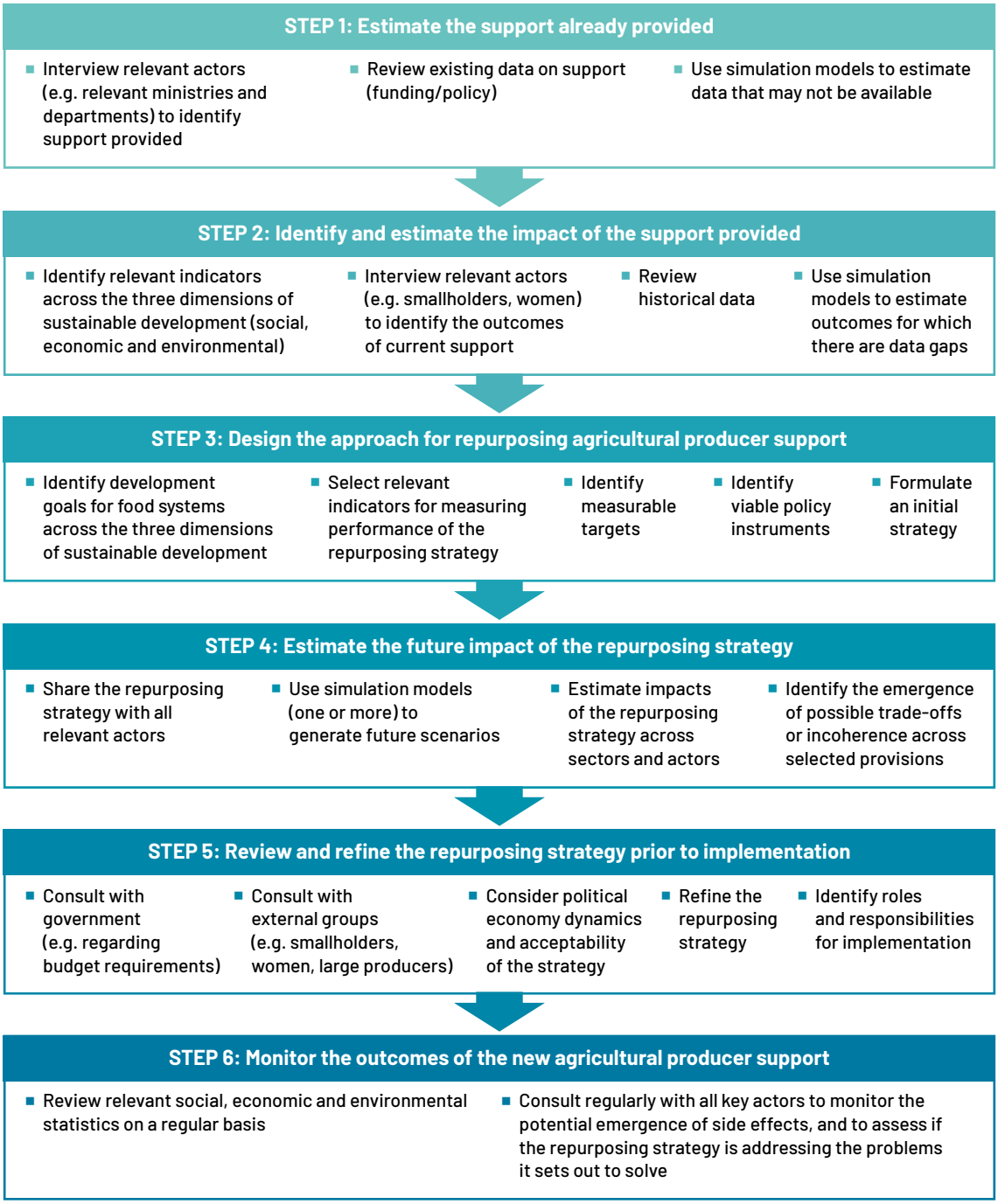
The six steps are described and supported by information on available assessment methods and tools and examples of their application. The process highlights the need for decision-making to be informed by science and data, using a systemic evidence-based approach that considers both traditional and innovative technologies and practices.

However, the design of methods for the implementation of these steps also has to be informed by the peculiarities of the local context. Specifically, the political economy that influences the policymaking process and the challenges and needs faced by different economic actors both require transparent, multistakeholder consultations, paying attention to include those that are normally at the margins of policymaking (e.g. smallholder farmers, women and youth). This is required to ensure that the repurposing strategy is well aligned with the goals of foods systems. With the latter cutting across dimensions of development and affecting all economic actors, the former needs to incorporate the views of all. These aspects should also be taken into consideration when designing a communication strategy and institutional arrangements for repurposing.

It is worth noting that these steps have been designed taking into consideration the information provided in this report along with available literature and experience from related policy processes (e.g. fossil fuel subsidy removal).

▶ **FIGURE 29**

Six steps for repurposing and reforming agricultural producer support



Source: Authors' own elaboration.

Table 10 summarizes the available methods and tools for analysing the six steps for repurposing agricultural producer support. The existing materials referenced (methods and tools) can provide both additional depth to the guide and examples of how it can be customized and adapted to specific country contexts, which can then be drawn upon by policymakers and stakeholders engaged in reform.

▶ TABLE 10

Overview of the steps for repurposing agricultural producer support and available methods/tools

STEP	AVAILABLE METHODS/TOOLS
Step 1: Estimate the support already provided	Data collection, qualitative models for mapping support and outcomes; statistics to measure the support provided (see, for instance, OECD, 2016c; MAFAP, 2015a, 2015b).
Step 2: Identify and estimate the impact of the support provided	Data collection; surveys and consultations with relevant stakeholders; simulation models: sectoral or cross-sectoral, biophysical or macroeconomic; statistics (see, for instance, CBD, 2011; OECD, 2005; IEEP, 2012; UNEP, 2014c; UNECA, 2015; PAGE, 2017; UNSD and TEEB, forthcoming).
Step 3: Design the approach for repurposing agricultural producer support, including identifying needed reforms	Assessment of political economy dynamics (political economy analysis); checklist of indicators for policy formulation; integrated policymaking process (see, for instance, OECD, 2019b; TEEB, 2009; BIOFIN, 2018; UNEP, 2014a).
Step 4: Estimate the future impact of the repurposing strategy	Simulation models: sectoral or cross-sectoral, biophysical or macroeconomic; statistics (see, for instance, CBD, 2011; OECD, 2005; IEEP, 2012; UNEP, 2014b; UNECA, 2015; PAGE, 2017; UNSD and TEEB, forthcoming). Multicriteria analysis (merging qualitative and quantitative indicators) for indicators cannot be quantified with confidence.
Step 5: Review and refine the repurposing strategy, prior to implementation	Surveys and consultations with relevant stakeholders; political economy analysis.
Step 6: Monitor the outcomes of the new agricultural producer support	Data collection; simulation models: sectoral or cross-sectoral, biophysical or macroeconomic; statistics (see, for instance, UNEP, 2012).

Source: Authors' own elaboration.

Step 1: Estimate the support provided

The first step is to estimate the support currently provided to the agriculture sector, including the type of support provided, the economic actor(s) receiving the support and the monetary amount transferred. It therefore includes tasks related to mapping the support provided, identifying all key actors involved in the definition of the existing support strategy and the amount of support they receive.

Several guidance documents and manuals exist to support the estimation of agricultural producer support. One of the most comprehensive is the manual published by the OECD (2016c), which includes a detailed explanation of the indicators available to estimate (i) support to producers, (ii) support to general services for agriculture, (iii) support to consumers, and (iv) total support to agriculture.

The estimation of agricultural producer support may include data collection, or calculations if data are lacking. Specifically, the use of modelled estimates may be required when support is provided in a variety of forms, e.g. via direct transfers, conditional incentives, or as foregone revenue (e.g. tax reductions).

The aggregate estimates of agricultural producer support presented in Chapter 2 build on indicators produced annually by the OECD and other international organizations such as IDB and FAO. Further, Chapter 2 provides estimates of agricultural producer support both at national and global level from the Ag-Incentives initiative, which aggregates estimates of support produced by different international organizations (OECD, FAO, IDB and World Bank) on the basis of a common and consistent methodology, building on the OECD estimates.

Step 2: Identify and estimate the impact of the support provided

The second step is the identification and quantification of the impacts generated by the support provided – using historical data or simulation models. A systemic approach is required to generate information on the desirable and undesirable outcomes of agricultural producer support, and how different economic actors and population groups are being currently impacted (e.g. smallholders, women). This information is needed to design a repurposing strategy that exploits positive synergies and ensures policy coherence (Box 12).

▶ BOX 12

Striving for policy coherence

The difficulty of using single policy instruments to meet multiple goals, as articulated by Tinbergen (1952), is well recognized. The most efficient policies are those that match a policy instrument to a single policy goal. Hence, often the challenge is how to achieve better policy coherence by minimizing trade-offs and maximizing synergies across multiple policy objectives. For example, as shown in Chapter 3, reducing fiscal subsidies results in reduced crop and livestock production. This means positive benefits for climate in terms of reduced GHG emissions; without compensation, however, farmers are left poorer and hence more vulnerable to undernourishment. Oftentimes, subsidies may have positive impacts on some criteria and negative impacts on other criteria. In addition, changes in policies can have important regional implications as production can shift from one area of the world to another, with accompanying impacts on nature, climate, nutrition, health and equity.

The design of policy support measures therefore needs to consider the need to minimize trade-offs through mitigation measures and maximize synergies across a number of dimensions including: (i) time – ensuring short-term positive outcomes do not lead to negative side effects that emerge over time; (ii) equity – ensuring that policy options which may be excellent at supporting specific economic actors (e.g. large producers) do not do so at the expense of others; (iii) intersectoral impacts – having a clear understanding of how agricultural producer support measures may improve productivity, for example through incentivizing the increased use of fertilizers and pesticides, but may also impose externalities in other sectors, e.g. by causing water pollution; (iv) geography – understanding how positive impacts in one location may lead to negative consequences in others (e.g. water extraction upstream for large agriculture developments may result in water scarcity downstream).

As indicated by the OECD (2021b), there is no "silver bullet" that addresses all considerations, and several policy instruments may be needed to act on synergies in the food systems that allow stated multidimensional goals to be achieved.

As indicated earlier (Section 4.2), a systemic assessment includes understanding the outcomes (impacts) for the agriculture sector (e.g. production, employment and value addition) and other sectors (e.g. water, forests, energy and health); economic actors (e.g. private and public sector, citizens), with an emphasis on equity; and dimensions of development (i.e. social, economic and environmental). It would also assess how these outcomes change over time (e.g. in the short, medium and longer term) and spatially (e.g. for different locations and geographical scales).

Chapter 2 identifies the characteristics of agricultural producer support that result in desirable or undesirable outcomes, while Chapter 3 provides estimates of the impacts of agricultural producer support (border measures and fiscal subsidies) on nature, climate, nutrition, health and equity for six generalized scenarios, using a general equilibrium model (MIRAGRODEP).

Several toolkits are available to support the estimation of the many outcomes of agricultural producer support, some of which are focused on specific types of support, such as fiscal subsidies. The Convention on Biological Diversity Technical Series N° 56 provides lessons learned and examples of good practices examples concerning the identification of harmful subsidies (CBD, 2011). A database is also available with several examples (see www.cbd.int/incentives/perverse-info.shtml). The OECD has proposed a checklist approach to identify and evaluate environmentally harmful subsidies in different sectors, one of which is agriculture (OECD, 2005). The Institute for European Environmental Policy's "Biodiversity Harmful Incentives Reform Tool" (IEEP, 2012) outlines a methodology for the identification and analysis of support measures that are harmful to biodiversity. The steps, aimed at identifying whether existing support needs to be reformed or entirely removed, are i) identifying threats to biodiversity, ii) screening of support measures, iii) assessment of the need for reform, and iv) identifying the reform option and opportunities for action. Similarly, the BIOFIN Workbook provides a step-by-step approach to identify and measure the outcomes of agricultural producer support (UNDP, 2018). In the context of nutrition, nutrient profile models could be used to distinguish between healthy and unhealthy food. Additional sector-specific assessments could also be performed (e.g. to estimate impacts on water pollution or carbon sequestration).

Step 3: Design the approach for repurposing agricultural producer support

Having identified the amount of support provided and its impacts on social, economic and environmental indicators, the approach for repurposing support can be formulated. Several intervention options may be required to create an effective strategy for improving the sustainability of the agriculture sector (OECD, 2019b, 2021b).

Creating a repurposing strategy comprises three main phases (see Hall, 1993): 1. first-order change – identify the changes required to existing policies (reform and/or removal); 2. second-order change – identify *new* policies to be implemented (repurposing); and 3. third-order change – determine the structural and institutional change that is required to generate a paradigm shift for the agriculture sector (institutional arrangements to make repurposing effective). This characterization of the design of a repurposing strategy highlights the different processes that need to be affected. While first-order change may be possible without changes in legislation or even budget, second-order changes would require new institutions and laws, and third-order change requires a sector- and/or government-wide reorientation towards multidimensional cross-sectoral sustainability. In Step 3, needed reforms to policies, legislation and institutions are identified.

Of critical importance for the removal of support (first-order change) are timing and trajectory. Timing refers to the extent to which the removal of support should be implemented immediately, in the short term, or over time (e.g. during a period of five or ten years, with a gradual phasing out). Trajectory refers to whether support should be removed in a linear or non-linear fashion or in an incremental way. Both factors are normally affected by considerations related to the policy cycle

and whether there is favourable political momentum to exploit, i.e. whether there is a specific time window, or entry point, for informing an ongoing policymaking process.

Other key factors to be considered when formulating a repurposing strategy are: (i) the amount of resources required to mitigate or offset the negative impacts generated by the existing support (e.g. environmental degradation), (ii) the possible need to compensate economic actors that are most impacted by reforming existing support, and (iii) the amount of resources necessary to create new opportunities and stimulate behavioural change among producers and consumers towards sustainable food systems (see Section 4.3). These three considerations are essential to ensure that the repurposing strategy supports equity, with a focus on marginalized communities, by both addressing the issues created by previous support strategies and by providing new, more sustainable and gender-balanced opportunities to be sought within known and emerging political economy dynamics. As noted in Chapter 2, the way support is financed may also have unintended macroeconomic repercussions, so this also has to be carefully decided.

Several reports provide guidance on the design and implementation of repurposing strategies. The TEEB report for Policy Makers is an example which, with a focus on subsidy reform, provides several guiding questions (TEEB, 2009) to determine (a) whether the support provided is damaging the ecosystem and biodiversity, (b) what support should be the target of reform (e.g. based on its effectiveness, as well as broader social and economic outcomes), (c) what the expected outcomes of a reform scenario are, and (d) whether there is a policy or political opportunity for action. Along the same lines, IEEP provides a decision flowchart for the reform of incentives harmful to biodiversity (IEEP, 2017). Further, BIOFIN provides a template for the information required for decisions related to policy reform in relation to biodiversity (BIOFIN, 2018), which include, as examples, the stakeholder/organization responsible, the amount provided, the motivations for the introduction of the subsidy, observed benefits, and harmful impacts.

Since every geographical area is characterized by its own mix of social, economic, environmental and political dynamics, there is no single approach to repurposing that can be generally applied. This is illustrated in the various examples provided in Box 13 and in Section 4.2.

▶ BOX 13
Building a strategy for repurposing

As of 2020 the CAP has provided support to farmers to implement **European Union** commitments to halt biodiversity loss and to reduce the use of agrochemicals, in line with the European Green Deal targets. In particular, the newly proposed Biodiversity Strategy aims to transform at least 30 percent of European territories and seas into protected areas and to restore at least 10 percent of agricultural land under high-diversity landscape features. This strategy is expected to receive funding of EUR 20 billion per year. Moreover, the Farm to Fork Strategy sets targets to improve food systems in the Europe Union, including a 50 percent reduction in the use of pesticides, a 50 percent reduction in sales of antimicrobials, a 20 percent reduction in the use of fertilizers, and a goal of 25 percent of agricultural land under organic farming (Bellmann, 2019; European Commission, 2020). As of the date of writing this report, the new CAP has not yet been agreed upon, and will not come into force before 2023. Furthermore, the new CAP does not contain binding targets, although the strategic plans are developed with the aspiration of countries achieving the ambitions mentioned above. ▼

▶ BOX 13 (CONT.)

A significant reform of agricultural policies in **China** in 2006 saw a shift from unsustainable trade-distorting price support mechanisms, which had proven costly and had breached WTO limits, to more environmentally friendly instruments. This included support to reduce the use of mineral fertilizers and chemical pesticides, as well as to encourage agricultural businesses to gain international voluntary certifications. The Single Payment Scheme in the **United Kingdom of Great Britain and Northern Ireland**, the main mechanism for decoupling CAP subsidies to farmers after the reform of the CAP in 2003, provides an example of how the trajectory of subsidy removal was tailored to smooth out the impacts of reform and to build buy-in. The Department for Environment, Food and Rural Affairs agreed to a request from the National Farmers' Union for a phased shift from a historical payment to an area-based payment. A seven-year transition period was put in place, including a three-year "safety net" period in the form of Less Favoured Area aid offered to farmers in rural areas.

Step 4: Estimate the future impact of repurposing strategies

Step 4 is similar to Step 2, except that, as historical data are not available on the expected (future) policy impact, only causal pathway exercises and simulation models can be used to forecast the likely outcomes of implementing the newly developed repurposing agricultural producer support strategy. It is important in this context that scenarios for the modelling exercise are co-formulated with all relevant stakeholders, possibly using group model building exercises, and that all results are shared, reviewed and validated with the same stakeholders (Probst and Bassi, 2014; Sánchez, 2018).

As in the case of Step 2, the following dynamics and indicators should be considered: impacts across sectors on production, employment and value addition (with a focus on agriculture but also considering other sectors such as water, forests, energy and health); economic actors (e.g. private and public sector, considering both smallholder farmers and cash farmers, and various population groups, including women and youth); and dimensions of development (i.e. social, economic and environmental). The analysis should also assess how these outcomes change over time (e.g. in the short, medium and longer term) and spatially (e.g. for different locations and geographical scales), and how political economy dynamics may change (or generate policy resistance).

The main purpose of this assessment is to determine whether the agricultural producer support strategy formulated will contribute to all or some of the overarching goals (depending on its focus) of sustainable food systems, while avoiding or mitigating any harmful impacts (see Section 4.3). That is, will the support strategy help the agriculture sector deliver the economic performance and jobs required for economic profitability (Goal 4), while producing food that strengthens human health (Goal 1) in an equitable way (Goal 2), and also creating a mutually beneficial relationship with ecosystems, by supporting or increasing environmental health (Goal 3).

Answering these questions does not only require the use of a systemic, science-based approach. As mentioned earlier and shown in Figure 29, it also requires sharing information with all relevant stakeholders, and consulting them on their expectations for success and failure of the proposed strategy. This allows for combined qualitative and quantitative analyses to refine and finalize the strategy in Step 5.

There are many types of models that could be used to carry out the assessment proposed in Step 4, including qualitative and quantitative models, static and dynamic models, as well as sectoral and integrated models. The choice of approach depends on various factors, such as the presence of existing models, data availability for expanding available models or creating new ones, the extent to which knowledge is available in the country to perform a systemic assessment, and more. Box 14 provides examples of measured impacts of existing policies and modelled results of future policy outcomes (see also example for ZBNF in Andhra Pradesh, India in Box 11).

▶ BOX 14

Estimating the impacts of agricultural repurposing and reform

Different indicators should be forecasted and assessed to determine if the proposed repurposing strategy will simultaneously result in socio-economic and environmental improvements.
Several methods and models may therefore be needed to undertake the assessment. A systemic and multidisciplinary approach is required to ensure that all key dimensions of development, and goals for the agriculture sector, are assessed. The following two example focus on a subset of the indicators of interest – GHG emissions in the European Union, and agricultural production and value added in France. Considerations are made on how these assessments, despite being already multidimensional, could be further expanded to create a more comprehensive and systemic analysis.
To evaluate the impact of reducing fiscal subsidies on GHG emissions in the **European Union**, Himics, Fellmann and Barreiro-Hurle (2020) conducted a simulation experiment using the Common Agricultural Policy Regionalized Impact (CAPRI) model. Results indicate that a budget-neutral reallocation of financial resources towards climate mitigation interventions could lead to a reduction in agricultural non-CO_2 emissions of around 21 percent by 2030, compared to a business-as-usual scenario. This analysis could be coupled with others to further expand the boundaries of the assessment and capture additional investment outcomes, such as on production, income and employment creation.
France is the main agricultural producer in the European Union accounting for 16 percent of total utilized agricultural area, one-fifth of total agricultural production, and employing 8 percent of all agricultural labour. France is also a major global exporter. However, the country's agricultural sector accounts for 20 percent of total GHG emissions in France, versus the 9–10 percent country average found for the European Union. Batini (2019) estimated the impacts of a gradual shift to sustainable land use, improved farming methods and a change in diet toward WHO recommendations. The assessment assumes a gradual elimination of all mineral fertilizers before 2050 and their replacement with organic and integrated agricultural methods; a full shift towards renewables before 2050; a reduction in herd cattle; the expansion of agroforestry production; and a shift towards healthier diets. Results suggest that this transition could quadruple agricultural non-food production, increase value added of the sector by 10 percent, avoid the projected decline in profitability due to climate change, increase agricultural jobs by around 10 percent, and double the stock of agro-ecological infrastructure. The overall economic gain of such a shift is estimated to be between 4 and 9 percent of French GDP per year. The formulation of policy support to realize such a transition would need to consider impacts on the value chain (e.g. those sectors and economic actors that see a net reduction in economic activity, in addition to those that profit from it) as well as on areas of development that are impacted by the agriculture sector in an indirect and induced way, such as nutrition, water quality and quantity, and infrastructure resilience to climate change.

Step 5: Review and refine the repurposing and reform strategy, prior to implementation

Step 5 consists of a systemic review of the proposed strategy and all its provisions, based on stated goals, expected outcomes and consultations with all relevant stakeholders and population groups. The finalization of the strategy has to take into account possible policy resistance (e.g. certain stakeholder groups may oppose policy reform) as well as synergies that could be created across sectors and economic actors (e.g. between the agriculture, health and finance ministries, but also for women and youth, which could increase the efficiency and the effectiveness of support). The implementation of the strategy has to take into account the needed reforms to policies, legislation and institutions identified in Step 3.

The review should result in a refined repurposing strategy, and is carried out before implementation. It builds on the food systems and development planning goals and the modelling results (Step 4), as well as on additional considerations that typically are not included in modelling exercises (e.g. political economy considerations, and institutional capacity to effectively implement the provisions and strategy) that are gathered through steps 1, 2 and 3. Many of these core considerations are elaborated in Section 4.5. Once the review is complete, the repurposing strategy should be approved, turned into law and implemented. This may require modifications to institutions to ensure that the repurposing strategy is implemented effectively, based on implementation arrangements that define roles and responsibilities. Finally, effective implementation cannot occur without a strategic communications plan and a strategy to address vested interests.

OECD (2021b) identifies the main causes of disagreements in policymaking as being related to facts, interests and values; it also recommends which processes can be used to overcome them. In alignment with these recommendations, the steps mentioned above provide a strong foundation for overcoming disagreements, by (i) focusing on the use of a systemic approach that creates a shared understanding of the food systems (including causes for the emergence of issues and opportunities); (ii) stressing the importance of dialogue and transparent communication; (iii) highlighting the need to use a multistakeholder approach; and (iv) proposing an evidence- and science-based approach.

Specifically, this systematic review should make use of all the information developed in steps 1 through 4. The extent to which the proposed strategy addresses key performance indicators across the three dimensions of development – social (e.g. employment, nutrition, health, equity), economic (production and value addition, income generation, fiscal balance) and environmental (e.g. land use and deforestation, air and water pollution, ecosystem restoration) – needs to be assessed. The assessment may alternatively choose to use indicators grouped according to the four main goals of healthy, sustainable, equitable and efficient food systems. Healthy and affordable diets (Goal 1) can be measured with indicators on food production, access and affordability; social equity (Goal 2) can be measured with indicators on employment and income generation for small and large producers, as well as with indicators of access to infrastructure and production practices; environmental health (Goal 3) can be measured with indicators on land use and deforestation, levels of water stress, air and water pollution, ecosystem restoration and habitat quality; and economic profitability (Goal 4), can be measured with indicators on income generation for farmers and value addition for the agriculture sector, as well as fiscal balance for the public sector.

Additionally, cultural aspects and public support for the new support strategy, also in relation to political economy dynamics for other economic actors (both national and international), need to be determined. The assessment of these indicators is critical both to ensure that policy coherence has been fully considered and that the potential emergence of trade-offs is minimized, as well as to support *ex post* monitoring and evaluation (Step 6). Practically, the systemic review supports the finalization of the strategy and specifies the expectations for its implementation. In doing so, it informs the formulation of required institutional changes to avoid reducing the systemic nature

of the repurposing strategy to a series of actions implemented in silo, and highlights the core roles and responsibilities of each actor contributing to the implementation of the repurposing strategy, including the tasks related to communication with all relevant stakeholders.

The Productive Safety Net Programme in **Ethiopia** presents an example of a holistic approach for public support to food systems development (Box 15) that explicitly considers possible policy responses and addresses them proactively.

▶ **BOX 15**

Productive Safety Net Programme in Ethiopia: combining social protection with agricultural development

Most of the transfers targeting food consumers in Ethiopia are carried out through the Productive Safety Net Programme (PSNP), considered the second-largest safety net programme in Africa (after South Africa) and one of the largest in the world (Cochrane and Tamiru, 2016). These subsidies accounted for 7 percent of total government expenditure and 33 percent of expenditures on food and agriculture during 2007–2017 (Pernechele *et al.*, 2021).

Since its inception in 2005, with the objective of achieving sustainable food security for chronic and transitory food-insecure households in rural Ethiopia, the PSNP has provided timely and predictable food and cash transfers to smooth consumption over the lean season, thereby protecting against the sale of assets due to financial distress. A combination of food and cash is provided, often in return for labour on public works programmes. While the PSNP is a social safety net scheme, it also encompasses agriculture and rural development. Through the Household Asset Building Programme, PSNP beneficiaries are provided with employment so that they can achieve sustainable food security and "graduate" from the programme. These complementary interventions include microcredit for buying agricultural inputs, and technical support for productive investments in irrigation, terracing, road rehabilitation, soil fertility and conservation, and livestock fattening. Those unable to supply labour (about 20 percent of beneficiaries) receive an unconditional transfer, known as direct support.

The PSNP has been strongly supported by donors since its launch, although the government is gradually increasing its contribution. The programme has demonstrated the benefits and long-term cost savings of a wide, predictable and sustained safety net scheme that enhances the population's resilience to shocks, rather than relying on ad hoc humanitarian and emergency responses (Endale, Pick and Woldehanna, 2019). In light of its success, social protection schemes in Ethiopia are being scaled up to include more beneficiaries with diverse needs. Since 2017, the PSNP has included urban households among its beneficiaries. The programme's budget also increased in 2015–2016 in response to the worst drought in decades, which affected nearly 10 million Ethiopians (Endale, Pick and Woldehanna, 2019).

Source: Authors' adaptation from Pernechele *et al.* (2021).

Step 6: Monitor the outcomes of the new agricultural producer support

Step 6 is to monitor and evaluate the performance of the agricultural producer support strategy after its implementation and to identify potential areas for improvement. Regular monitoring is needed given the constantly changing landscape for the sector, due to the growing impacts of climate change as well as to international dynamics such as COVID-19.

The monitoring indicators align with the indicators in Step 5 in relation to the assessment of the strategy and its implementation arrangements. This allows the development of a consistent and coherent set of indicators to support each step of the agricultural support repurposing process. Core indicators, as mentioned earlier, cover social, economic and environmental objectives. As stated in Step 5, these can also be grouped to be aligned with the four main goals of healthy, sustainable, equitable and efficient food systems. Examples of indicators worth considering include impacts on land productivity, production, jobs and income for different economic actors (e.g. smallholder farmers) and populations groups (e.g. women and youth); impacts on nature and resulting consequences for health (also impacted by nutrition); knowledge generation for farmers; access to investment, natural resources and quality production inputs; and all dimensions of equity. All four goals of the agricultural producer support strategy require monitoring simultaneously.

In addition, the impact on government finances should be assessed, including determining the extent of savings in public expenditure on account of the agricultural producer support reform and the amount of expenditure that is redirected or in some cases increased as part of the repurposing process, including to other sectors and systems (e.g. health, relief expenditure for climate disasters, or water supply), from which synergies for food systems are very important.

Finally, it is important to estimate, as mentioned earlier, the extent to which the measured outcomes of the new agricultural producer support create synergies with other development planning processes and related investments (e.g. SDGs, Paris Agreement, 30x30 and New Deal for Nature targets), thus highlighting success in creating policy coherence.

4.5 OVERCOMING CHALLENGES

There is no single best strategy to repurpose and reform agricultural producer support, as it is dependent on a range of factors (including culture and values) and country-specific circumstances. Furthermore, repurposing is not an easy task, especially when it requires removing support from a sector or a group of economic actors. It may also raise concerns over profitability and income loss, uncertainty about the future, and the need to adapt to changing work practices for which knowledge may be lacking. The key challenges facing the repurposing of agricultural producer support are discussed below, which should be taken into account by analysts and decision makers throughout the process of policy repurposing and in the implementation of the six steps described above.

Vested interests and resistance to change

There are economic actors, both in the public and private sectors, who see advantages in the status quo (OECD, 2021b). These vested interests can be powerful barriers to change, as they resist accepting their perceived “loss” even though the policy reform benefits many other actors (Pearce and Finck von Finckenstein, 1999; Swinnen, 2018). Virtually all countries will have their own experiences of the power of vested interests in policymaking, but most are linked to institutional and economic conditions that allow unbalanced accumulation of influence in deliberating bodies. In this area, political economy analysis can be a helpful tool in unravelling the complexity of vested interests (OECD, 2021b). As an example, government spending in the United States of America is allocated to protect farmers from possible declines in prices (Bellmann, 2019). In many instances nowadays the agriculture sector has the ability to manage fluctuations of prices and income, suggesting that government support may no longer be required. However, significant reform may not be possible, or easy to implement, for two main reasons. First, powerful commodity groups are interested in maintaining or even increasing government support. Second, the fragmentation of

interest groups, even if in support of policy reform, makes it so that their message is hardly heard (Bellmann, 2019).

Current support tends to benefit a few key and powerful actors, particularly the private sector, while the associated costs and externalities associated with such support are spread widely across consumers and taxpayers (TEEB, 2009). Repurposing aims at changing this outcome. The benefits of agricultural producer support can be effectively accumulated by influential organizations with strong interests in a particular policy, while there is generally fragmentation on the side of consumers and taxpayers, whose interests are less directly tied to the costs and benefits of agricultural producer support. In addition, several ministries and public authorities at regional and local level are often responsible for addressing the negative impacts of agricultural producer support that emerge across, for example, on water quality, nutrition, employment and the economy, while the administration of agricultural producer support benefits is often centralized in a single institution.

In 2019 in **Kyrgyzstan**, the Government allocated 2.3 percent of the budget (USD 43 million) to the agriculture sector, while the import of fertilizers amounted to USD 47 million in 2018. Subsidies provided from the public budget are not always effective in terms of economic growth, poverty reduction and environment. As an example, six out of nine fiscal subsidies in Kyrgyzstan have been found to be harmful to biodiversity.[73] However, misperceptions among stakeholders and the Kyrgyz Government about the impact of these subsidies pose an important obstacle to reform. To overcome this barrier, an interministerial working group has been set up to inform stakeholders and lead the reform process. UNDP-BIOFIN Kyrgyzstan, together with UNEP and the Partnership for Action on Green Economy (PAGE), is currently supporting the reform of harmful fiscal subsidies through engagement with local and national stakeholders (BIOFIN, 2019). Three subsidies are targeted to be repurposed, by which farmers are encouraged to switch to green or organic practices and supporting technologies, thus creating new business and employment opportunities. The three subsidies are (a) irrigation subsidies, (b) value added tax (VAT) exemption on mineral fertilizers and imports of pesticides, and (c) subsidized interest rates for loans to agricultural producers and exporters.

Repurposing agricultural producer support raises concerns about income reduction and affordability, to which individuals, communities and businesses may face challenges in adapting. Understanding the social impacts of the repurposing strategy in the short term is one of the most important and difficult aspects of the policy reform component. While the repurposed strategy will strengthen the business case for new investments in sustainable agriculture practices, the reform of existing support may create downsides for certain economic actors and population groups. Of particular relevance are impacts on smallholders, women and marginalized communities. Well-designed mitigation measures (e.g. social safety nets) can minimize social impacts, with transitional assistance to ease the move towards the creation of new economic opportunities. **Ghana**, for instance, expanded its social welfare programme to cover affected households after reforming subsidies for petrol kerosene, diesel and liquefied petroleum gas. More recently, **Ukraine** simplified social assistance mechanisms and improved targeting to register an additional 5.5 million households into its Housing and Utilities Subsidy programme in 2017, after reforming subsidies to residential gas and district heating (ESMAP, 2017).

Institutional barriers and bureaucracy

Governance institutions can be set up in ways that make coherent and cross-cutting policymaking and implementation difficult. For example, when governments at different levels share responsibilities for policymaking, programmes can work at cross purposes, complicating opportunities for positive

[73] These include VAT exemption on sales of pesticides and mineral fertilizers, and personal income tax exemptions on income from sales of agricultural produce.

outcomes. When different levels of government share responsibility for implementation of national policies, fragmentation and overlap can make it difficult for beneficiaries to access programmes and for policymakers to monitor programme outcomes. For example, in **India**, the complex system of institutions responsible for the design and implementation of agricultural policies represents a significant challenge to domestic support reform. Despite the fact that each state is responsible for different aspects of agricultural management, the central government still holds an important role in defining and implementing policies. In addition, several ministries are involved in different aspects of agricultural policies, creating further fragmentation and overlapping responsibilities. For this reason, a careful assessment of required institutional reforms is proposed in Step 3 of the guide provided above, and the implementation of required changes is included in Step 5.

Transparency and communication can support the creation and implementation of a repurposing strategy

Experience shows that reforms are more effective when pre-announced, implemented gradually and accompanied by public awareness campaigns. Repurposing should be announced at the same time as the reforms, highlighting how resources are being reallocated, possibly resulting in a zero-net revenue (or neutral fiscal balance) outcome for the government. This is well observed in the removal of fossil fuel subsidies in the energy sector, where examples highlight the importance of a collaborative, equitable and gradual subsidy reform approach (Box 16). In support of transparency, in 2006 a financial regulation introduced by the European Union required "adequate *ex post* disclosure" from the beneficiaries of all European Union funds, including agricultural spending transparency that started in 2008 (TEEB, 2009).

The acceptance and effectiveness of a repurposing strategy can depend on the socio-economic context at the time of implementation

From a farmer's perspective, the removal of a subsidy will have a much lower impact when the cost of production is low, or the price of production inputs are falling (e.g. for fertilizers, which are impacted by the price of oil). However, in periods of low economic growth (when prices tend to be low), governments are more likely to develop strategies to stimulate economic activity, and hence these are opportunities to reform support to create fiscal space and repurpose. From a public sector perspective, the most beneficial time for subsidy reform is when prices, and hence pressure on public fiscal resources, are high (e.g. during the period 2006–2008, with the rise in oil prices and subsequent impacts on fertilizer prices). However, reforming subsidies when prices are high would be highly unpopular with farmers without mitigation measures that are targeted and well communicated. This highlights that there is no "best time" for agricultural producer support repurposing and reform if based narrowly on financial/economic drivers; moreover, there needs to be a clear and transparent strategy that communicates the wider benefits (social, environment and economic) to all actors. Box 17 highlights the acute pressures on public expenditure in Africa and opportunities for agricultural producer support to be reformed and repurposed to create synergies with priority sustainable development targets and goals.

Knowledge barriers

Aversion to risk and a lack of knowledge are key reasons why farmers have not adopted climate-smart inputs or practices (Wineman and Jayne, 2017). Understanding why farmers do not adopt or discontinue certain practices is crucial to ethically repurposing and reforming agricultural producer support. The existence of barriers to adoption may call for coordinated complementary policies such as knowledge transfer or income support.

▶ **BOX 16**

Learning from the reform of fossil fuel subsidies

Experiences in Ecuador and France point to the need for transparency and inclusive consultation for reforms to be accepted. In line with an International Monetary Fund (IMF) loan that was conditional on fiscal reforms, the Government of **Ecuador** announced in October 2019 the removal of subsidies on diesel and gasoline as a part of a larger austerity package. Consequently, gasoline prices increased by 25 percent, while diesel prices almost doubled. These price hikes initiated 12 days of violent public protests. Indigenous Peoples from the Amazon and the Andes took a leading role in the protests, as rural areas, where many of them live, were particularly vulnerable to an increase in transportation fuel costs. After negotiations with the Indigenous Nations Confederation mediated by the UN, the government agreed to reinstall fossil fuel subsidies (IISD, 2019). The president also vowed to cooperate with the Indigenous Peoples community to design a more equitable reform package. Similar events happened in **France** at the end of 2018 (Roth and Gerasimchuk, 2018).

Indonesia was able to push through with its fuel subsidy reforms by linking them to a social assistance scheme to mitigate the disproportionate impacts on poor households. In 2014 the Government of Indonesia announced the complete removal of its fuel subsidies, introducing a price-adjustment mechanism that aligned domestic to international prices on a monthly basis; this, however, increased gasoline and diesel prices by more than 30 percent. Since higher fuel prices would have severely impacted vulnerable households, the government launched a social assistance scheme – the Productive Family Programme – which assisted families with young children and/or in need of health assistance. Following the reform of fuel subsidies, the state budget benefitted from savings amounting to more than USD 15.5 billion. Although there was no formal reallocation of those savings, analyses indicate that three areas experienced a major budget increase: (a) regional government and villages (USD 1.6 billion); (b) ministries, health insurance programmes, affordable housing, and clean water access (USD 12 billion); and (c) investments in infrastructure (USD 4.1 billion). Hence, removing fossil fuel subsidies allowed for improvements in social protection programmes while reducing diesel and gasoline consumption by 6 and 9 percent respectively, benefiting the environment and human health (IISD, 2018).

▶ **BOX 17**

Repurposing public expenditure towards sustainable resources management and environmental protection

Africa is extremely vulnerable to climate change due to its high dependence on natural resources and limited adaptation capacity. Land degradation affects 65 percent of Africa's land area, and every year the continent loses about 4 million hectares of forest (FAO, 2020c). Deforestation is mainly caused by the conversion of forest land to agriculture. Without a coherent strategy, the combined effects of natural resource degradation and climate change could hamper the agricultural growth that is needed to feed the continent's rapid growing population. ▼

▶ BOX 17 (CONT.)

In response, African governments have committed to a sustainable pathway to agricultural transformation that invests in, maintains and sustains the ecological infrastructure on which agriculture and livelihoods depend. However, such commitments will only be realized if adequate policies and resources are put in place. It requires a reorienting and scaling up of funding for natural resources preservation, resilience and protection.

A recent FAO analysis on public expenditure on food and agriculture in selected sub-Saharan African countries (Pernechele *et al.*, 2021) found that expenditures on forestry, land management and environmental protection (FLE) have been increasing recently in some of these countries. However, these accounted for more than 10 percent of public expenditures on agriculture in only 4 of the 13 analysed countries, namely Burkina Faso, Burundi, Ghana and Kenya (see Table A).* Nonetheless, the share of the agricultural budget devoted to FLE programmes and projects has increased in about half of the countries studied, mostly in Eastern and Southern Africa, suggesting a refocusing of spending towards natural resources preservation, resilience and protection (see Figure A).

TABLE A

Average public expenditures on forestry, land management and environmental protection by country

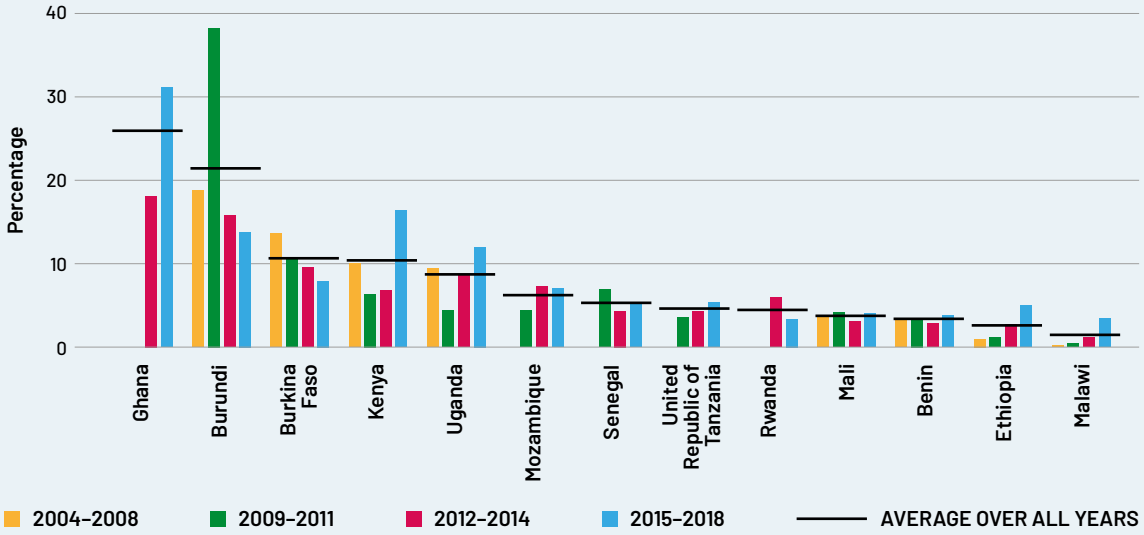
COUNTRY	TIME PERIOD	AVERAGE FLE EXPENDITURE SHARE OF AGRICULTURAL PUBLIC EXPENDITURE	AVERAGE FLE EXPENDITURE SHARE OF TOTAL PUBLIC EXPENDITURE	SOURCE OF FINANCE	
				DOMESTIC	DONOR
Burundi	2005–2017	26%	1.4%	14%	86%
Ghana	2013–2017	24%	0.2%	99.9%	0.1%
Burkina Faso	2006–2016	12%	0.9%	37%	63%
Kenya	2007–2018	12%	0.6%	100%	–
Uganda	2004–2017	9%	0.4%	90%	10%
Mozambique	2009–2017	8%	0.3%	62%	38%
Senegal	2010–2017	6%	0.4%	72%	28%
Rwanda	2012–2018	5%	0.3%	56%	44%
United Republic of Tanzania	2011–2017	5%	0.2%	76%	24%
Mali	2005–2017	4%	0.3%	79%	21%
Ethiopia	2007–2017	4%	0.3%	51%	49%
Benin	2008–2018	3%	0.2%	26%	74%
Malawi	2006–2018	2%	0.2%	71%	29%

Source: Pernechele *et al.*, 2021. ▼

▶ BOX 17 (CONT.)

FIGURE A

Forestry, land management and environmental protection expenditure as share of total spending on food and agriculture



Source: Pernechele *et al.*, 2021.

Ethiopia, Ghana, Kenya, Malawi, Uganda and the United Republic of Tanzania are all part of the African Forest Landscape Restoration Initiative, under which they have pledged to restore millions of hectares of forest land. In addition, land management and forestry concerns feature prominently in the national agriculture strategies and/or plans in most of these countries. For example, FLE expenditure in Malawi increased by over 500 percent between 2012 and 2018, including major investments in rehabilitating forest plantations and land management research. In Ethiopia, the restoration of degraded land and protection of forest resources are central to the country's Climate Resilient Green Economy Strategy, launched in 2011. And in the United Republic of Tanzania, FLE spending decreased as a share of public spending but increased as a share of agriculture-specific expenditure. During 2011–2017, the country adopted several policies to enhance the sustainable management of natural resources in agriculture, including the Agricultural Environment Action Plan (2011–2017) to address land degradation as a result of deforestation and livestock overgrazing, the Revised National Forest Policy (2012) to foster sustainable forest land management and ecosystem conservation, and the Agricultural Climate Resilient Plan (2014–2019), among others.

* These data have two main limitations. First, FLE expenditures were computed from direct support to the food and agriculture sector, which includes expenditures from the ministries of agriculture, livestock, fisheries, forestry, environment, and other agriculture-specific projects. Expenditures focusing purely on natural parks or other environmental transfers unrelated to the agriculture sector are excluded. Second, there is only partial information on donor expenditures in Kenya (2007–2018), Burundi (2011 and 2013) and Mali (2012 and 2017). There were no data on public expenditures carried out by the Ministry of Environment in Rwanda.

Source: Authors' adaptation from Pernechele *et al.* (2021).

4.6 CONCLUSION

Undertaking a successful transition from the current type and level of agricultural producer support to the implementation of a repurposing strategy that favours health, sustainability, equity and efficiency requires coordinated efforts across all stakeholders in a systemic approach. There are encouraging experiences but, as indicated throughout the chapter and confirmed by case studies, success is contingent on the execution of many steps: setting the right goals; considering challenges and untapped opportunities for various economic actors and population groups (e.g. smallholder farmers, youth and women); understanding causes and effects; designing a holistic strategy that addresses the need for changes in policies, laws and institutions; assessing its likely impacts across a variety of indicators and dimensions of development; implementing the strategy effectively (e.g. strengthening capacities, reforming and modernizing institutions, collaborating across ministries and engaging transparently all relevant actors for effective implementation); creating opportunities for investment in more transparent and competitive food systems; designing and implementing clear communication strategies; supporting institutional/governance reforms; and monitoring impacts on an ongoing basis.

As governments develop plans to invest large sums to trigger economic recovery post-COVID-19 pandemic, reforming current support can free up important resources for a more sustainable and effective repurposing strategy, both in ecosystem restoration and in the use of more equitable and sustainable agriculture practices that encourage production of nutritious foods. Repurposing can thus be an enabler of development in the post COVID-19 world, even in country contexts where fiscal deficits have prevented the effective implementation of policies in past years. In addition, given the large distortions caused by existing agricultural producer support, repurposing would allow for increasing policy coherence and better aligning the sector to the SDGs and other development goals. But, being a systematic process that requires following many steps in sequence, repurposing agricultural support takes time, so it needs to be part of the broader strategy to build forward better and transform our food systems.

A member of Mkulima Youth Group inspects the watering system at a farm in Kiambu, Kenya.

5

REPURPOSING AGRICULTURAL SUPPORT: A KEY OPPORTUNITY FOR FOOD SYSTEMS TRANSFORMATION

Current agricultural practices have been key in enabling the production of enough food to feed the world's population. However, these practices demonstrate an inefficient use of scarce natural resources, and are a main contributor to current crises of environmental disruption, biodiversity loss and pollution. Current agricultural practices also do not always lead to diversification towards more nutritious foods, which continue to be costly. As a result, billions of people from all regions of the world are unable to afford healthy diets, and if current food consumption patterns continue, there will be a significant increase in diet-related health costs linked to mortality and diet-related non-communicable diseases (FAO, IFAD, UNICEF, WFP and WHO, 2020 and 2021). While this was true before 2020, the unprecedented shock of the COVID-19 pandemic has laid bare the weaknesses of our food systems that threaten the lives and livelihoods of people around the world, particularly the most vulnerable.

Transitioning to healthier, more sustainable, equitable and efficient agricultural practices is imperative to eradicate hunger, achieve food security and eliminate malnutrition. It is also fundamental to redefining our relationship with nature in ways that reduce the likelihood of future risks from pandemics, conflicts, economic crises, and climate and environmental shocks.

Current agricultural practices exist for a number of reasons, not least the policy choices that have been made to support them. But if these policies are reformed, they can become the driving force to transform food systems and achieve the SDGs by 2030. Hence government's willingness to pursue reforms will play a vital role in influencing the changes required and in ensuring their success. These reforms need to be based on a wide range of consultations involving all food systems actors, in particular smallholder farmers and vulnerable population groups, including women and youth, as well as Indigenous Peoples and local communities.

The international community has acknowledged that transformed food systems are a central factor in achieving a strong, equitable economic recovery for the post-COVID-19 era. This conviction is manifest in the UN Food Systems Summit 2021, which seeks to set out concrete actions that actors all over the world can adopt to support the transformation of the world's food systems. The process of transforming food systems so they become healthier, more sustainable, equitable and efficient has several entry points. This report has focused on one key entry point: namely, rethinking and updating the approach used to support agricultural producers. The upcoming Summit is a critical opportunity to obtain a global commitment to repurpose agricultural support measures that have negatively impacted on nature, climate, nutrition, health and equity.

Because not all the policies that have shaped food systems are necessarily harmful, the process of repurposing agricultural producer support, as well as the reforms this may necessitate, needs to be very carefully designed and implemented to avoid unintended consequences. This report has focused on agricultural support policies that benefit producers, because of all food systems actors, producers have the most direct engagement with nature; and, in fact, they are the main recipients of all agricultural support. The report does acknowledge, however, the importance of other measures, such as subsidies to consumers that may contribute to increasing the affordability of healthy diets. Repurposing agricultural support can also result in producers' decisions that can, for example, increase the diversity and reduce the cost of nutritious foods, which may in turn contribute to changing consumers' behaviour towards healthier and more sustainable dietary patterns. Environmental regulations have not been analysed, but the report recognizes their key role in ensuring that agricultural production, whether intensive or extensive, is sustainable.

"Repurposing" in this report refers to the reduction of agricultural producer support measures that promote certain activities deemed inefficient, unsustainable and/or inequitable, in order to replace them with agricultural producer support measures that promote other activities deemed more sustainable and equitable, and that use scarce resources more efficiently. This implies that agricultural producer support is not eliminated, but reconfigured. In this way, repurposing will always imply policy reforms that drive changes to the formal "rules of the game" – including laws, regulations and institutions – to achieve a transformation towards healthier, more sustainable, equitable and efficient food systems. Changes, within laws, regulations and institutions, will be needed either to fully or partially remove some types of harmful support or to allot fiscal resources to forms of support that will help improve the efficiency, sustainability and equity of food systems.

The chapters of this report have explored and assessed (i) the current scale of agricultural support and the potential economic, social and environmental impacts of its removal; (ii) the benefits and challenges of removing support, to help make the case for repurposing; and (iii) the opportunities that emerge from repurposing inefficient and harmful support. While repurposing and reforming support to expedite a food systems transformation can be challenging, this report, drawing from global evidence as well as country experiences, recommends clear principles and guidance to help governments achieve it. The key findings and actions to take are detailed in the remainder of this final chapter.

5.1
EIGHT KEY FINDINGS AND ASSOCIATED POLICY RECOMMENDATIONS

1. Current agricultural producer support strongly relies on measures that are distorting and harmful for nature, climate, nutrition, health and equity. Considering also that the COVID-19 pandemic has strained public budgets worldwide, an urgent overhaul of agricultural support policies is required to achieve healthier, more sustainable, equitable and efficient food systems

This report has estimated that, worldwide, governments spent nearly USD 540 billion a year on average during 2013–2018 on direct support for individual agricultural producers, which accounts for 15 percent of agricultural production value. Out of this, almost USD 300 billion was provided in the form of price incentives, which are coupled with a specific commodity production. These incentives distort global production and trade and incentivize the production of emission-intensive products (e.g. beef, milk and rice). They may result in an increase in the use of land, fertilizer, water and chemicals, and may hinder availability of and access to more nutritious food for the poorest consumers. Approximately USD 245 billion of agricultural producer support is also provided in the form of fiscal subsidies, most of which (USD 176 billion) are linked to the production of a commodity or to the use of specific inputs (coupled subsidies). This type of subsidy leads to negative social, environmental (e.g. through overuse of agrochemicals and natural resources and the promotion of monoculture) and nutritional outcomes (e.g. by disproportionately fostering production of staples versus fruits and vegetables).

Projecting agricultural producer support into the future under a business-as-usual scenario, it is estimated that it could reach almost USD 1.8 trillion by 2030. Of this, over 70 percent would be provided in the form of border measures (as price incentives), which affect trade and hence domestic market prices. About USD 475 billion would be in the form of fiscal subsidies to agricultural producers.

The COVID-19 pandemic has strained public budgets worldwide. Countries are trying to address the health crisis while reviving their economies with limited resources, particularly low- and middle-income countries that may not have easy access to foreign borrowing sources and/or are struggling with very high levels of public debt. Today more than ever before, governments need to rethink how to make the most efficient use of their limited resources, and in ways that are not only fiscally viable, but also supportive of sustainable development. With this in mind, along with aforementioned challenges presented by current agricultural practices, it appears there is even more pressure to repurpose the agricultural producer support that has negative social, environmental and nutritional outcomes. Such alternative investments can be a driver of economic recovery post-COVID-19 and the transformation of food systems to enhance their sustainability, equity and efficiency while achieving better health outcomes.

2. As a part of a coherent policy package, reforming agricultural producer support offers many opportunities to optimize the use of scarce public resources and avoid the socio-economic and environmental costs of unsustainable food systems

There is a need to shift from distorting and harmful forms of agricultural producer support (such as price incentive measures and coupled subsidies) to support that is well targeted, decoupled from production of a specific crop or livestock, and that incorporates conditions to improve productivity and reduce negative environmental impacts. For instance, this report highlights that emission-intensive commodities (e.g. beef, milk and rice) receive the most support worldwide, despite their negative effects on climate change adaptation and mitigation, and the disincentives

they create towards the production of healthier and more nutritious foods, such as fruits and vegetables. This is especially the case in high-income countries, where consumption of dairy and meat products is the highest. Nonetheless, with population and income growth in developing countries, dietary patterns are changing towards the consumption of dairy and meat products, and the growing demand for these products may prompt governments to support their production.

Governments are allocating only limited expenditure and investment to the provision of public goods and services for agriculture (e.g. infrastructure, R&D, climate adaptation, risk management measures), despite the fact that this is the least distorting and most rewarding form of fiscal support to agriculture. One of the reasons could be that their positive impacts take a long time to materialize compared, for example, to input subsidies. As such, policymakers may be hesitant to increase funding to R&D or infrastructure.

This trend has changed in some countries in recent years, though not at the speed needed and not broadly enough. These investments are aimed at enhancing sector productivity, resilience, equity and sustainability, as well as increasing access to food, and can also contribute to the development and application of environment-friendly technologies that create economies of scale and other efficiencies. For example, increasing smallholder farmers' access to digital advisory services, such as meteorological data, crop cycle advice or digital extension services, can play an important role in limiting the use of harmful inputs, reducing food losses and building increased resilience against climate change.

3. While repurposing agricultural producer support offers a range of benefits, there is no uniform best strategy, as it depends on a range of factors and country-specific circumstances. Hence, policy decisions and associated reforms need to be evidence-based and tailored to country contexts and objectives

The means of agricultural support used by countries varies widely and deciding on which ones mainly depends on the stage of development and agricultural transformation, socio-economic structure, government objectives, and political economy (through which decision-makers must navigate). These factors determine the departure point for repurposing. Thus, country-specific repurposing strategies for agricultural support and the reforms associated with them need to be designed accordingly. However, lessons from the countries spending the most today on agricultural support, which are predominantly high-income countries, provide insights on how price-distorting measures and fiscal support tied to production and input use can have significant implications for nature, climate, nutrition and equity outcomes that, in turn, influence health.

While it is difficult to make general observations that are valid for every country, this report offers an explanation of how different groups of countries have used and adapted agricultural producer support policies. The various impacts support policies have across different country groups (high-income, middle-income and low-income) have also been analysed and discussed.

High-income countries

Many countries in this group heavily supported agriculture in the past, but have since started repurposing their policies, including through various reforms. Enhanced efforts are needed to strengthen this process and accelerate it to support food systems' capability of meeting current challenges. The following is recommended for high-income countries:

- Pursue further reduction of harmful/distorting support by (i) incorporating conditionality mechanisms in subsidies schemes – as allowed by the WTO (see Box 5 in Chapter 2), and (ii) avoiding resorting to distorting measures, even in times of crisis (such as health pandemics and climate shocks).

- Adopt forms of support that are not coupled to production.
- Focus on investment in public goods provision for more balanced and sustainable food systems management and development.
- Make the best use possible of COVID-19 recovery packages to invest in nature-based solutions, sustainable smallholder food production, and preservation and restoration of ecological infrastructure.
- Improve nutritional outcomes of agricultural producer support packages by incentivizing production of the nutritious foods that make up healthy diets.

Middle-income countries

Countries within this group are highly heterogeneous, so there is no one set of recommendations that would apply to all of them. In middle-income countries as a whole, price incentives and other coupled support, especially subsidies on inputs, still account for over 10 percent of agricultural production value. However, within this group, there are countries like Colombia, Indonesia, the Philippines and Turkey who have strongly subsidized agriculture and others, such as Brazil and China, who have already started reforming their agricultural support. For these countries, the above-mentioned recommendations for high-income countries would apply.

There are then other countries, like Argentina, India, Senegal or Ukraine, who have continued to disincentivize farmers by keeping domestic food prices low to protect the poorest consumers. To compensate these farmers – albeit partly – they have provided them with fiscal subsidies that can be very costly for the public purse. This fiscal burden could be released through reforms that put in place direct compensation measures targeting the poorest consumers. Furthermore, taking into account environmental externalities and social dimensions of price disincentives that penalize producers could also result in better reforms and identification of how funds can be best repurposed.

Many of these countries (as is the case also for low-income countries, discussed further below) rely heavily on agriculture and face concerns over poverty and food security. Recommendations for these countries would include the following:

- Address food security and nutrition dimensions/outcomes carefully when designing agricultural support policies (e.g. ensure they are nutrition-sensitive).
- In reducing distorting support, especially on food security crops, design well-targeted subsidies decoupled from production or inputs. Such decoupled subsidies are an option for mitigating the negative effects on farm revenues from the removal of more harmful measures, and for improving the affordability of healthy diets.
- Accompany reforms with tailored social protection schemes. These are imperative for successful reform, and are designed to be compatible with agricultural producer support schemes and with compensation schemes for farmers.

Low-income countries

In the context of low-income countries and the COVID-19-induced economic downturn, repurposing agriculture support is crucial given the fiscal constraints in these countries. In sub-Saharan Africa, for example, expenditure allocation to food and agriculture in several countries is around 6 percent, way below the African Union's 10 percent target that is widely deemed necessary for sustained agricultural GDP growth and for tackling food insecurity and malnutrition (Pernechele *et al.*, 2021). Reallocation of resources in reforming agricultural support is key to unblock the bottlenecks that are holding back the agricultural potential of low-income countries.

Recommendations for low-income countries, in addition to the above-mentioned recommendations for middle-income countries on food security and poverty (where applicable), include the following:

- Narrow the agricultural bias by minimizing the use of distorting policies and supporting a freer trade and market environment. The trend of penalizing the farming sector needs to be reversed, which is especially important for subsectors that are more market-oriented by nature (export crops) and have often the greatest potential to make agricultural businesses more efficient, productive, profitable and sustainable. Protecting poor consumers by keeping domestic food prices low does not account for the fact that some consumers are also smallholder farmers themselves, and thus reinforces farming subsistence practices.
- Ensure coherence across policy instruments that could also improve fiscal efficiency. This requires avoiding costly and inefficient policy mixes. For example, compensating price disincentives with subsidy schemes coupled to production may not be cost-effective. Subsidies on inputs, for example, are often very costly, prone to implementation issues and can severely affect the environment, nutrition and health.
- Prioritize increasing fiscal spending on general sector support. Investing in R&D, technology improvements and infrastructure (to improve access to markets and reduce the cost of the nutritious foods that make up healthy diets) has the largest payoffs in the long term, can drive agricultural transformation, and is an essential ingredient for food security and nutrition. Despite its benefits, general sector support is particularly low in low-income countries where the fiscal purse is limited. Reducing (if not ending entirely) support for coupled subsidies can help generate the fiscal space needed to invest in general sector support.

4. Mitigation measures such as cash transfer schemes are needed to address any short-term negative implications of repurposing agricultural producer support for poor producers, consumers and developing economies

Removal of fiscal subsidies to agricultural producers, in the absence of any sort of compensation for those affected, can lead to a fall in farm incomes and per capita consumption for most food groups. This may push a portion of the population in developing countries into extreme poverty, with adverse effects on the prevalence of undernourishment (PoU). Switching to consumer subsidies on the one hand (that can at the same time enable better access to nutritious foods), accompanied by well-tailored social protection schemes on the other hand, could improve affordability of and preference for healthy diets in the poorest countries. The removal of subsidies has a proportionately larger impact in developing countries in terms of income, poverty and PoU, due to the larger size of the agriculture sector relative to the national economy, the lower level of agricultural support and the larger share of the population in low-income levels. Appropriate mitigation measures, including well-targeted compensation measures such as direct cash transfers, are therefore important elements to take into consideration when designing repurposing strategies. There is a vast pool of experiences and lessons learned from the reform of other environmentally harmful subsidies (such as fossil fuel subsidies) to inform the design and implementation of mitigation measures that could contribute to successful repurposing processes.

Fiscal subsidies can thus be repurposed to protect consumers and ensure food security, through targeted subsidies and social protection mechanisms that ensure access to nutritious food and affordability of healthy diets, especially in low-income countries. This could also cushion the impact of price increases stemming from the reduction in those agricultural producer support measures deemed harmful. In general, the analysis in this report shows that direct payments (cash transfers) are the most effective way of boosting incomes in the short term; thus, in order to

mitigate impacts, direct payments targeting poor and low-income households should be adopted, using the fiscal savings from the repurposing of other resources.

5. Any strategy to repurpose agricultural producer support must recognize smallholder farmers, many of which are women, as they make a significant contribution to addressing food security and are key agents for a successful shift to healthier, more sustainable, equitable and efficient food systems

Within the agriculture sector, small farms account for 84 percent of all farms worldwide, and although they operate only around 12 percent of all agricultural land, they produce roughly 35 percent of the world's food (Lowder, Sánchez and Bertini, 2021) and support about 2 billion people in developing countries (EIU, 2018). Small farms are also vital for food access for communities (Herrero *et al.*, 2017). They are found to be more productive per acre than large farms, better for spurring surrounding economic growth, and better for ecosystems and biodiversity conservation. Out of the 17 SDGs, at least ten (SDGs 1, 2, 3, 5, 8, 10, 11, 12, 13 and 15) are directly linked to the growth and development of small farms (Abraham and Pingali, 2020). Furthermore, women, who make up a substantial portion of smallholder farmers, play a vital role in the production of the food consumed locally, making small farms central for poverty reduction, gender equality and the empowerment of women in rural areas. Globally, women comprise over 37 percent of the world's rural agricultural workforce, a ratio that rises to 48 percent for low-income countries, and their contribution is prominent in all agricultural subsectors (FAO, 2020b). Yet, agricultural producer support measures are often not directed towards areas that can strengthen smallholders' capacities and networks or enhance their role in aiding food systems transformation.

Evidence also indicates that input subsidies mainly reach better-off farmers, and therefore need to be effectively targeted at subsistence, smallholder and family farmers who lack the resources to independently buy certain inputs that could lead to productivity improvements and to better adaptive capacity. Similarly, farm programme payments are often tied to production, benefitting the farms with the largest production capacity. To address equity concerns, it is important to decouple such farm programme payments from production, commodities and yields. Repurposing fertilizer subsidies, for instance, towards nature-based solutions employed by smallholder farmers, or creating backyard nutrition gardens for smallholders can reduce risk of future zoonotic diseases, improve the well-being of those most vulnerable to biodiversity loss, and increase resilience capacities of rural areas overall.

In many countries where food systems, in addition to providing food, drive the rural economy, it is important to consider the impact of shifting to healthy diet patterns in terms of the livelihoods of smallholder farmers and the rural poor as well. In these cases, care must be taken to mitigate the negative impact on incomes and livelihoods as food systems transform to deliver affordable healthy diets (FAO, IFAD, UNICEF, WFP and WHO, 2020).

6. Food systems are complex and interlinked across countries through the global market. Repurposing agricultural producer support requires policy coherence across all elements of food systems in order to minimize trade-offs and capitalize on the opportunities to achieve the SDGs and related agriculture sector objectives

As an example of the complex interconnections between food systems, the model-based scenario analysis in this report shows that eliminating border measures globally is projected to reduce GHG emissions by 55.7 million tonnes CO_2 e. Therefore, reducing price incentives and output

subsidies, especially in the more developed economies, should be the priority. However, the possible relocation of production from developed to developing countries – assuming that all countries undertake reforms of such support – could result in an increase of emissions intensity.

Another example of the global complexity of food systems is the projected increase in chemical input use per hectare if border measures alone are removed. This is due to the increase of crop production in large exporting countries as market access improves. The analysis in Chapter 3 indicates that both border measures and fiscal subsidies should be removed to reduce chemical input use.

Policy coherence requires thinking at multiple levels (local to global), efforts to reform all parts of integrated food systems, and integrated assessments of agricultural support policies. At the national level, for reforms of agricultural support to be effective and to enable a systemic shift in food systems, it is crucial to build an understanding of possible synergies and trade-offs with other policy areas as well as identify complementary changes needed in terms of land use, trade policies and other related areas.

7. Political economy decisions are central to the design of effective agricultural support policies that underpin transformation towards healthier, more sustainable, equitable and efficient food systems

While there are economic, social and environmental benefits to be gained from repurposing agricultural support, there will inevitably be winners and losers, which can present a dilemma for policymakers. Under pressure from specific interest groups, they may opt to provide support to some groups using types of measures that lead to unsustainable practices and unhealthy consumption patterns. Policymakers may also be hesitant to increase expenditures on public goods, such as R&D or infrastructure, since the effects and benefits of these investments take a long time to materialize.

In reforming policies for repurposing, attention needs to be paid to how negative short-term impacts and trade-offs can be mitigated, especially for vulnerable groups. As noted earlier, where appropriate, specific compensatory measures should be considered for those who face higher costs, or even unemployment, as a result of reform measures. At the same time, reforms should make the most of potential synergies; for example, supporting farmers to diversify into the sustainable production of more nutritious foods will have a greater payoff if combined with support measures that encourage consumers to buy these foods.

The most effective way to address the decision-making dilemma in repurposing agricultural support is through a transparent, multistakeholder, customized and systemic approach, where all food systems actors, especially the most disadvantaged, are duly represented. Transparency and inclusive consultations are critical to address institutional bottlenecks and vested interests that could hinder and affect the credibility of repurposing strategies and the reforms that facilitate them. Any agricultural support repurposing strategy will raise concerns about income reduction, food affordability and the use of taxpayer resources, and is likely to be opposed by farmers and other stakeholders benefiting from the current system. It is therefore important to communicate, based on evidence, that repurposing agricultural support is not about taking away support from farmers, but about reconfiguring support such that it rewards good practices rather than perpetuating practices that threaten the stability and sustainability of food systems and the welfare of farmers.

8. While a few countries have started repurposing agricultural producer support, broader, deeper and faster reforms are needed to ensure this process can effectively support the transition to healthier, more sustainable, equitable and efficient food systems

Positive examples of repurposing and reforming agricultural support have emerged in the last decade, which have been noted in this report. Recent trends suggest that the levels of price incentives are declining, investments in general services for agriculture are on the rise in some countries, and it is becoming more common to include environmental considerations in the design of subsidies. Still, it is essential to increase momentum on these recent trends (which have stalled in recent years in some countries) and take advantage of COVID-19 recovery packages to promote greener, climate-smart support to the sector that is inclusive of all actors, including smallholder farmers as well as different groups such as Indigenous Peoples, women and youth.

5.2 THE WAY FORWARD, FROM A UNIQUE JUNCTURE

The transformation to healthier, more sustainable, equitable and efficient food systems needs to be accelerated if we are to meet the SDGs, but tools are at the disposal of policymakers and all relevant actors to make it possible. This report has argued that rethinking and updating the approach used to support agriculture, the backbone of food systems, is fundamental. As one of the first steps to transform food systems, strong political will needs to be demonstrated to mobilize efforts to address the increasing levels of agricultural producer support that is distorting and harmful to nature, climate, nutrition, health and equity.

This section outlines the immediate and longer-term actions needed by the diverse set of actors involved in the development of agricultural support policies to reduce or eliminate distorting and harmful forms of support, and replace them with policies that will catalyse the needed food systems transformation.

1. In the immediate term, there are several high-profile global events that can be leveraged to drive home the urgency of repurposing of agricultural support as a means of achieving healthier, more sustainable, equitable and efficient food systems

Of paramount importance is the UN Food Systems Summit in September 2021, which presents the opportunity for countries to commit to reforms that address harmful support policies. This would be an important step towards meeting each of the objectives under the five Action Tracks of the Summit, through positive impacts on the farm sector, nature, climate, nutrition, health and equity.[74] In particular, agricultural support features prominently within the solution clusters of Action Track 3 (nature-positive production). This report clearly sets out the case of why and how agricultural support should be repurposed, which can help advance discussions during and beyond the Summit. Indeed, this report provides useful evidence on the impacts of agricultural support through various reforms, the updated estimates of agricultural producer support with a larger country coverage to complement recent reports (e.g. OECD, 2021b); and its discussion of how best to reformulate support and mitigate the adverse trade-offs. This can be used to advocate for reform and repurposing in association with coalitions of stakeholders.

[74] Action Tracks: 1. Ensure access to safe and nutritious food for all; 2. Shift to sustainable consumption patterns; 3. Boost nature-positive production; 4. Advance equitable livelihoods; 5. Build resilience to vulnerabilities, shocks and stress.

The post-2020 global Biodiversity Framework, to be discussed at the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP15) in October 2021, will include efforts to eliminate incentives harmful to biodiversity. Target 17 of the framework aims to "redirect, repurpose, reform or eliminate incentives harmful for biodiversity, including reduction in the most harmful subsidies, ensuring that incentives, including public and private economic and regulatory incentives, are either positive or neutral for biodiversity" by 2030 (UNEP, 2020d). The findings of this report on the impacts of agricultural producer support on nature and biodiversity, and its guidance on how to repurpose such support, provide concrete steps for the committed countries to deliver Target 17.[75]

The Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26) summit in November 2021 will bring parties together to accelerate action on the Paris Agreement. On the topic of sustainable agriculture, the Convention aims to build on the foundations laid at the 2019 UN Climate Action Summit, by "working with governments, businesses and civic organisations to raise ambition on tackling the drivers of climate change and biodiversity loss, mobilize financing to protect and restore critical ecosystems, and kick-start a just rural transition towards sustainable land use to benefit people, climate and nature". In advance of the summit, several countries and organizations have signalled their commitment to strong action to countering climate change and biodiversity loss by signing the Leaders Pledge for Nature, which includes a commitment to reform economic sectors by "eliminating or repurposing subsidies and other incentives that are harmful to nature, biodiversity and climate while increasing significantly the incentives with positive or neutral impact for biodiversity across all productive sectors" (Leaders' Pledge for Nature, 2020). By providing concrete evidence on climate impacts of agricultural producer support at the commodity and input levels, and by directing countries to eliminate public spending that is not climate friendly, the evidence and recommendations of this report can inform countries on sound ways to deliver their commitments on repurposing support towards measures that benefit nature.

In the run-up to these key upcoming events, governments will be holding independent dialogues and discussions related to food systems, biodiversity and climate change. From these discussions, a commitment needs to be cemented to account for environmental, social, nutrition and health impacts in rethinking and redesigning agricultural support. This requires political will at the highest level and commitment to reassess COVID-19 recovery plans and packages to ensure support delivers affordable healthy diets for all and is grounded in nature-positive and equitable outcomes. Attention must be paid to country experiences of sustainable agriculture reform achieved through bottom-up and participatory approaches that have included women farmers, Indigenous Peoples, local communities and youth. This is needed to concretely integrate the views and needs of these groups into the dialogues and action pathways that are being developed in preparation for the UN Food Systems Summit 2021 and COPs.

[75] Ahead of the Convention, governments and other key stakeholders have been invited to develop biodiversity commitments that contribute to the framework and to the Sharm El-Sheikh to Beijing Action Agenda for Nature and People. As of May 2021, 182 commitments had been made, including 21 by government bodies, such as an initiative by Mexico and Colombia to measure the connectivity and contribution of protected areas towards mitigating biodiversity loss from land use change.

2. In the short term, a global effort is needed to repurpose agricultural support in ways that act as incentives across food systems to specifically achieve the SDGs and deliver on other global commitments

With less than ten years to go, stakeholders across global food systems need to advance the speed and scale of transition in order to deliver the promises set out in the 2030 Agenda for Sustainable Development. In the coming months and years, the decisions and commitments made about transitioning to sustainable and more equitable food systems will either support or hinder progress towards at least 12 of the 17 SDGs (UNEP, 2016).[76] For instance, SDG Target 2.4 sets out to "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" which is critical to end hunger, achieve food security and eradicate all forms of malnutrition. This report has shown that repurposing support will be essential in setting the incentives across food systems that will encourage producers to meet this goal; however, action will be needed in the short term if such ambitious objectives are to be met.

Beginning this year, the UN Decade on Ecosystem Restoration (2021–2030) also provides a platform to accelerate reforms to agricultural policies and support which can prevent, halt and reverse the degradation of land-based ecosystems. Farmlands cover one-third of the Earth's land surface, and human well-being relies on their sustainable use and management. As discussed in this report, repurposed support policies can incentivize producers to avoid or reduce certain practices (e.g. intensive ploughing, overgrazing) and the use of some inputs (e.g. fertilizers and pesticides) which can damage soils, and to adopt regenerative agricultural practices instead. In addition, current agricultural support policies play a significant role in driving deforestation in various ways, for instance by promoting expansion through input- or output-based subsidies (World Bank, 2021). Crucially, this report has also shown that, if well designed, repurposing certain types of support (border measures, coupled subsidies) can lead to ending or reducing these practices.

Furthermore, this report can contribute to inform new actions and commitments within the second half of the UN Decade of Action on Nutrition (2016–2025), as it has identified ways of repurposing support to yield positive nutrition outcomes. Given the fiscal constraints facing governments in the wake of the COVID-19 pandemic, redirecting public finances towards healthier, more sustainable, equitable and efficient food systems is a relatively low-cost way of meeting the primary objective of the Nutrition Decade – notably, to increase nutrition investments and implement policies and programmes to improve food security and nutrition (UN, no date).

3. In the short term at the country level, efforts are needed to better understand the impacts of current agricultural support, which is key to designing repurposing strategies, especially the phasing out of the most distorting and damaging policies for nature, climate, nutrition, health and equity

At the country level, a repurposing strategy that puts sustainable development at its core should be developed, following the six-step guide in this report: (i) estimating the existing support provided; (ii) identifying and estimating the impact of the support provided; (iii) designing the approach for repurposing agricultural producer support, including identifying needed reforms; (iv) estimating the future impact of the repurposing strategy; (v) reviewing and refining the repurposing strategy, prior to implementation; and (vi) monitoring the outcomes of the new agricultural producer

[76] Including, for example, No poverty (SDG 1), Zero hunger (SDG 2), Good health and well-being (SDG 3), Gender equality (SDG 5), Clean water and sanitation (SDG 6), Decent work and economic growth (SDG 8), Responsible consumption and production (SDG 12), Climate action (SDG 13) and Life on land (SDG 15).

support. This will however require developing data and analysis based on in-depth country work to understand conflicting interests within countries and how these can be addressed and managed to progress with the necessary reforms.

In supporting countries' efforts to repurpose agricultural support, UN Resident Coordinator offices coordinating with relevant UN agencies with technical expertise and development partners could play a key role in the following: undertaking necessary analyses; developing reform, repurposing and communication strategies; and engaging with stakeholders. There are also several UN-led initiatives which could serve as vehicles to support such reform at the country level. BIOFIN, for instance, has carried out initial mapping in 30 countries in 2014–2019 and is now working across 27 developing countries to generate key data and analysis on how incentives and policy instruments are having harmful impacts on biodiversity; this will allow them to create practical action plans on how to rethink and redesign these policies for governments (UNDP, 2021). The Partnership for Action on Green Economy (PAGE),[77] in close cooperation with UN Resident Coordinator offices, is also providing support to 30 countries for their economic transformation and recovery plans to ensure that public finance is aligned with sustainability.

4. In the short term, greater collaboration and cooperation across government, research institutions, non-governmental organizations and the private sector is also needed at the country level, in order to promote collaborative research that provides evidence for decision-making and stakeholder engagement

Currently, institutions or government bodies typically work with specific key performance indicators. That is to say, generally, they do not look after various cross-sectoral and multi-thematic indicators of performance for a whole system (or country).[78] In line with this, research on current agriculture support and the pros and cons of alternative repurposing and reform strategies seems often to be carried out without coordination with other ministries or public institutions, making the potential advantages of these strategies invisible to decision makers and relevant stakeholders. There is a need for countries to continue to build institutional capacity for collaborative work and systemic analysis, and to increase the number and capacity of institutions coordinating work on agricultural policymaking.

To achieve policy coherence at the national level, it is crucial to develop an understanding of possible synergies and trade-offs in other policy areas. Given the cross-cutting impacts of agricultural support, institutional arrangements such as an interministerial committee led by agricultural ministries together with environment ministries could be created to facilitate close policy coordination among all relevant ministries, including finance and planning, health, energy, education and trade, among others. Trade-offs may also be assessed or resolved through regulatory impact assessments and stakeholder consultations. In particular, the views and participation of smallholder farmers and other vulnerable groups (e.g. women, youth, Indigenous Peoples) would be important to develop bottom-up and coherent approaches across sectors.

Furthermore, collaboration and cooperation across ministries could be improved through green performance-based budget allocation processes. This could include development of common green metrics (reflecting for example SDGs, biodiversity and climate targets) against which government

[77] PAGE is a partnership of five UN agencies – UNEP, UNDP, International Labour Organization, UN Industrial Development Organization, and UN Institute for Training and Research – that support an economic transformation for sustainability at the country level.

[78] The SDGs are a case in point, where typically an individual ministry monitors a few indicators of its own, which is most likely to lead to sector plans that reinforce a silo approach – despite the SDGs being designed as an integrated, holistic framework.

performance should be measured. The development of a green public finance framework which allows countries to track consistent and sustainable public spending, including for sustainable agricultural production and food systems, could also help improve the efficiency of government spending in this area. This could encourage governments to create incentives for state-level action towards healthier, more sustainable, equitable and efficient food systems and lead to more coordination on the redirection of public financing.

5. Over the short to medium term, key data, research and knowledge gaps need to be bridged, in collaboration with relevant international organizations, including UN agencies and research think tanks, to support the development of country-level repurposing strategies

Among others, the following actions would be vital to advance the repurposing agenda at the global level and support countries to repurpose agricultural support:

- Promote the adoption of a set of consistent definitions that are internationally agreed to allow precise measurement of agricultural support for both producers and consumers. This includes more robust analysis and recommendations on what policies best support a transformation towards healthier, more sustainable, equitable and efficient food systems.
- Strengthen the database developed by the Consortium for Measuring the Policy Environment for Agriculture (or Ag-Incentives Consortium) by:
  - closing the data gap on policy support estimates including consumer subsidies, subsidies targeting climate-smart practices, natural resource conservation and resilience as well as transfers/expenditure on general sector services, with a detailed breakdown by type of service to have a better picture of the public expenditures and investments that are the most conducive to food systems transformation;
  - expanding the country coverage of policy support estimates, in particular for significant players such as Thailand and North African countries, which have a specific profile of policy support as well as regional food systems challenges.

- Develop the evidence base on the impacts of agricultural support, including:
  - the socio-economic impacts of support policies on agriculture and related sectors (e.g. energy, water, marine and inland fisheries) and the wider macroeconomic effects;
  - the impacts on vulnerable population groups whose livelihoods depend on agriculture, like women, youth and Indigenous Peoples. This initially requires data development, potentially through special modules in household and agricultural surveys through which these groups can express their existing support (or need) and their rationale for more support;
  - the positive and negative externalities generated by agricultural support. This requires developing an evidence base on negative/positive flows and stock losses/gains in terms of capital (natural, physical, human and social) to inform the design of positive support measures. The adoption of the UN System of Environmental-Economic Accounting (SEEA) can be considered to make the value of nature explicit;
  - the effects of agricultural support for specific subsectors on relative prices of foods and consumption choices across diets and other subsectors. This is important to ensure that incentives to increase production of more nutritious foods effectively translate into lower prices for consumers and make healthy diets affordable.

- Develop simulation models (at local, country and global level) that are systemic, and bridge the gap between fiscal concerns and biophysical impacts for production activities and their outcomes (e.g. water scarcity, pollution), with results and scenarios validated with key stakeholders, particularly policymakers.
- Assess agriculture support policies for the marine and inland fisheries sector (not addressed in this report) and identify opportunities for repurposing that take into account effects on biodiversity, climate change, nutrition, health and equity in coastal communities and Small Island Developing States. This includes assessing the impact of support to the land-based agriculture sector on marine ecosystems, fisheries and oceans, and subsequently developing the evidence base.
- Develop additional specific guidance and knowledge products so that both policymakers and stakeholders can understand concepts, datasets and evidences (including through case studies) to support informed decision-making. In this regard, establishing virtual learning platforms will be important and, in the medium term, integrating these concepts into curricula of academic and civil service training institutes will be key.

6. In the medium term, the international community, including the WTO and other trade forums, can play an important role in supporting countries to pursue further reductions in distorting trade measures and coupled subsidies, which account for a significant part of overall agricultural support

The COVID-19 crisis had unprecedented effects on agricultural value chains and the global trading system. Many countries adopted policies to curb potentially adverse effects on their domestic markets, including export restrictions, lowering of import barriers and domestic measures to ensure stability of production, such as income support provisions or input subsidies to farmers. Luckily, most of the trade restriction measures that could have exacerbated market instability and price increases were short-lived (FAO, 2021a). The international community played an important role in limiting the use of these measures during the pandemic. Through several joint ministerial declarations and statements, many countries made non-binding commitments to refrain from using trade restrictions (FAO, 2021a).

Within the context of the WTO Agreement on Agriculture and subsequent negotiations, the Committee on Agriculture at its Special Session will be an important vehicle for pursuing the reform of border measures and fiscal subsidies within the agriculture sector. Subsidies (or support) to agriculture, as defined by the WTO, are subject to rules with different policy instruments classified on the basis of how much they distort trade (see Box 5 in Chapter 2). Countries must limit support to Amber Box measures that include support coupled to production, while Green Box measures, including decoupled subsidies and support for the provision of public goods and general sector services, are exempt from ceiling commitments. We have seen in this report that most of the current producer support measures are coupled to production and are trade-distorting, as well as being harmful to nature, climate, the farm sector and, ultimately, human health.

The WTO can therefore play a core role in coordinating members to update agricultural trade rules to ensure they support the transition to sustainable food systems.[79] For example, a key target under SDG 2 is Target 2b, which aims to "[c]orrect and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of

[79] Encouragingly, the WTO Director General, Ngozi Okonjo-Iweal, has recently stated her ambition to "look at subsidies across the board" and see how "from all perspectives we are creating a level playing field", as well as noting that "with facts on the table, including the negative spill-overs of industrial subsidies", there may be further scope for discussion (Blenkinsop, 2021).

agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round". With regard to export competition, during the 10th WTO Ministerial Conference held in Nairobi, Kenya in 2015 (WTO, 2015), members agreed on a decision that foresees the elimination of export subsidies in different time frames for developed and developing countries.[80] However, several developing country members have yet to implement the decision, and recent proposals have called on them to ensure that the commitment to eliminate export subsidies is reflected in their WTO schedules of commitments no later than December 2021.

Beyond the elimination of export subsidies, to achieve the overall objective of correcting and preventing trade restrictions and distortions, countries will need to take a broader approach to indicators of progress, including a wider range of measures that affect agricultural trade and markets in global agricultural and food systems. Currently, only trade distortions are disciplined within the WTO Agreement on Agriculture, even within the narrowly limited area of policy impacts. Therefore, there is more work to be done to identify and reform policies that currently sit within the Amber Box. Moreover, there continues to be an unsolved debate with regard to the types of domestic support (subsidies and other support programmes) that should be deemed as trade-distorting, and the principle of "proportionality" in subsidy reduction commitments – that is, the idea that countries that have more potential to distort global markets would contribute more to the reform process (WTO, 2020, 2021).

Some regional trade agreements, such as the Comprehensive Economic and Trade Agreement (CETA) between the European Union and Canada, the United States-Mexico-Canada Agreement (USMCA), and the African Continental Free Trade Area (AfCFTA) have also made progress in committing to further reduce or abolish tariffs between major trade partners. Regional trade platforms, continental initiatives and multilateral trade agreements are other important instruments to advocate for open trade, and for refraining from implementing measures that have detrimental consequences on food trade and, ultimately, on food systems transformation.

7. In the medium term, there is a need to improve and develop standardized monitoring and reporting at the global level that can be adopted by countries

Systems and processes need to be developed to track the outcomes of each policy intervention aimed at supporting agriculture. Given the competing interests and the adverse but often hidden impacts of agricultural support policies, it is essential to gather more evidence on the effects and trade-offs of agricultural interventions and their long-term implications. It is therefore important to invest in a policy monitoring system to measure the effects of public policy using a common approach and global parameters. This will make it possible to pinpoint key factors and the actions needed to repurpose agricultural support effectively, including the required policy reforms. Outcomes should be measured across social, economic and environmental indicators. These outcomes should also inform state and national budgets that are annually allocated for support, such as subsidies on fertilizers and pesticides, for example, which have been shown to be harmful.

[80] Under the decision, developed country members committed to immediately eliminating all export subsidies, while developing country members agreed to eliminate export subsidies by the end of 2018 (or 2016 in the case of cotton). An extended 2023 deadline is provided to the developing countries regarding the use of Article 9.4 of the Agreement on Agriculture. Least developed countries and net food-importing countries get an additional seven years (until the end of 2030) compared to other developing countries (WTO, 2015).

All in all, the transformation to healthier, more sustainable, equitable and efficient food systems must be accelerated if we are to meet the SDGs. This report has argued that one of the key entry points to this accelerated transformation process is to rethink and update the approach used to support agriculture, which is the backbone of food systems. Agricultural producer support has created massive inefficiencies and distortions, leading to unacceptably high costs for nature, climate, nutrition, health and equity. For many countries with strained public purses, this support is not sustainable. Given the state of the planet and human health needs, a key step towards transforming food systems is to revisit and repurpose the policies that shape agricultural production with the strong backing of governments worldwide.

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ANNEXES

ANNEX 1
METHODOLOGY ON POLICY SUPPORT ESTIMATES

IFPRI maintains a harmonized database on policy indicators for the Ag-Incentives Consortium with FAO, IDB, OECD and the World Bank as partner institutions and data providers. The coverage of the dataset is reported in Table A1.

▶ TABLE A1

Countries in the Ag-Incentives database (2012, year with the greatest coverage)

HIGH-INCOME COUNTRIES	MIDDLE-INCOME COUNTRIES		LOW-INCOME COUNTRIES
Australia	Argentina	Mexico	Burundi
Bahamas	Belize	Nigeria	Benin
Barbados	Brazil	Nicaragua	Burkina Faso
Canada	China	Pakistan	Ethiopia
Switzerland	Colombia	Panama	Haiti
Chile	Costa Rica	Peru	Mali
European Union*	Dominican Republic	Philippines	Mozambique
Iceland	Ecuador	Paraguay	Malawi
Israel	Ghana	Senegal	Rwanda
Japan	Guatemala	El Salvador	United Republic of Tanzania
Norway	Guyana	Sri Lanka	Uganda
New Zealand	Honduras	Suriname	
Republic of Korea	Indonesia	Turkey	
Russian Federation	India	Ukraine	
Trinidad and Tobago	Jamaica	Viet Nam	
Uruguay	Kazakhstan	South Africa	
United States of America	Kenya		
Total: 17*	Total: 33		Total: 11

Note: * The European Union (which consisted of 28 Member States until January 2020, when the United Kingdom of Great Britain and Northern Ireland left the union) is treated as one single country observation in the analysis. In actuality, 44 high-income countries are captured in the analysis.

Source: Ag-Incentives (forthcoming).

While the nominal rate of protection (NRP) has been the focus of this database to date, the Ag-Incentives Consortium has decided recently to also produce and release estimates of the nominal rate of assistance (NRA). The NRA includes subsidies and income transfers in addition to price incentives through border measures, thus providing a more complete picture of the extent of agricultural producer support.

The database identifies a set "s" of policy instruments that form together the support to agricultural producers:

A1. Price incentives (or market price support)
A2. Subsidies based on output
B. Subsidies based on input use
C. Subsidies based on current A/An/R/I,[81] production required
D. Subsidies based on historical (non-current) A/An/R/I, production required
E. Subsidies based on historical (non-current) A/An/R/I, production not required
F. Subsidies based on non-commodity criteria
G. Miscellaneous payments.

Categories C to G altogether are defined in this report as subsidies based on factors of production, with categories E and F being subsidies decoupled from production (i.e., monetary transfers to producers not linked to current production levels).[82]

NRA calculation and disaggregation

The NRA for a country r, year t, and all products "Total" is defined as:

$$\mathrm{NRA}_{\text{“}Total\text{”},r,t} = \left(\frac{\sum_{s \in S,i} \mathrm{X}_{s,i,r,t}}{\sum_i ValueProduction_{Ref_{i,r,t}}} \right) * 100$$

where X denotes the associated transfer from consumers or taxpayers to agricultural producers and $ValueProduction\_Ref$ is the value of production valued at reference prices at farm gate.

Conceptually, the NRA can be disaggregated along two dimensions. First, along the product dimension (horizontal disaggregation), for each product i, the $\mathrm{NRA}_{i,r,t}$ can be computed as:

$$\mathrm{NRA}_{i,r,t} = \left(\frac{\mathrm{A1}_{i,r,t} + \sum_{p \in P,} \mathrm{X}_{p,i,r,t}}{ValueProduction_{Ref_{i,r,t}}} \right) * 100 = \mathrm{NRP}_{i,r,t} + \frac{\sum_{p \in P,} \mathrm{X}_{p,i,r,t}}{ValueProduction_{Ref_{i,r,t}}} * 100$$

Second, along the policy dimension, the NRA can be disaggregated by type of policy support, and therefore by support provided by border measures (NRP), by fiscal subsidies linked to output (A2 category), to inputs (B category), and to other factors of production (C, D, E, F and G).

The NRP (component A1 of the support) is computed as the price difference, expressed as a percentage, between the producer price and an undistorted reference price at the farm gate level (Laborde and Mamun, 2020). The NRP is therefore defined, for product i, in country r, and year t, as:

$$\mathrm{NRP}_{i,r,t} = \left(\frac{ProducerPriceAtFGL_{i,r,t}}{ReferencePriceAtFGL_{i,r,t}} - 1 \right) * 100 = \left(\frac{ValueProductionPP_{i,r,t}}{ValueProduction_{Ref_{i,r,t}}} - 1 \right) * 100$$

[81] The letters stand for Area (A), Animal Numbers (AN), Receipts (R) or Income (I).

[82] These categories of support measures are based on OECD definitions, though category A1 is defined as "market price support" and subsidies are defined as "payments" in the OECD methodology (OECD, 2016a).

The NRP is computed and presented in the Ag-Incentives database using both simple average and weighted average formulas (Laborde and Mamun, 2020). In this study, we use only aggregate simple average NRPs which are simple arithmetic averages, defined over product (Ia) and country group (Ra) for year t as:

$$\mathrm{NRP}_{Ia,Ra,t} = \frac{\sum_{i \in Ia, r \in Ra} \mathrm{NRP}_{i,r,t}}{\sum_{i \in Ia, r \in Ra} 1}$$

Reconciliation of the different policy support datasets

The IDB and World Bank dataset uses a policy support classification framework very similar to the OECD, though data are organized slightly differently, while FAO provides a different mapping of subsidies to producers.[83] The datasets provided by the various institutions have been reconciled to the OECD methodology through a validation strategy that pools all subsidies, ensuring no omission of any data and no double counting.

Mapping of commodity support

An important issue in the consolidated NRA dataset relates to commodity mapping, for example how to account for subsidies benefiting a product, but not specific to this product (e.g. a fertilizer subsidy that benefits crop producers, and in particular the main crops), or how to treat subsidies not attributed to a specific commodity or group of commodities.

Table A2 shows schematically how different forms of support can be mapped to individual commodities (C1, C2, etc.) or groups of commodities (C_group). Some subsidies cannot be directly mapped to any specific individual commodity and have been mapped to broader categories (crops, livestock, or agriculture in general). Non-NRP commodities are those not targeted by border measures that generate price incentives, i.e. those for which an NRP is not available in the dataset.

The OECD data map a portion of support measures to broader commodity categories: other transfers to producers (OTP) to all commodities, all commodity transfers (ACT), and group commodity transfers (GCT). Commodities under OTP and ACT are tagged as "non-allocated" or non-allocable to specific commodities. The commodities under GCT have their own labels such as vegetables, fruits and vegetables, livestock, etc. There is some overlap between GCT commodities and commodity codes among the countries.[84] For the NRA database, all GCT have been mapped to either crops or livestock.

In the case of the FAO data, subsidies are not specified by commodity if these are not specifically targeted or when, because of inadequate data quality, they cannot be mapped to products or groups of products. In this case, FAO is forced to label a payment as going to the generic "crops" or the even more generic "agriculture sector". As such, subsidies were mapped to four additional commodity categories in this case: "non-allocated", "non-NRP other livestock", "non-NRP other crops" and "non-NRP non-specified".

Combining the OECD, IDB, World Bank and FAO databases generated a total of 186 commodity categories, of which 89 have an exact match with the commodities specified in the NRP database. Hence, for the NRA database the remaining 97 commodity categories have been harmonized and then assigned appropriate unique commodity codes.

[83] IDB provides support data for NRP and non-NRP commodities, while FAO does not provide data for non-NRP products. The FAO database also covers additional agricultural subsectors, i.e. fisheries and forestry. Support to these subsectors has been removed for the NRA calculations to maintain consistency in the coverage across organizations.

[84] The "overlap" exists because commodity codes and labels are not unique across countries. For example, GCT10 is the commodity code applied for 16 countries, but the exact commodity labels differ by country; these may be specified (e.g. as milk and meat or beef and milk) or may consist of partially overlapping categories such as grains and oilseeds.

▶ TABLE A2

Classification of type support to producers for the nominal rate of assistance computation

SUPPORT CATEGORY	C1	C2	C_group x	C3	C_non-NRP	Non-allocated	Total
A1. Price incentives	NRP_1	NRP_2	N.A.	NRP_3	NRP_{XE}		NRP_T
A2. Payments based on output							NRA_ output
B. Payments based on input use							NRA_ input
C. Payments based on current A/An/R/I, production required							NRA_ others
D. Payments based on non-current A/An/R/I, production required							
E. Payments based on non-current A/An/R/I, production not required							
F. Payments based on non-commodity criteria							
G. Miscellaneous payments							
TOTAL by commodity	NRA_1	NRA_2		NRA_3	NRA_{XE}		NRA_ total

Notes: For the sake of simplicity, the table only visualizes one example of a group of products. No total is specified for the column "C_group" as these general clusters of commodities and estimates are not necessarily additive.

Source: Authors' own elaboration.

Valuation of production at reference prices

In order to estimate the NRA indicator, it is essential to have value of production (VoP) at reference farmgate prices. This was first obtained from the NRP database for the commodities covered. When not available, VoP data was derived from the FAOSTAT database and interpreted as $ValueProduction\_Ref$. The OECD and IDB provide VoP data for "total" and for "non-NRP commodities", but these were not available for countries covered in the FAO database.

In the consolidated database, an NRA indicator for "non-NRP commodities" is provided. For NRP computed at the country level, this is equivalent to considering that non-NRP commodities have the same NRP as NRP commodities, while across countries, the average for NRP commodities is used to compute support on non-NRP commodities.[85] To generate the NRA, we need to have the same scope for subsidies (all agricultural activities) and price incentives (both NRP and non-NRP commodities).[86]

[85] This assumption of filling data gaps by using the average NRP for NRP-commodities to compute support on non-NRP commodities across countries diverges from the data currently published in the Ag-Incentives database, where no data gap filling assumption is applied.

[86] In terms of classification of subsidies to non-NRP commodities, differentiated treatment across data sources was applied. Since OECD and IDB provide support data for non-NRP products, for countries covered by these institutions we have NRA disaggregated indicators (i.e. output, input and others) for non-NRP commodities. For countries monitored by FAO, this is not the case.

Finally, in the computation process, an intermediate variable, "relevant production", was computed which refers to the VoP at the reference price relevant to the different NRA indicators (outputs, inputs, others, etc.). For example, relevant production for NRP-commodities comes directly from the NRP database. On the other hand, relevant production for crop or livestock is the VoP of all crops or all livestock and for non-NRP commodities.[87] This procedure ensures that non-NRP commodities will have the same NRP as the national average and avoids biases in the aggregation procedure (Laborde and Lallemant, 2017).

The consolidated NRA dataset

The final NRA data presented in this report contains an aggregate NRA indicator at country level, disaggregated by type of support (price incentives, subsidies on output, on inputs or based on factors of production) and by sector for crops, livestock, non-commodity specific or non-allocated. Aggregation is done at global level and by income group (i.e. high-, middle- and low-income), through simple averages of actual observations (i.e. no data gap "filling" for missing country/year values). The resulting database covers close to 90 percent of world agricultural production in most years since 2005, with peak coverage of 61 countries (considering the European Union as one entity) and 88 percent of global agricultural production in 2012.

[87] This case applies to the FAO data only and is derived as VoP (total) – VoP (NRP) for crops and livestock, respectively. However, in this case we maintain a ratio of VoP (NRP_crop) + VoP (NRP_livestock) / VoP_Ref (NRP), named as factor of production, and then multiplied VoP (non-NRP) by factor of production (scale up or down) to compute the final "relevant production".

Beneficiary of an agricultural livelihoods protection project in Bangladesh.

ANNEX 2
THE MODELLING FRAMEWORK

The modelling framework is based on IFPRI's global computable general equilibrium (CGE) model, MIRAGRODEP. MIRAGRODEP is an extension of the widely used MIRAGE multisector, recursive dynamic CGE model of the global economy (Decreux and Valin, 2007) that allows for a detailed and consistent representation of the economic and trade relations between countries.

In each country, a representative consumer maximizes a constant elasticity of substitution linear expenditure system (CES-LES) utility function subject to an endogenous budget constraint to generate the allocation of expenditures across goods. This functional form replaces the Cobb-Douglas structure of the Stone-Geary function (that is, LES) with a CES structure that retains the ability of the LES system to incorporate different income elasticities of demand (Stone, 1954), with those for food typically lower than those for manufactured goods and services. The demand system is calibrated on the income and price elasticities estimated by Muhammad *et al.* (2017). Once total consumption of each good has been determined, the origin of the goods consumed is determined by another CES nested structure, following the Armington assumption of imperfect substitutability between imported and domestic products.

On the production side, demands for intermediate goods are determined through a Leontief production function that specifies intermediate input demands in fixed proportions to output. Total value added is determined through a CES function of unskilled labour and a composite factor of skilled labour and capital. This specification assumes a lower degree of substitutability between the last two production factors. In agriculture and mining, production also depends on land and natural resources.

The underlying database used for the analysis is Pre-release 1 of the GTAP v11 database for 2017 (see www.gtap.agecon.purdue.edu). This database includes 141 regions/countries and 65 products. It includes updated Social Accounting Matrices for all individually specified countries and updated estimates of agricultural support measures based on measures of average domestic support provided by OECD, adjusted to include the impacts on bilateral protection rates of major trade preferences. A realistic baseline is constructed aligned with the UN demographic projections and updated IMF economic growth estimates to bring the base year values (2017) up to those of the actual years of simulation (2021–2025) and on to the comparisons between reference and simulated outcomes in 2030.

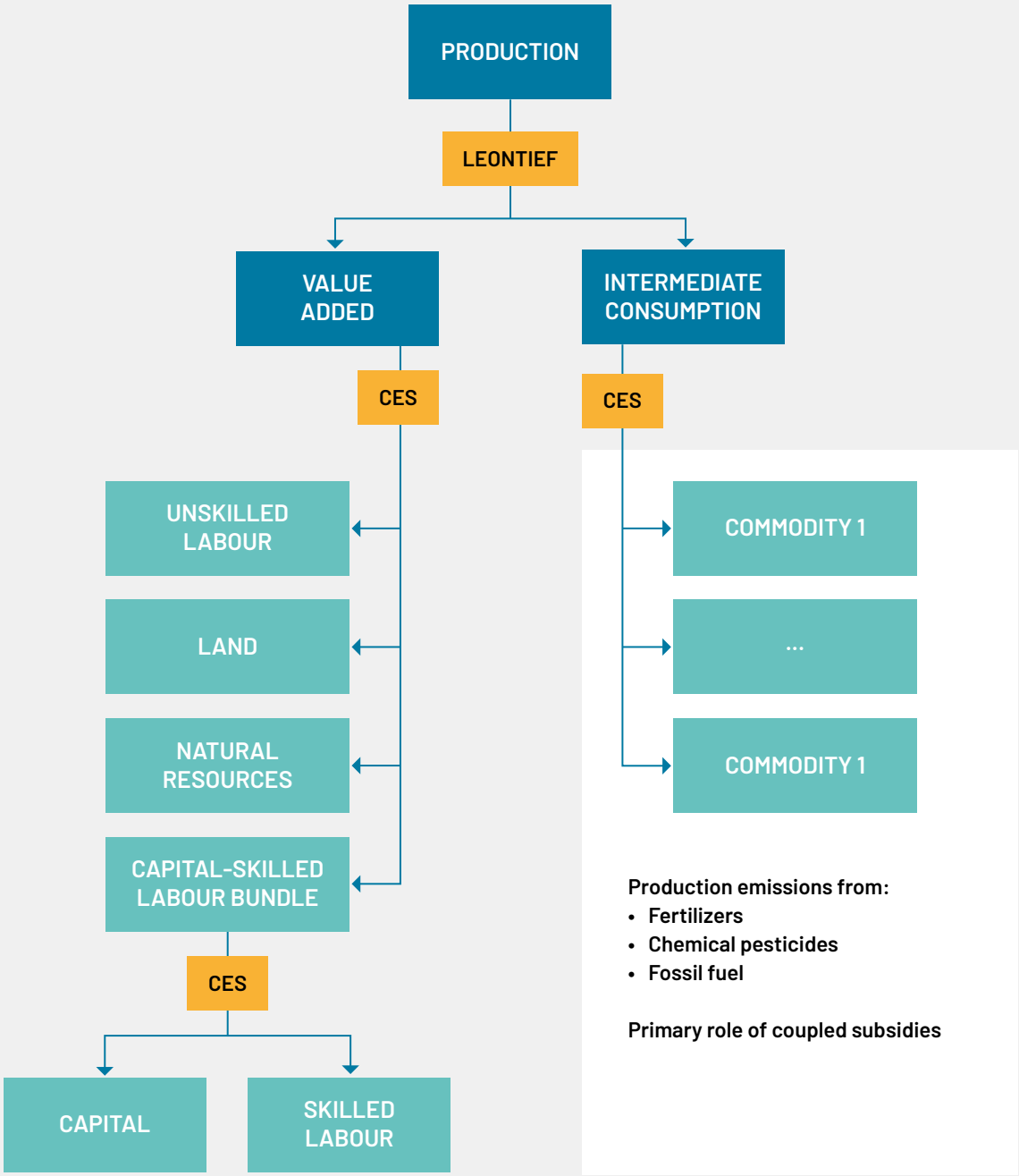
The data on agricultural support were adjusted in line with the measures discussed in the article for agricultural border measures and subsidies that influence output or input decisions. The model was augmented with a post-solution module based on the new emission database presented above, which links GHG emissions to outputs and inputs of agricultural activities within the model. These linkages are presented schematically in Figure A1. The combined model was then used to assess the impacts of policy reform on emissions of CH_4, CO_2 and N_2O, and these results combined to generate changes in emissions in CO_2 equivalents.

The macroeconomic assumptions used for the analysis were designed to be relatively "neutral" to avoid situations where macroeconomic adjustments such as real exchange rate changes outweigh the impacts of interest, and to allow focusing on the impacts of agricultural support policies on emissions. These assumptions were:

i. The analysis is based on macroeconomic projections to 2030 implemented annually in a recursive-dynamic model.
ii. Investment is savings-driven and the real exchange rate adjusts to keep the current account constant relative to national GDP.

iii. Aggregate real public expenditures are kept constant, and a consumption tax is adjusted to keep the government budget balance fixed as a share of GDP.
iv. Land use change varies across agro-ecological zones as defined for each region specified in the model and follows the procedure outlined in Hertel *et al.* (2009), where land is reallocated in response to changes in returns.
v. Total employment as a share of the active population is constant. The active population is defined by the group aged 15–60 years in the UNDESA projections.

▶ FIGURE A1
Linking emissions to production in MIRAGRODEP



Source: Laborde *et al.* (forthcoming).

The modelling approach for land builds on the AEZ approach of Golub, Hertel and Sohngen (2009). Competition for land between forestry and agricultural uses within 16 agro-ecological zones is represented using a constant elasticity of transformation (CET) specification. Land is also reallocated between agricultural activities in response to changes in relative prices. Emissions from land use and land use change arise from conversion of land between forestry and agricultural uses, from transitions between grassland and cropland, from cultivation of organic soils, and from CO_2 sequestration. The model considers only land use and land use change created by changes in agricultural incentives, and thus generates estimates of emissions from conversion of forest to agricultural land smaller than the gross estimates of land conversion away from forestry reported by FAO.

A description of the model indicators is presented in Table A3.

▶ TABLE A3

Description of model indicators

INDICATOR	UNIT
Macroeconomic	
National real income	Percent change from baseline (2030)
Farm sector	
Real farm income	Percent change from baseline (2030)
Real farm income per worker	Percent change from baseline (2030)
Real value added	Percent change from baseline (2030)
World prices	Percent change from baseline (2030)
Production volume – crops	Percent change from baseline (2030)
Production volume – livestock	Percent change from baseline (2030)
Crop yield – intensification component	Percent change from baseline (2030)
Crop yield – relocation component	Percent change from baseline (2030)
Crop yield – total	Percent change from baseline (2030)
Social	
Farm employment	Percent change from baseline (2030)
Extreme poverty USD 1.90	Change in the percent (x100) of population in extreme poverty (prevalence in scenario – prevalence in baseline)
Extreme poverty USD 1.90 among farmers	Change in the percent (x100) of population in extreme poverty (prevalence in scenario – prevalence in baseline)
Extreme poverty USD 3.20	Change in the percent (x100) of population in extreme poverty (prevalence in scenario – prevalence in baseline)
Prevalence of undernourishment	Change in the percent (x100) of population in extreme poverty (prevalence in scenario – prevalence in baseline)

▶ TABLE A3 (CONT.)

INDICATOR	UNIT
Diets	
Dairy consumption per capita	Percent change from baseline (2030)
Fat consumption per capita	Percent change from baseline (2030)
Sugar consumption per capita	Percent change from baseline (2030)
Fruit and vegetable consumption per capita	Percent change from baseline (2030)
Food prices based on current diet	Percent change from baseline (2030)
Food prices based on healthy diets	Percent change from baseline (2030)
Affordability of healthy diets	Percentage point change in the percent of population who can afford healthy diet in 2030
Climate	
Energy in agriculture – MToE	Percent change in energy use in agriculture (in 2030)
Emissions – production	Percent change in emissions due to crop and livestock production (in 2030) compared to baseline
Emissions – total	Change in emissions, in 1 000 tonnes of CO_2 e, between the scenario and the baseline
Emissions – land use, last year	Percent change, compared to baseline, in annual emissions (CO_2 e) due to land use change in 2030, as in IPCC Tier 1 (= as in FAOSTAT)
Emissions – land use, cumulative	Percent change in the sum of annual emissions (CO_2 e) (as in the previous row), between 2020 and 2030 between scenario and baseline
Environmental/nature	
Agricultural land	Percent change from baseline (2030)
Cropland	Percent change from baseline (2030)
Pastureland	Percent change from baseline (2030)
Index: chemical inputs per ha	Percent change from baseline (2030)
Index: biodiversity	Percent change from baseline (2030)
Forest habitat	Percent change from baseline (2030)
Other land habitat	Percent change from baseline (2030)

Source: Authors' own elaboration.

A MULTI-BILLION-DOLLAR OPPORTUNITY

Repurposing agricultural support to transform food systems

Public support mechanisms for agriculture in many cases hinder the transformation towards healthier, more sustainable, equitable and efficient food systems, thus actively steering us away from meeting the Sustainable Development Goals and targets of the Paris Agreement. This report sets out the compelling case for repurposing harmful agricultural producer support to reverse this situation, by optimizing the use of scarce public resources, strengthening economic recovery from the COVID-19 pandemic, and ultimately driving a food systems transformation that can support global sustainable development commitments.

The report provides policymakers with an updated estimate of past and current agricultural producer support for 88 countries, projected up until 2030. The trends emerging from the analysis are a clear call for action at country, regional and global levels to phase out the most distortive, environmentally and socially harmful support, such as price incentives and coupled subsidies, and redirecting it towards investments in public goods and services for agriculture, such as research and development and infrastructure, as well as decoupled fiscal subsidies. Overall, the analysis highlights that, while removing and/or reducing harmful agricultural support is necessary, repurposing initiatives that include measures to minimize policy trade-offs will be needed to ensure a beneficial outcome overall.

The report confirms that, while a few countries have started repurposing and reforming agricultural support, broader, deeper and faster reforms are needed for food systems transformation. Thus, it provides guidance (in six steps) on how governments can repurpose agricultural producer support – and the reforms this will take.

The report proposes greater collaboration and cooperation across government, research institutions, non-governmental organizations and the private sector to generate the evidence needed for the development and implementation of repurposing strategies. It observes that the United Nations Food Systems Summit in September 2021 is a momentous opportunity to generate a groundswell of support for repurposing. This momentum then needs to continue to build through the Conference of the Parties to the Convention on Biological Diversity (COP15) and the COP26 to the United Nations Framework Convention on Climate Change (UNFCCC). The decisions and commitments made at these global forums and in the coming years will either support or hinder at least 12 of the 17 Sustainable Development Goals.

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