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Using food reserves to enhance food and nutrition security in developing countries

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This report has been prepared by

Consortium composed by:
DAI Europe, HTSPE, DAI Global, Institute of Development Studies
Leader of the Consortium: DAI Europe
Contact Person: Anne-Sofia Holmberg, Anne-Sofia_Holmberg@dai.com

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DAI Europe Ltd.
3rd Floor Block C, Westside, London Road, Apsley
HP3 9TD
United Kingdom
www.dai.com

About ASiST

ASiST is an advisory service of the European Commission (EC) managed by the unit in charge of rural development, food security and nutrition (C1) within the Directorate General for International Cooperation and Development (DEVCO). It has been conceived as a flexible tool to support the work of the European Union (EU) aimed to strengthen food and nutrition security and sustainable agriculture (FNS-SA) in developing countries. ASiST has been operating since January 2012 under three successive contracts. It offers short-term expertise, backstopping facilities and support teams in the following areas: social transfers (and social protection) for FNS-SA; resilience to food crises; budget support and public finance management for FNS-SA; and, when needed, any other FNS-SA-related issues not covered by any other advisory service. The service is accessible to all EU Delegations and their partners, as well as EC headquarter units. To request assistance from ASiST, please contact EuropeAid-C1@ec.europa.eu.

About this report

This report is one of the products of a study commissioned by the European Commission's Directorate-General for International Cooperation and Development (DEVCO). It aims to clarify the potential role of food reserves in enhancing food and nutrition security in developing countries and make recommendations on how to use food reserves (in complement to other tools), taking into account the specificities on the context and the constraints of World Trade Organization (WTO) disciplines.

The study was conducted in 2016 based on i) an extensive review of the existing literature (both theoretical and empirical) and ii) ten case studies analysing national or regional experiences in Africa, Asia and South America.

All the products of the study, including a compilation of case study summaries, are available at https://europa.eu/capacity4dev/hunger-foodsecurity-nutrition/discussions/how-can-food-reserves-best-enhance-food-and-nutrition-security-developing-countries.

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- Bangladesh: Paul Dorosh (IFPRI)
- Brazil: Walter Belik (University of Campinas, São Paulo) and Altivo Almeida Cunha (FAO consultant)
- Burkina Faso: Arlène Alpha (CIRAD) and Bénédicte Pémou (SONAGESS)
- ECOWAS Regional Reserve: Franck Galtier (CIRAD) with the help of Roger Blein (Bureau Issala)
- Ethiopia: Shahidur Rashid (IFPRI), Dawit Alemu (Ethiopian Institute of Agricultural Research) and Paul Dorosh (IFPRI)
- Indonesia: Peter Timmer (Emeritus, Harvard University)
- Nigeria: Chukwuka Onyekwena (Centre for the Study of the Economies of Africa, Abuja)
- Philippines: Ramon Clarete (University of the Philippines)
- Senegal: Ibrahima Hathié (IPAR)
- Zambia: Antony Chapoto (Indaba Agricultural Policy Research Institute)

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Disclaimer

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LIST OF ABBREVIATIONS AND ACRONYMS

AFD	Agence Française de Développement
AMIS	Agricultural Market Information System
APTERR	ASEAN Plus Three Emergency Rice Reserve
ASEAN Plus Three	Association of Southeast Asian Nations (ASEAN) and the three East Asia nations of China, Japan and South Korea
BULOG	Food logistics agency (Indonesia)
CDDS	Direct Purchase for Simultaneous Donation (a modality of the PAA)
CGD	Center for Global Development
CIRAD	French research institute on developing countries' agricultures
Conab	Brazil FR agency
CONSEA	National Food and Nutritional Security Council (Brazil)
CPI	Consumer Price Index
DEVCO	Directorate General for International Cooperation and Development (EC)
EC	European Commission
ECOWAS	Economic Community of West African States
ECX	Ethiopia Commodity Exchange
EU	European Union
FAO	Food and Agriculture Organization
FNDE	National Fund for the Development of Education (Brazil)
FR	Food reserves
G20	Group of Twenty
GDP	Gross Domestic Product
HEA	Household Economy Approach
HLPE	High Level Panel of Experts of the UN Committee on World Food Security (hosted at the FAO)
ICAs	International Commodity Agreements
IFPRI	International Food Policy Research Institute
II PRONAN	Second Food and Nutrition National Programme (Brazil)
IPAR	Initiative Prospective Agricole et Rurale (Senegal)
IPC	Integrated Food Security Phase Classification
IRAM	Institut de Recherche et d'Application des Méthodes de développement
LASDEL	Laboratoire d'Etudes et de Recherche sur les Dynamiques Sociales et le Développement Local
MAFAP	Monitoring and Analysing Food and Agricultural Policies (FAO programme)
MDA	Ministry for Agrarian Development (Brazil)
MDS	Ministry of Social Development and Fight against Hunger (Brazil)

MESA	Extraordinary Ministry for Food Security (Brazil)
MPC	Marginal propensity to consume
MSF	Médecins Sans Frontières
NFA	National Food Authority (Philippines)
NGO	Non-governmental organisations
OECD	Organisation for Economic Co-operation and Development
P4P	Purchase for Progress (WFP programme)
PAA	Food Acquisition Programme (Brazil)
P_D	Domestic price
P_M	Import parity price (import price cost)
PNAE	National School Feeding Plan (Brazil)
PPROC	FR procurement price
PRONAF	National Programme for the Strengthening of Family Farmers (Brazil)
PSNP	Productive Safety Net Program (Ethiopia)
SAARC	South Asian Association for Regional Cooperation
SFB	SAARC Food Bank
SONAGESS	Société nationale de gestion du stock de sécurité alimentaire (Burkina Faso)
STUR	Stock-to-use ratio
SUSENAS	National Socioeconomic Survey (Indonesia)
UNICEF	United Nations International Children's Emergency Fund
USA	United States of America
USAID	United States Agency for International Development
USD	US Dollar
USDA	United States Department of Agriculture
WFP	World Food Programme
WRS	Warehouse Receipt Systems
WTO	World Trade Organization
ZAMACE	Zambia Commodity Exchange

CHAPTER 1 INTRODUCING THE POTENTIAL ROLES OF FOOD RESERVES IN IMPROVING FOOD AND NUTRITION SECURITY

1.1 Objective and scope of the study

The study aims to clarify the potential roles of food reserves (FR) in enhancing food and nutrition security in developing countries and analyse the substitutability and complementarity between FR and other tools.

The study is based on i) a review of the existing literature (both theoretical and empirical) and ii) ten case studies analysing experiences in Asia (Bangladesh, Indonesia, and Philippines), South America (Brazil) and Africa (Burkina Faso, ECOWAS Regional Reserve, Ethiopia, Nigeria, Senegal and Zambia).

1.2 Food and nutrition security

The definition of food and nutrition security strongly evolved with time, reflecting the progressive enlargement of the concept (FAO, 2006). The definition adopted during the 1996 World Food Summit states that "*food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*."

Compared with the previous definitions, this definition introduces new dimensions by referring to i) nutrients and dietary needs (thereby going beyond staples and calories), ii) access (thereby going beyond physical availability), iii) food safety and iv) consumers' preferences. The widely accepted interpretation of this definition enlarged it even more by considering the "utilisation" of the food through "adequate diet, clean water, sanitation and health care" in order to reach "a state of nutritional well-being where all physiological needs are met" (FAO, 2006). According to this interpretation, food and nutrition security encompasses four dimensions: i) food availability, ii) food access, iii) utilisation and iv) stability of the three first dimensions. It is worth noting that consumers' preferences have been left out in this interpretation, which reflects the reduction of food and nutrition security to its nutritional dimensions. More precisely, consumers' preferences are implicitly considered as being part of the "utilisation" dimension, meaning that they are taken into account only as far as they affect food consumption. However, satisfying consumers' preferences may be important for other reasons. It has for instance occurred that maize has being distributed to food insecure households in regions where it was usually only consumed by animals. Even when recipient households actually consume the maize they receive, there is still a problem, not related to nutrition but to dignity and self-esteem. In other words, food security cannot be reduced to a component of nutritional security.

For this reason, this study, considers five dimensions of food and nutrition security: i) food availability, ii) food access, iii) utilisation, iv) adequacy to preferences and v) stability of the four first dimensions. Note that access mainly refers to households' economic access to food but it can also refer to the intra-households' allocation of the food (i.e. individual access rather than household access).

Food and nutrition insecurity can be chronic or transitory (World Bank, 1986). Chronic food and nutrition insecurity refers to households with permanent difficulties to feed themselves whereas transitory food and nutrition security refers to households in difficulty only when facing a crisis. Of course, households may shift from the category 'food secure' to the category 'transitory food insecure' or 'chronically food insecure' and vice versa.

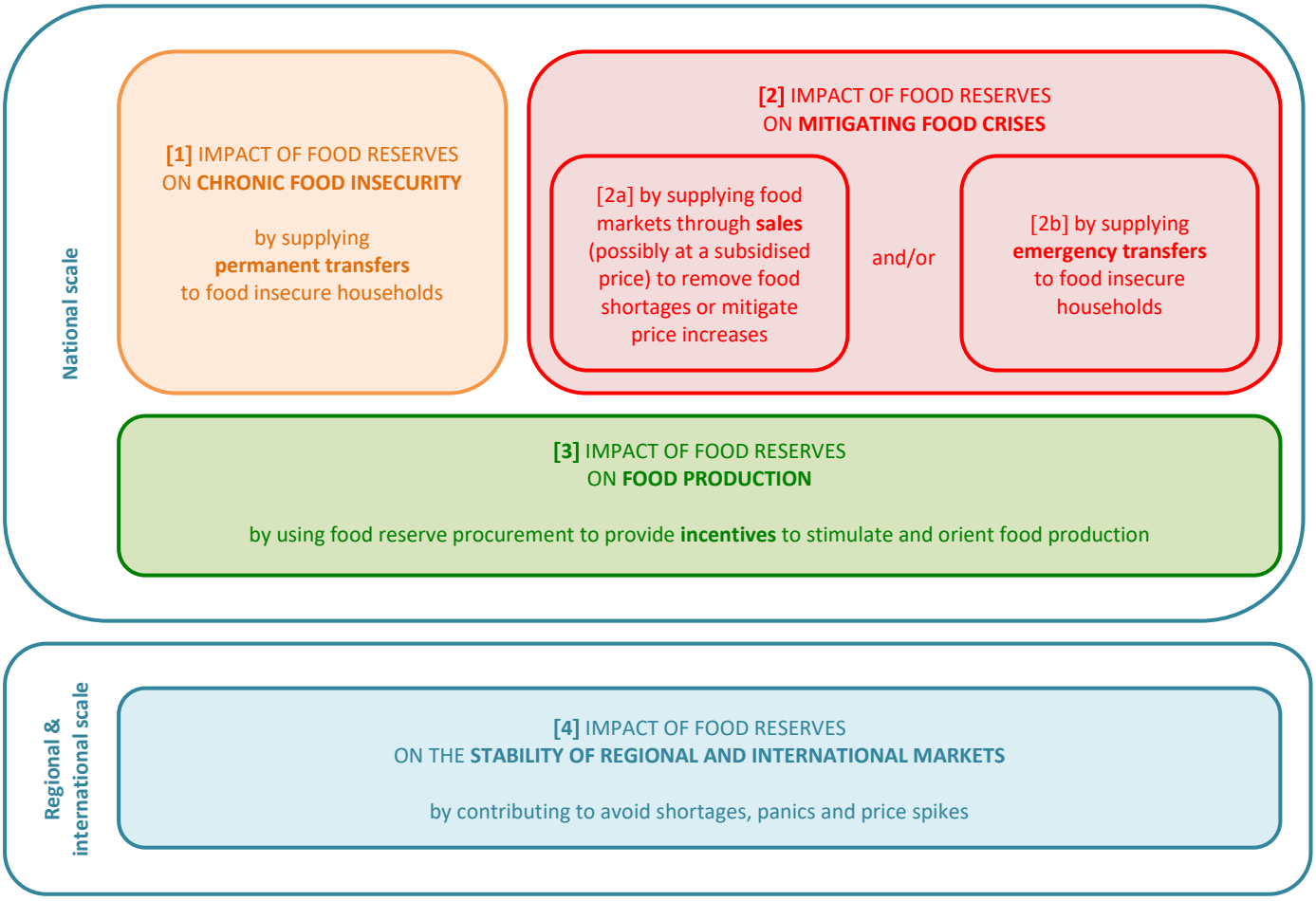
1.3 Food reserves

What are food reserves? FR are stocks of food products held by a public entity. The considered products should be food products with content in calories or nutrients that render them important for food and nutrition security (stocks of coffee or cacao can hardly be considered as FR). In practice, FR are mainly made of grain or other staples (for instance milled cassava in some regions of the world). The public entity that holds the FR can be national but also local, regional (ASEAN Plus Three, ECOWAS and SAARC have built regional grain reserves) or (theoretically) international. By extension, stocks managed by communities are sometimes assimilated to FR as their effect is quite similar to the effect of local FR (see the case of 'cereal banks' in the Sahel). By extension the expression "food reserves" can also refer to the FR agency (the agency in charge of managing the FR).

Impact pathways of food reserves on food and nutrition security. There are **three different impact pathways through which food reserves can be used buy governments to improve national food and nutrition security** (see Figure 1). First, the food stored can be used to supply **permanent transfers** to chronically food insecure households. Second, food reserves can be used to manage food crises, by removing shortages or mitigating price surges through **sales** into the national market (possibly at a subsidised price) (strategy 2a), or by supplying **emergency transfers** to households hit by the crisis (strategy 2b). These two strategies are not exclusive and are often combined. Third, whatever the way the food stored is used (permanently or in periods of crisis), food procurement by the food reserve agency offers the opportunity to send **incentives to farmers** to stimulate or orient their investment in food production, with potential effect on food and nutrition security in the medium run. Of course, this third impact pathway is strongly related to the first two ones: a country's ability to use food reserve procurement to orient food production strongly depends on the quantity to be procured and released, as well as the way it is used (permanently or only in periods of crisis).

In contrast with the first three impact pathways that are purposely activated by national governments, **the fourth impact pathway operates** at a cross-country level and is often an unintended effect of national food policies. It results from the fact that food reserves in a given country are likely to benefit other countries (especially importing countries) **through a stabilising effect on regional or international markets**. By avoiding or smoothing price surges on these markets, food reserves can contribute to improving food and nutrition security at the global level

Figure 1 Potential use of FR for improving food and nutrition security



Source: Authors.

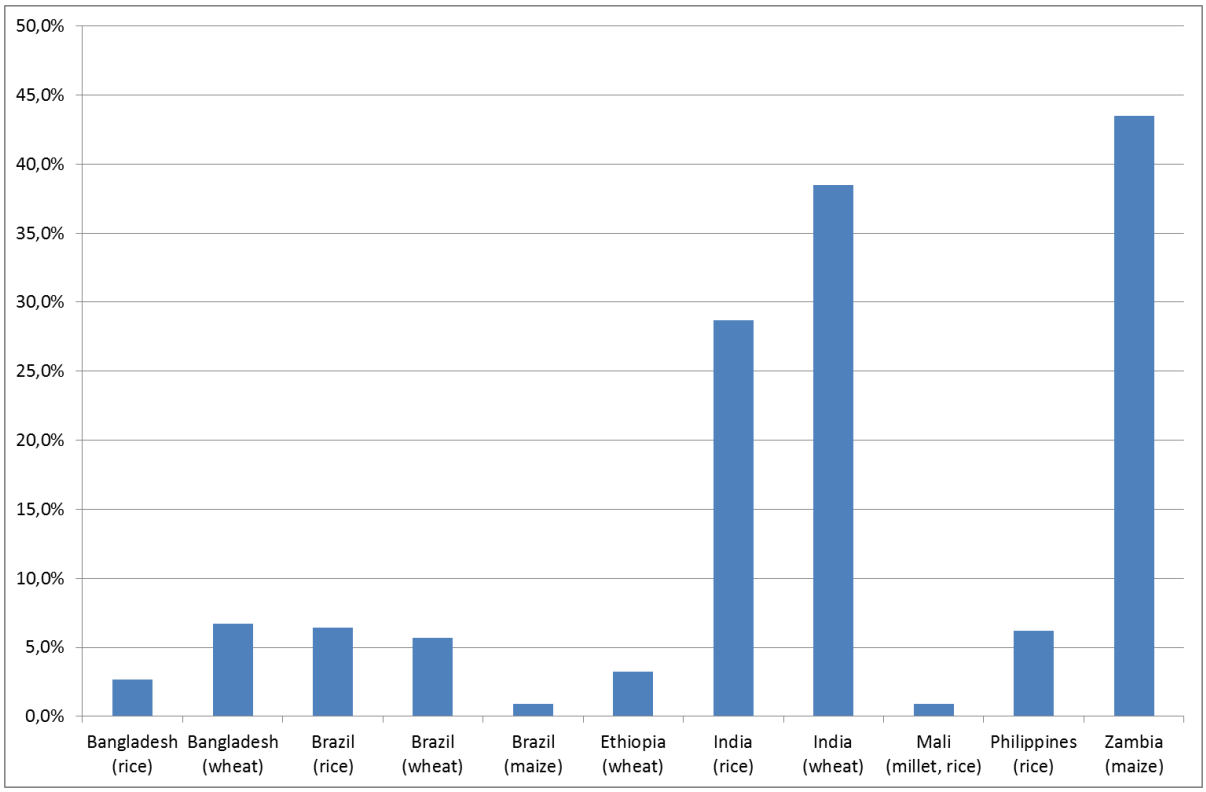
Note that these effects are not guaranteed, as they depend on the context and the way FR are managed.

Magnitude of food reserves. Data on the size of FR is scarce and not always reliable. Regardless, an idea of the importance of FR is provided by the fact that, during the 2008 crisis, many developing countries released public grain stocks at subsidised prices in order to protect poor consumers: it was the case for 15 Asian countries

(out of 26), 13 African countries (out of 33) and 7 Latin-American countries (out of 22) (for more details, see Demeke et al., 2008).

Moreover, many countries increased their FR after the 2008 crisis. Bangladesh is a good illustration of this phenomenon as, after the 2008 crisis, public food grain stocks nearly tripled: from 617,000 tons in 2007/08 to 1,690,000 tons during the July 2012-February 2016 period (see Bangladesh case study report). This process is still on-going as many developing countries or regions plan to increase the level of their FR. For instance, Ethiopia is considering expanding its FR up to 1,500,000 (around three times its pre-2013 target), while the ECOWAS Regional Reserve Project is planning to increase the level of grain FR in West Africa up to more than 840,000 tons (more than three times their 2017 level). In Asia, the ASEAN Plus Three Emergency Rice Reserve (APTERR) may also lead to a significant increase in the level of FR. Figure 2 gives a brief outlook of current available data on food and nutrition security FR in some developing countries.

Figure 2 Size of food reserves by country and commodity (expressed as a percentage of the consumption of the considered commodity in the considered country)



Source: Authors, based on FAO for data on the rice FR of Bangladesh, Brazil, India and the Philippines; Dawe (2016) for the case of wheat in India; FAO-MAFAP (2016a) for data on Malian FR; Bangladesh, Brazil, Ethiopia and Zambia case studies for other data on FR; USDA-PSD for data on grain consumption. All data on FR are averages for 2011-2016 (when providing from FAO) or between 2011-2015 when providing from other sources except for wheat and maize in Brazil for which the data correspond to the year 2011-12.

1.4 Costs of food reserves

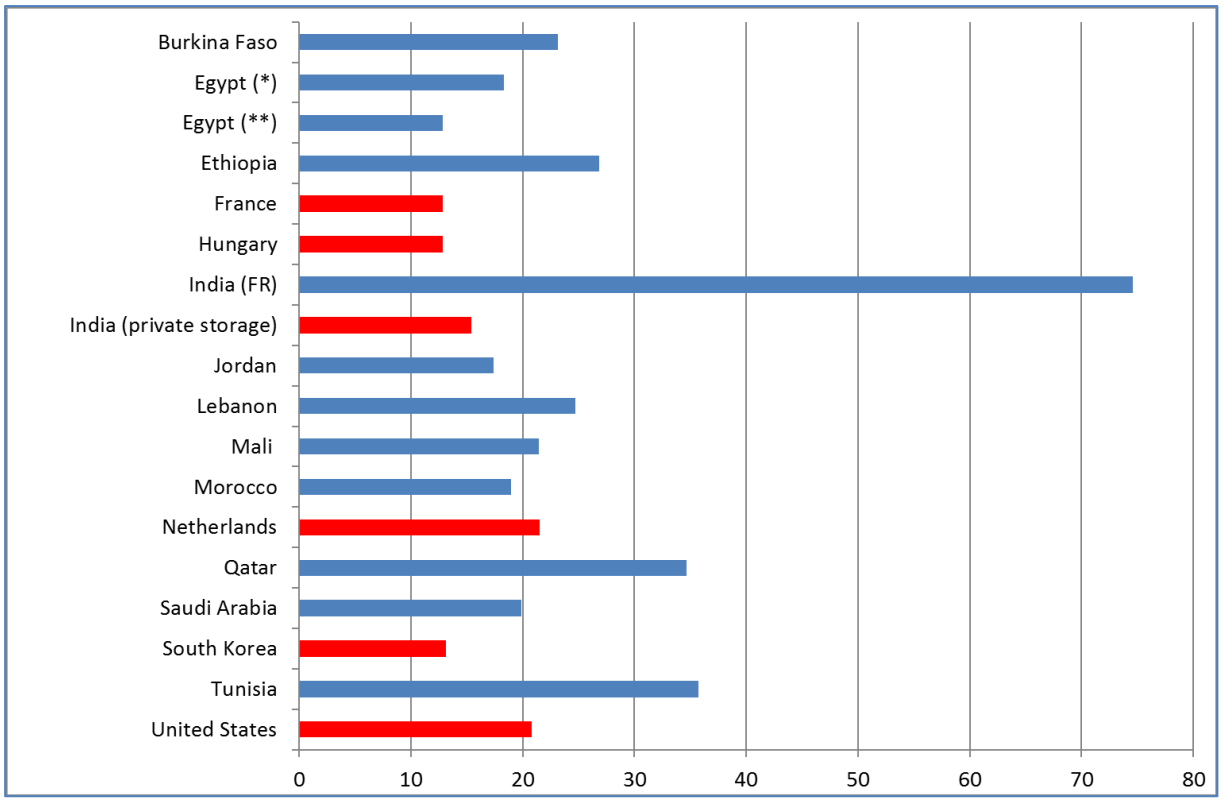
Estimating the cost of FR is challenging, as data is scarce, often incomplete and generally not expressed by activities (procurement, storage, distribution etc.), but rather in the categories used in accountability (wages, energy, transport…). An additional difficulty stems from the fact that some costs correspond to effective monetary costs and others to opportunity costs (that are usually not registered). For instance, the financial cost is a monetary cost if the FR agency has to borrow money to buy food and is an opportunity cost if it purchases with its own money (as the money used by the FR agency to buy food does not generate interest anymore). The same can be said with warehouses that can be rented (generating a monetary cost) or owned by the FR authorities (generating an opportunity cost, as they may have been rented to someone else thereby generating an income). Of course, opportunity costs should be included in the estimation of the total cost. Nevertheless, existing data allows one to understand the bigger picture of the magnitude of the cost of FR. This cost can be disaggregated

into four components: i) physical costs of storage, ii) financial costs of storage iii) logistical costs of operations (procurement, sales and distributions) and iv) purchase costs net from sale revenue.

Physical storage costs. They include logistical costs (warehouses, bags, treatments against insects, handling…) and the costs related to losses, leakages and quality deterioration. These costs strongly depend on the characteristics of the products stored (vulnerability to insects, to humidity etc.) and the characteristics of the country (climate but also level of wages and warehouse rental). Some products (milk, meat, fruits and vegetables…) have to be stored in refrigerated places. Some grains can be stored in warehouses whereas others require silos. The quality of the rice stored in India begins to deteriorate after 3 months. Conversely, in Sahel countries, millet and sorghum can be stored for 2 or 3 years. Although many determinants of the physical costs of storage cannot be changed, an appropriate physical management of the stocks (treatments, rotations etc.) allows reduce them. Despite the incompleteness and the lack of reliability of certain data, the international comparisons provided on Figure 3 below show that the annual physical costs of storage range between 13 and 38 euros / t. Depending on the considered product and the market dynamics, these costs may account for 5 to 10% of the value of the stocks at the beginning of the year.

It has been reported that, in certain occasions, the physical cost of storage may be higher for FR than for private storage (the case of India where more than four times higher is often cited, see Gouel *et al.* 2014). However, the case of India seems to be rather exceptional. Although data on public and private storage cost in the same country is not available, the international comparisons provided by Figure 3 suggest many FR have storage costs in line with the costs of private stocks. When it appears that physical storage costs are lower for the private sector, outsourcing the physical management of the FR may be an option.

Figure 3 Physical storage costs in different countries (euro per ton per year)



Note: Private storage costs are indicated in red and public storage cost in blue.

Source: Authors, based on World Bank and FAO (2012) for South Korea, Jordan, Egypt (*), Morocco, Saudi Arabia, United States, Netherlands, Lebanon, Qatar and Tunisia; AFD (2014) for Hungary, France, Egypt (**), Mali, Burkina Faso and Ethiopia; Gouel et al. (2014) for India. All storage costs are for wheat except for Mali and Burkina Faso (millet and sorghum). All costs have been converted in euro by using the September 2018 exchange rate provided by the International Monetary Fund (1 euro ≈ 1.166 US dollar).

Financial costs of storage. They are highly country-specific, as they depend on the level of interest rates which can vary considerably from one country to another. If in one country the interest rate is 8%, this means that, for a

product stored one year, the financial cost accounts for 8% of the value of the stock at the beginning of the year. Of course, the level of interest rates cannot be modified, but financial costs also depend on the length of storage which is manageable. Sometimes, stocks are kept for too long a time in public warehouses as they have been procured at a too high price (that prevents exporting them without losing money). This is what happened in Zambia, for instance, in 2010 and 2011 and in Thailand in 2011.

Logistical costs of FR operations (procurement, sales and distributions). These costs are usually not reported (either ignored or mixed with others in the categories of 'transport', 'handling' etc.). For the FR managed by SONAGESS in Burkina Faso, they have been estimated to 118 FCFA/t for FR procurement and to 65 FCFA/t for FR sales (respectively 18 euro cents/t and 10 euro cents/t, see AFD 2013), but these values are probably strongly underestimated. Note that the cost of distributing food products is likely to be much higher than the cost of selling food products (as distribution is much heavier in terms of logistics: it implies targeting, delivering in remote areas etc.). The logistical costs of FR operations can be reduced through different means: the use of tenders for procurement and sales allows both more transparency and reduced costs; innovative options have been experimented in order to reduce the cost of distributing food (for instance, ESFRA in Ethiopia used to outsource the distribution to NGOs and it proved to be a cost-effective way to reach food insecure households).

Purchase costs net from sale revenue. These costs strongly depend on the objectives of the FR. When part of the food purchased is distributed for free or sold at a subsidised price, the revenue generated by sales is much lower than when the FR are used to mitigate food price increases (which implies that part of the stock is sold in periods of high prices). Purchase costs strongly depend on whether the objective is i) only supplying the FR, ii) also supporting producer prices in periods of price collapses or iii) also supporting permanently producer prices. Trying to support producers and consumers *permanently and simultaneously* is likely to generate extremely high costs. In Zambia, purchase costs net from sale revenue reached €108 million in 2011, accounting for 42.5% of the total cost of the FR and 3.5% of the national budget! Conversely, supporting producers only when the price collapses and supporting consumers only when the price spikes (or provide permanent support only to food insecure households) is a way to significantly reduce the cost of FR without undermining their effect on food and nutrition security (see Box 1 for the example of Indonesia).

Box 1 Defining 'reasonable objectives' as a way to reduce the cost of FR: lessons from Indonesia

Indonesia is especially interesting on this issue because the objective of its FR changed in 1998. Prior to this, the aim was stabilising the domestic price of rice around its mid-term trend value: therefore, the FR agency (BULOG) was supporting either farmers (when the international price was collapsing) or consumers (when the international price was increasing sharply), or even none of them (when the international was at acceptable level). Since 1998, the objective has been to permanently hold the domestic price at a high level while simultaneously providing support to consumers through targeted food transfers (the Raskin program). The implication on the cost of the FR has been huge: the current cost of the FR is more than four times its 1991 level, "a year when BULOG was actively managing the price stabilisation effort solely on the basis of its domestic buffer stock […], [resulting in a full cost] of BULOG's rice activities of $233 million, which amounted to 0.11 percent of total GDP, and about 1.2 percent of the National Budget" (Timmer, 2013b).

Source: Indonesia case study report, and Timmer (2013b).

Another important way to reduce food purchase costs is timely procurement. Purchasing when the price is low (in good years and/or during the post-harvest period) allows not only to reduce FR purchase costs but also allows to smooth the seasonality of prices (by mitigating the collapse in price that often occurs during the post-harvest period). Allowing timely interventions may imply providing the FR agency with a working capital (in order to allow quick purchases) and adequate rules and procedures. In Mali, it has been estimated that allowing the two national FR to do 100% of their procurement during the four months that follow the harvest would allow them to reduce their purchase costs by around 10 % (FAO-MAFAP, 2016b and 2016c).

1.5 Alternative tools

As we have seen, FR can play a role in i) fighting against chronic food and nutrition insecurity, ii) managing food crises, and iii) providing incentives to production and income to small farmers.

However, other tools are available to reach the same objectives. The question is therefore to know whether *in a given context* FR are likely to perform better than alternative tools.

In order to fight against chronic food and nutrition insecurity, permanent transfers can be provided to food insecure households. When the transfers are made of food, FR may be required to supply them, but it is also possible to provide cash or vouchers instead of food and in this case there is no need for FR. Even when food transfers are provided, they can in some occasions be supplied through just-in-time purchases. In this scenario, a financial reserve is needed instead of a physical reserve. The role of FR in providing transfers is therefore related to two debates: i) the performance of food transfers compared to transfers of cash or vouchers and, in case food transfers are preferred, ii) the relevance of supplying food transfers through FR or just-in-time purchases.

In order to manage food crises, two broad categories of policies can be used: providing food insecure households with emergency transfers and/or implementing interventions to mitigate staple price increases (when a food crisis occurs, staple prices usually surge, thereby generating a collapse in household purchasing power). FR can play a role for both policies. They can play a role in supplying food transfers and in mitigating staple price increases. However, alternative tools do exist such as providing cash transfers or vouchers, increasing imports or reducing exports, or implementing policies aiming to boost private storage.

In order to incentivise production and provide income to small farmers, FR procurement can be used, as well as alternative tools: price incentives can be provided through trade policies or policies to boost private storage and small-scale farmers can be supported through targeted (cash or input) transfers.

1.6 Performance criteria

We selected three categories of performance criteria to evaluate FR and compare their performance to the one of alternative tools:

- The effectiveness of the tool in improving food and nutrition security (in its different dimensions);
- The cost of the tool;
- The effect on other countries.

The aggregation of the first two criteria gives an estimate of the *cost-effectiveness* of the tool, which is supposed to be the main criterion for the decision-making at the country level. However, for a donor such as the EU, the (negative or positive) spill-over effects on other countries should be taken into account, as the policies implemented in a given country may affect (positively or negatively) the neighbouring countries or even (in the case of a 'big country') the rest of the world. It is worth noting that the effect of the tools on food and nutrition security, their cost and therefore their (relative) performance are likely to be highly context-dependent.

1.7 Structure of the report

The country level will be considered first, by presenting how using national FR may improve *national* food and nutrition security. We will consider the use of FR to fight against chronic food and nutrition insecurity (Chapter 2), to manage food crises (Chapter 3) and to provide incentives and incomes to food producers (Chapter 4). The issue of how to govern FR to maximise their cost-effectiveness in improving food and nutrition security will also be addressed (Chapter 5).

The second part of the report deals with the international dimensions of FR. The effect of national FR on international markets (and by this way on global food and nutrition security) is analysed in Chapter 6. Chapter 7 highlights the need for an international governance of FR, demonstrating that the current framework (mainly based on WTO rules) is not adequate and makes proposals to improve it.

I. USING FOOD RESERVES TO IMPROVE NATIONAL FOOD AND NUTRITION SECURITY

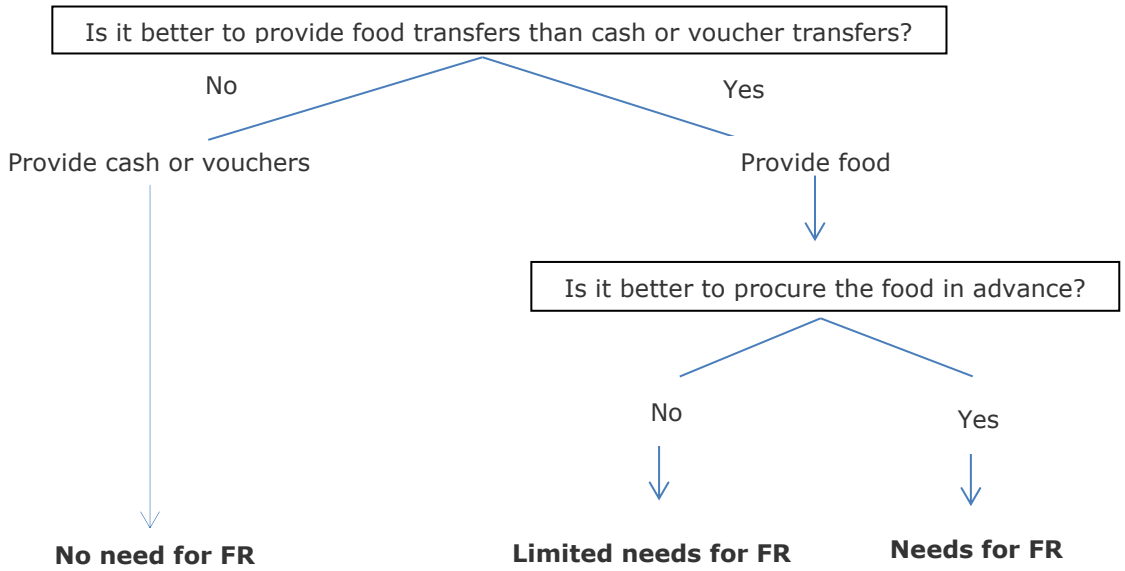
CHAPTER 2 WHICH ROLE FOR FOOD RESERVES IN FIGHTING AGAINST CHRONIC FOOD AND NUTRITION INSECURITY?

Chronic food and nutrition insecurity refers to permanent deficiencies in the consumption of calories or nutrients (not deficiencies occurring only in periods of crisis). *Permanent transfers* targeted to food insecure households can be an effective way to fight against chronic food and nutrition insecurity. They can also be very useful in post-crisis periods in order to help poor households rebuild their capabilities and increase their resilience.

Transfer programmes can be classified depending on many variables, the main ones being i) the nature of the goods transferred, ii) the existence or not of a matching contribution and iii) the way the beneficiaries are targeted. Transfers can be provided in food but also in cash or vouchers (sometimes, other in-kind transfers are provided, such as seeds). The matching contribution (if any) may take the form of work (as in *cash for work* and *food for work* programmes), money (if the transferred goods are not distributed for free but subsidised) or the adoption of specific behaviours by recipient households (such as sending their children to school or attending family planning awareness meetings). Targeting may rely on a wide variety of methods and may be conducted on different scales: areas, population categories (e.g. children through school feeding programmes), households or individuals (e.g. children under five or breast-feeding women).

The role of FR in providing transfers depends on whether food transfers are deemed more appropriate than transfers of cash or vouchers: when cash or voucher transfers are deemed more appropriate, there is no need for FR. When food transfers are deemed more appropriate, this does not imply that huge FR are required: the distributed food can in certain occasions be purchased on a just-in-time basis. The influence of these two debates (food vs. cash; purchase in advance *vs*. just-in-time procurement) for the role of FR is summarised on Figure 4.

Figure 4 Role of FR in providing transfers to food insecure households



Source: Authors.

2.1 The 'food versus cash' debate

Five key aspects to be considered when selecting the nature of the good distributed by a transfer programme have been identified (see Gentilini, 2007 and Box 42 in European Commission, 2012):

- The objective of the transfers (for instance: increase resilience, reduce poverty, improve nutrition);
- The situation of markets (for instance: existence of shortages or sharp price increases);
- The implementation capacity (for instance: concerns about security or corruption that may lead to part of the transfers being diverted);

- The cost and effectiveness (the logistical and administrative costs to deliver the transfers and their ability to reach their objective;
- The beneficiary preferences.

In this chapter, we will only consider transfers with the same objective: improving the food consumption and the nutrition status of food insecure persons. We will also only consider the case of transfers when there is no major tension on food markets: the use of transfers during food crises will be dealt with in Chapter 3. As far as the nature of the good transferred is concerned, the implementation capacity is mainly related to risk of diversion. This risk may be different for cash, food or voucher. We chose to include this dimension in the cost of transfers, thereby adopting a large definition of the transfer cost. For us it includes not only logistical and administrative costs but also leakages resulting from diversion, quality deterioration or other causes. We also chose to include in effectiveness the satisfaction of beneficiary preferences. This choice is coherent with the definition of food and nutrition security that encompasses the satisfaction of preferences as one of its dimension (see Chapter 1). Therefore, for us, transfer effectiveness (in improving food and nutrition security) encompasses both objective dimensions (related to recipients' food consumption) and subjective dimensions (related to recipients' satisfaction).

The section will therefore be organised as follows. We will first consider the compared effectiveness of cash, food and voucher transfers for improving recipients' food and nutrition security (Section 2.1.1). We will then consider the compared costs of these different types of transfers (Section 2.1.2), before concluding on their cost-effectiveness (Section 2.1.3). In each of these sections, we will present both theoretical considerations and empirical evidences. From an empirical point of view, comparing the effectiveness and the cost of food transfers and cash transfers is difficult because transfer programmes not only differ by the nature of the goods transferred, but also by many other parameters (arbitrage between the number of recipient household and the amount transferred per household, targeting, the triggering rules, context of the considered country, etc.). It is therefore almost impossible to draw lessons on the influence of the nature of goods transferred, only by comparing existing transfer programmes. By chance, impact assessment studies have been explicitly designed to compare food transfers and cash transfers (and sometimes also voucher transfers). We will build on Gentilini (2015) who compiled findings of this kind of evaluation studies conducted in ten countries.

2.1.1 Effectiveness (in improving recipient food and nutrition security)

The effectiveness of transfers in improving recipients' food and nutrition security will be analysed by considering both objective variables (related to their food consumption) and subjective variables (related to the satisfaction of their preferences). We will not consider data on recipients' nutritional status, following Gentilini's statement that "the multidimensional nature of malnutrition and the non-linear link between food consumption and nutrition make it difficult to attribute a nutritional outcome to one single tool, whether food or cash" (Gentilini, 2007: 7). Following Gentilini (2015), the effect of transfers on food consumption will be estimated through three variables: calories consumption, food expenditures and food consumption diversity (measured through three different indicators). We will present successively the compared effects of food and cash transfers on i) recipients' food consumption and ii) recipients' satisfaction.

Effects on recipients' food consumption. The classical (common sense) view is that transferring food (or voucher) should be better than cash for incentivising households to increase their food consumption: cash can be used to buy everything whereas using a food transfer or a voucher transfer to buy a non-food product requires first reselling the food or the voucher received. However, this argument based on transaction cost has been challenged by economic theory: theoretically, households who receive a food or voucher transfer should use it for their food consumption and reduce their food purchases for the same amount, thereby saving money that can be used for any purpose (Southworth, 1945). Therefore, transferring food or vouchers should not generate a stronger incentive to consume food than transferring cash.

The empirical evidence reviewed by Gentilini (2015) does not confirm any of these theories: it appears that i) the nature of the transfer matters (the effects of food transfers and cash transfers are often significantly different) and ii) food transfers and cash transfers may be better depending on the variable considered and the context. In most cases, food transfers are better for the consumption of calories and cash transfers for food expenditures (see Figures 5 and 6 below). For the diversity of food consumption, the results are more ambiguous as, depending on the country and the indicator, cash may be better than food or vice versa.

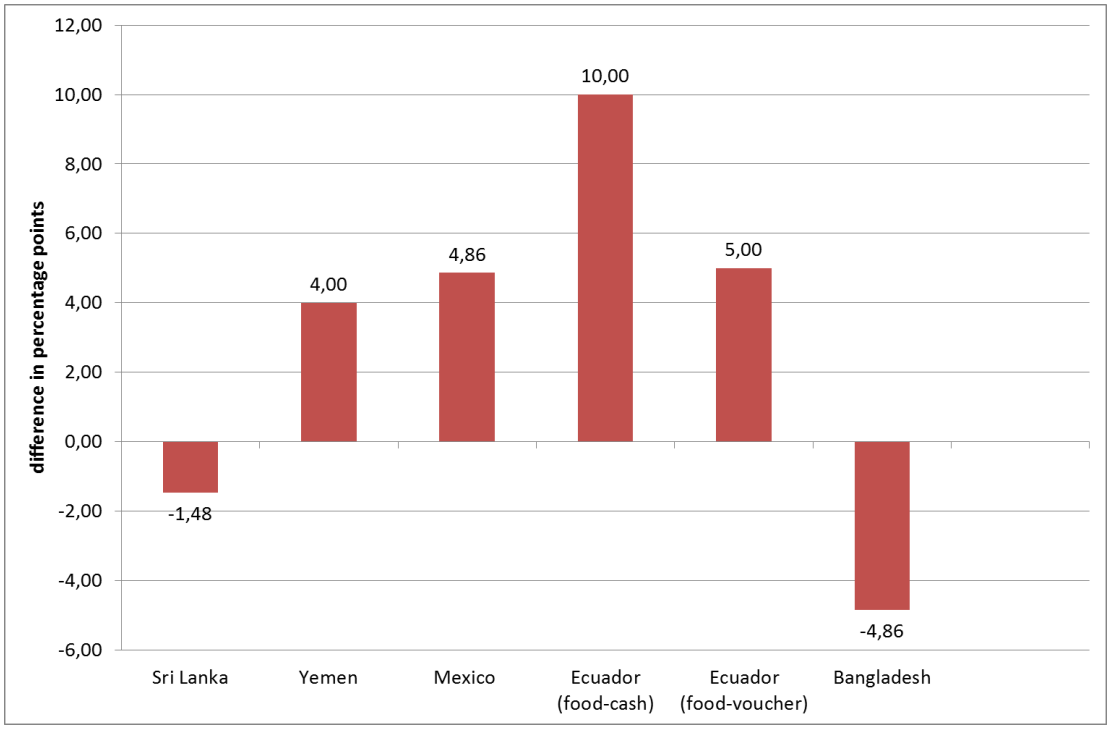
How to explain that food and cash transfers have differentiated effects on recipients' food consumption? Three (non-exclusive) hypotheses can be formulated:

The nature of the good transferred may matter because, in some occasion, the amount of food transferred is higher than the needs of recipient households (related to their usual consumption of the food products received). Technically speaking, the transfer is considered as "extramarginal". In this situation, the households have the choice between increasing their consumption of the received products or resell them (which is not always possible and, in all cases, generates transaction costs). They are therefore likely to increase their consumption of the food products received through the transfers. As, in developing countries, food transfers are mainly made of cereals or other staples, this may explain why food transfers generate a stronger increase in the consumption of calories.

The nature of the good transferred may matter because, in many cultural contexts, the transfer is more likely to be managed by women when it is made of food or vouchers and by men when it is made of cash (even if the cash transfer is given to the woman). As men and women may have different preferences, this may result in differentiated effect on the family food consumption.

The nature of the good transferred may matter by affecting the "citizenship effect" of the transfers. The citizenship effect has been identified by observing that households increase more their food consumption when their income increase because of a (cash, food or voucher) transfer than when it increases for other reasons (Banerjee, 2016). It expresses the fact that transfers do not only provide additional resources to recipient households: they also convey a message regarding what should be done with these resources. This message can generate increased awareness and thereby emphasise importance given to the food consumption of the family. The important point for us is that the message is likely to differ depending on the nature of the goods transferred: transferring staples conveys the message that more staples should be consumed whereas transferring money can be interpreted as 'spend more money on food consumption'. This may explain why food transfers usually result in a higher increase in calorie consumption and cash transfers in a higher increase in food expenditures.

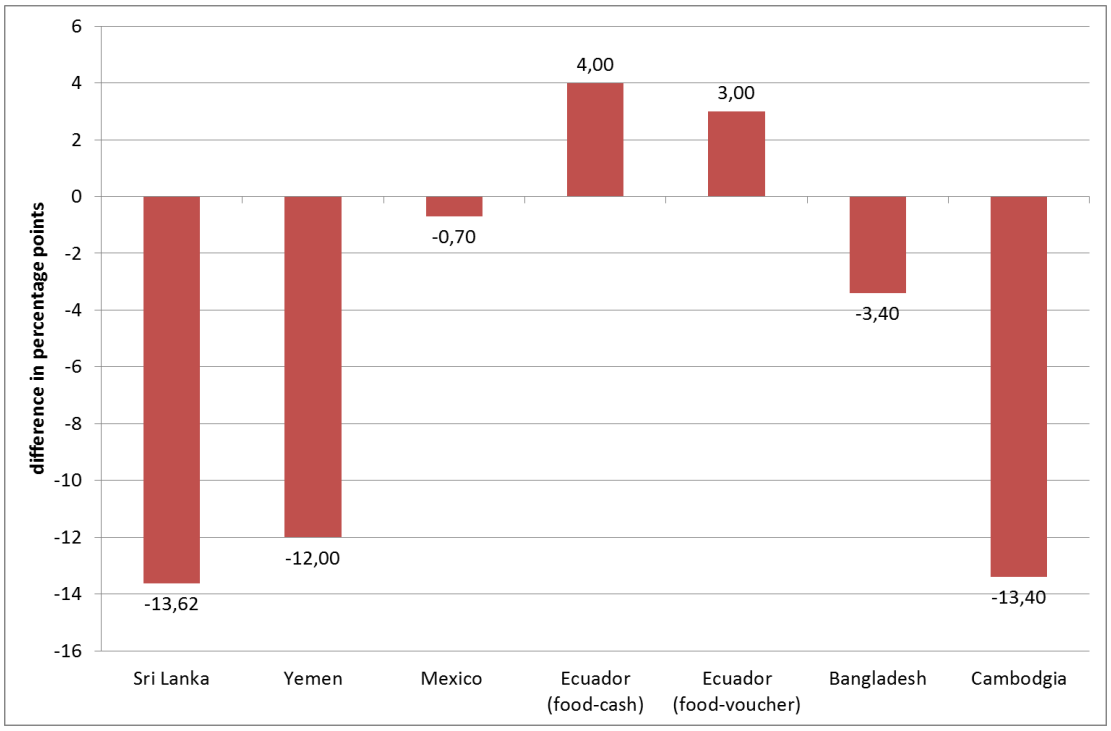
Figure 5 Relative impacts of food versus cash transfers on per capita calorie intake



Note: A positive difference in percentage points means that food transfers are better.

Source: Gentilini (2015).

Figure 6 Relative impacts of food versus cash transfers on food expenditures



Note: A positive difference in percentage points means that food transfers are better.

Source: Gentilini (2015).

Effects on recipients' satisfaction. The results presented above refer to dimensions of food and nutrition security that are implicitly related to nutrition: increasing calorie consumption, increasing food expenditures and increasing diet diversity. However, another dimension should be taken into account: the ability of the transfers to meet recipients' preferences (this dimension is part of the definition of food and nutrition security, see Chapter 1).

A priori, this dimension clearly plays in favour of cash and against food. *First*, food transfers may not fit with recipient habits and preferences. This is obvious in the case of extramarginal transfers as, in this situation, the amount of food received exceed household needs for the received products, thereby forcing it to increase its consumption of these products or resell them. This is probably the reason why recipient households living in rural areas expressed that during the post-harvest period they prefer receiving cash transfers (Gentilini, 2007): in this period of the year, they have stocks and the food transfers received are likely to be extramarginal. But even when inframarginal, food transfers may not fit with recipients' preferences if the products or qualities distributed are not adequate. This is an extreme example but maize has been distributed in areas where it is usually only used to feed animals. The problem is not only related to households rejecting this food or consuming it without appreciating it. If we come back to the idea that transfers not only convey resources but also a message, we should ask to yourself what is the content of this message when is distributed a food product considered by the recipients as a feed product only. To sum up, as cash transfers give more freedom to choose, they are likely to lead to a better fit between the additional consumption allowed by the transfers and recipient preferences. The situation is in between with vouchers: they provide more choice than food transfers but this choice may be restricted when vouchers are not accepted by a large share of retailers.

It is more than this: consumers' preferences are not only related to the nature and quality of the food products but also the way to get them. Again, cash transfers are likely to better as they allow the consumer to purchase where they want (instead of having to get their food either in public shops -for food transfers- or with retailers that accept the vouchers) and to pay exactly as other consumers (whereas paying with a voucher may be a source of stigmatisation). The freedom to choose does not only allow to a better fit of the consumed products with recipients' preferences: it also has a value in itself by providing more dignity to recipient households.

Therefore, **cash transfers are usually much better than food transfers to meet recipients' preferences**. **There may be exceptions however because of the already mentioned "gender effect"**: in some social groups, cash transfers are more likely to be managed by men and food transfers by women. Therefore, cash

transfers may be better for satisfying men's preferences and food transfers for satisfying women's preferences. This is probably what explains that women often express their preference for food transfers (Gentilini, 2007).

***Coherence between the objectives of improving recipients' food consumption and recipients' satisfaction*.** We considered two criteria to assess the effectiveness of transfers in improving food and nutrition security: improvement in recipients' food consumption and increase in recipients' satisfaction. To what extent are these two criteria convergent or divergent? The dominant view is that recipients know their needs better than anyone else and are therefore the best judge of what should be done to improve their food and nutrition security. This suggests that **providing more freedom to choose (by giving a priority to cash transfers) is likely to improve more both recipients' satisfaction and recipients' food consumption**. This is likely to be true **most of the time, but not always**. First, recipients may not be aware of their nutritional problems: Gentilini (2007: 6) cites a World Bank report about the role of nutrition education programmes in Malawi highlighting that "while very cost-effective in improving child health, [such programmes] are rarely demanded by communities, as they may not be aware that their young children are deficient in micronutrients and suffer from anaemia". Second, gender issue may play an important role: when food transfers are managed by women and cash transfers by men, giving the priority to cash transfers may in some occasions reduce the beneficial effect on the household food consumption (as women are often willing to invest more than men in the consumption of their family).

2.1.2 Cost

It is usually assumed that food transfers entail higher logistical costs than cash or vouchers (the costs of distribution are higher and additional costs are generated such as procurement and storage costs). It is also usually assumed that leakages are likely to be higher for food transfers because of losses and potential deterioration in the quality of the food. The question is more controversial regarding diversions: the classical view is that "cash [is] more prone to diversion than commodities because of its greater fungibility and appeal, and because of powerful interests within the target areas" but on the other hand "cash is […] not necessarily as visible as large-scale commodity distributions" (Gentilini, 2007: 13). According to Banerjee (2016), preventing thefts is likely to be more difficult for food than for cash. The overall expectation is that, most of the time, food transfers should be more costly than cash transfers.

These expectations are confirmed by the data provided by Gentilini. Although this data should be taken very cautiously due to its lack of reliability, it suggests that **the cost of transferring food is often much higher than the cost of transferring cash or voucher** (usually between twice and four times the cost of transferring cash, see Table 1 below). Moreover, according to Banerjee (who reviewed part of the studies reviewed by Gentilini), the cost of food transfers may be underestimated in these studies because "the possibility of losses since the delivery in these pilot implementations was tightly controlled". Last but not least, the gap between the cost of cash transfers and food transfers is likely to increase in the near future, due to the increased use of Information and Communications Technology (ICT) (cell phones, credit cards) to transfer cash and vouchers, thereby reducing the percentage of resources lost in logistical costs or leakages.

Table 1 Comparing the cost of food, cash and voucher transfers

		Amount that reaches the recipients for each euro invested in the transfer programme		
		Food transfers	Cash transfers	Voucher transfers
Country	Mexico	0.85	0.98	
	Niger	0.79	0.93	
	Ecuador	0.78	0.93	0.92
	DR of Congo		0.62	0.56
	Yemen	0.83	0.92	

Source: Authors' calculus based on data provided by Gentilini (2015).

It should be noted, however, that these costs only cover the costs incurred by the transfer programme, not the cost incurred by recipients. Receiving cash means incurring transport and transaction costs in order to get food. This is probably the reason why "people living in remote areas distant from main markets tend to prefer food transfers, while proximity to markets makes it easier to spend cash on the desired goods" (Gentilini, 2007: 16).

In addition, the empirical work done in Niger by Olivier de Sardan and the LASDEL team questions the concepts of logistical costs and leakages (Olivier de Sardan, 2007 Olivier de Sardan *et al*., 2014). In a country where the major part of the population is poor (especially in rural areas), part of the logistical costs (such as the wages of the persons employed for handling or other activities related to food distributions) cannot be considered as being without effect on food security (all the more so that the additional incomes earned circulate within traditional solidarity networks). The same can be said to some extent of "leakages" linked to food being diverted to its normal distribution channel. If part of logistical costs and leakages have an effect on food security, maybe they cannot be considered as 'lost' even if they fall out of the targeted recipients of the transfer programme.

2.1.3 Cost-effectiveness

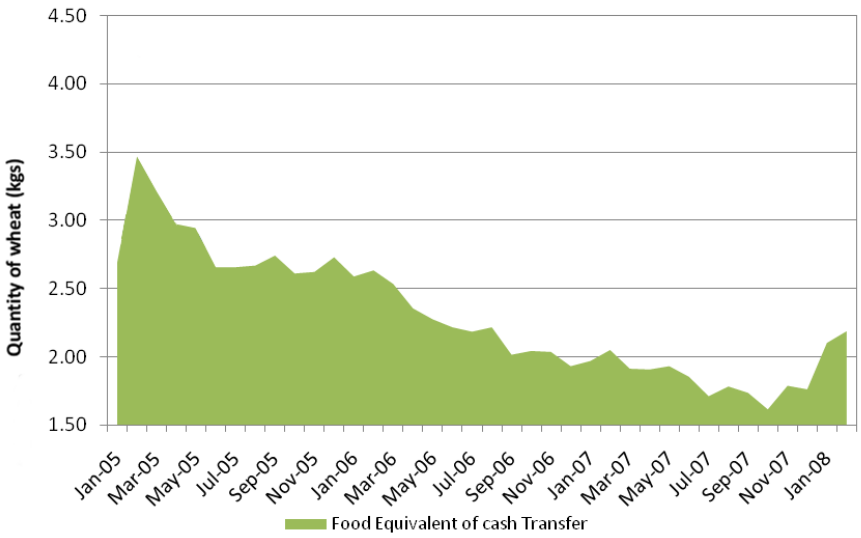
The choice between cash and food has often been presented as a dilemma between reducing logistical costs and leakages and increasing the incentives to consume food. This dilemma is illustrated by the following (striking and famous) example:

> "In a maternal-child health programme in Honduras, it cost 1.03 lempiras to deliver 1 lempira of income transfer in the form of a cash-like coupon, while it cost 5.69 lempiras to deliver the same income transfer in the form of food. However, the cash transfer had no effect on child's calorie consumption nor on use of the health centres, while the food transfer increased both" (Sanghvi et al, 1995 cited by Rogers and Coates 2002).

The debate has recently evolved from the above presented dilemma toward the idea that cash (or voucher) transfers are more cost-effective than food transfers, most of the time: their costs are much lower and likely to decrease a great deal because of their increasing use of cell phones or smart-cards; the effectiveness of food transfers is not systematically higher (as we saw, it depends on the context and the considered variables). Data confirms the view that **cash transfers are frequently (but not always) more cost-effective in improving recipients' food consumption**. In Ecuador, it has been estimated that increasing the calories consumed by 15% would cost $10.78 with food transfers, $7.58 with cash transfers and $4.50 with voucher transfers (Hidrobo et al. 2014), whereas in Bangladesh, increasing the calories consumed by 100 kcal, will cost Tk249 with food transfers and Tk255 with cash transfers (Ahmed et al., 2010). In both cases, cash was transferred at a lower cost but its effect on calorie consumption was also lower. In addition, **cash transfers are also often better to improve recipient satisfaction**.

However, it may also occur that, in the same country, food transfers are more cost-effective for some food and nutrition security objectives (for instance increasing calorie consumption) and for some regions or for some social groups (for instance, persons living far from markets and social groups where women manage food transfers and pay more attention than men on the food consumption of the family).

Figure 7 Evolution of the wheat purchasing power of the cash transfers provided by Ethiopia's PSNP



Source: Rashid and Taffesse (2009).

In addition, cash transfers may prove to be ineffective in periods of high inflation rates because in these situations, the purchasing power of the amount transferred is decreasing over time (see Figure 7 above for the example of Ethiopia's Productive Safety Net Programme or PSNP). It is of course possible to increase the amount transferred but, if the increase in food prices is ongoing, many successive adjustments will be necessary. The amount of the cash transfers can also be indexed on the Consumer Price Index (or the CPI for food products). But then there is the risk of exacerbating the inflation of food prices. Therefore, there may be some reasons for shifting to food transfers in periods of high inflation rates.

The practical implication is that, **as cash transfers are often more cost-effective than food transfers to improve recipients' food and nutrition security, they should be considered as the default option**. This in line with the recommendations of the European Commission (2012 and 2015). However, **specific situations, regions or social groups do exist where it is worth considering if a mix (cash and food transfers) is required, or if food transfers alone would be more suitable** (as acknowledged in European Commission, 2012).

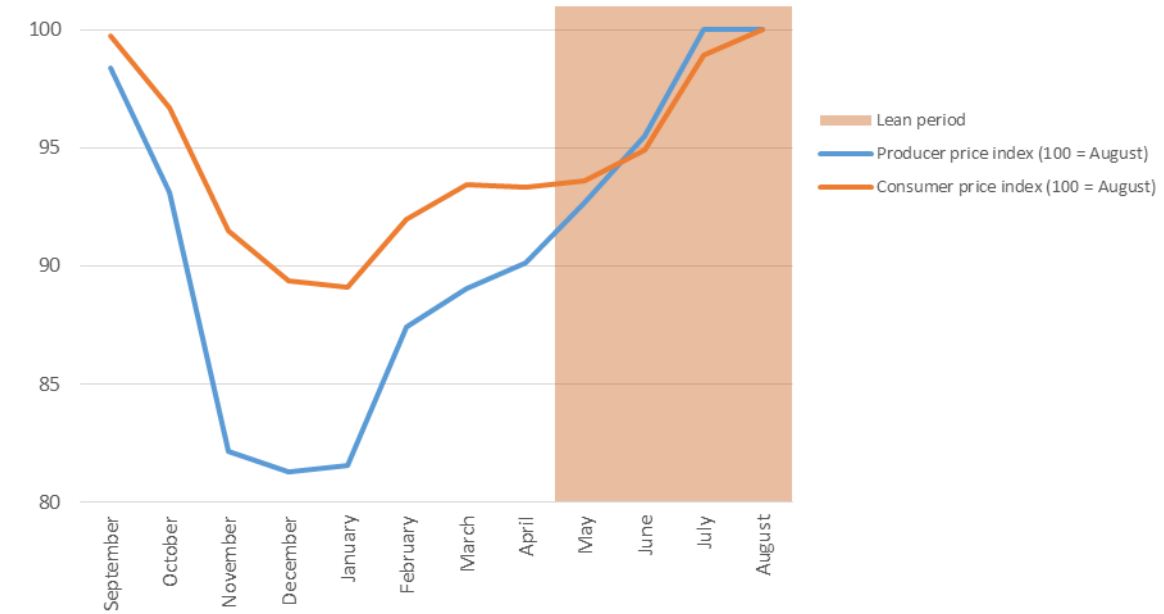
2.2 To what extent are food reserves necessary to supply permanent food transfers?

When permanent food transfers are implemented, public purchases are required to supply them. As their needs are known in advance, it is possible to make these purchases in advance or on a just-in-time basis. Just-in-time purchases do not mean that the food procured is immediately distributed: managing logistical timelines usually requires storing them for at least some days or some weeks. However, they reduce the length of public storage (and thereby storage costs) and, for that reason, they may be preferred.

However, in some occasions, it is relevant to purchase much more in advance (thereby increasing the length of public storage). This is especially the case when:

- There is a risk of shortages: then just in time purchases may be complicated or take too much time.
- Prices are highly unstable: then the cost of just in time purchases is unpredictable, generating a risk that, most of the time, cannot be hedged efficiently (lack of future markets for the considered commodities, high basis risk, high cost).
- Purchasing immediately after the harvest would increase food quality and safety: it may occur in some developing country when, because of the lack of infrastructures of private companies, public storage is safer than private storage.
- Purchasing immediately after the harvest would reduce food costs. This is the case when the seasonality of producer prices is excessive. The seasonality expresses the fact that prices usually decrease with the arrival of the new harvest, then increase progressively until reaching its highest levels in the months preceding the next harvest (the lean season). This seasonality of prices is normal: as harvests are concentrated in time and consumption is daily, there is a need for intra-annual storage, which is costly. The seasonal pattern of prices therefore reflects these storage costs. However, in many developing countries, the seasonality of prices is excessive: the price difference between the lean period and the post-harvest period is higher than storage costs. This situation is frequent in developing countries because farmers - indebted with traders or relatives and with very limited access to formal credit- have to sell a high share of their production just after harvesting, thereby provoking a collapse of producer prices during the post-harvest period. This is why the seasonality of producer prices is usually much higher than the normal seasonality of prices (accounting for storage costs) reflected by the seasonal pattern of consumer prices (see Figure 8 below). In this situation, procuring food during the post-harvest period is a way to both reduce the cost of public purchases and to smooth the excessive seasonality of producer prices.

Figure 8 Seasonality of sorghum producer price and consumer price in Mali



Source: FAO - MAFAP (2016a)

Recommendation Box 1

FR may have a role to play for fighting against chronic food and nutrition insecurity: they may be useful for supplying regular food transfers to food insecure households. Their role depends on two debates: whether it is more cost-effective to transfer food than cash or vouchers and, in case food transfers are better, whether it is more cost-effective to supply them through FR or just-in-time purchases.

Food transfers tend to be costlier to administer than cash and voucher transfers and they are not always more effective in increasing the level or the diversity of food consumption. As they give less choice to recipient households than cash transfers, they are likely to give these households less dignity and less opportunity to satisfy their preferences. For these reasons, providing cash transfers is a more cost-effective way (than food transfers) to fight against chronic insecurity, most of the time. In this situation, there is of course no need for FR to supply transfer programmes.

However, situations do occur where food transfers are more cost-effective for specific food and nutrition security objectives (e.g. increasing the consumption of calories or specific nutrients) or specific social groups. For instance, when cash transfers are managed by men and food transfers by women, food transfers may have a stronger impact on the family food consumption (and contribute to empower women). This may give arguments for providing both cash and food, as already done by several safety nets (such as Ethiopian PSNP). Cash may be provided in specific regions or social groups and food in other. Or both cash and food can be distributed to the same households, in order to provide them with the right incentives for the different components of food consumption. In all cases, the choice should be based on empirical evidence: the existing knowledge on food consumption habits and social practices should be mobilized and, in some occasions, pilot projects may be run.

When permanent food transfers are implemented, it is often possible to supply them through just-in-time purchases, which allows reducing the length of public storage (and therefore its cost). In some situations, however, purchasing in advance is a more cost-effective option. It may be the case for food safety reasons or when there is a risk of shortages or sharp price increases. It is also the case when the seasonality of producer prices is excessive: then, procuring food during the post-harvest period is a way to both reduce the cost of public purchases and to mitigate the collapse in prices that occurs during this period of the year. In practice, all these issues are more likely to occur when the food products distributed are produced locally, although they may also occur when they are imported, especially if the country is a big importer.

CHAPTER 3 WHICH ROLE FOR FOOD RESERVES IN MANAGING FOOD CRISES?

Food crises occur when the access to food of many households collapses at the same time, generating a sharp rise in hunger and malnutrition rates at local, national, regional or global levels. Depending on each household's situation, the collapse in access to food may result in reduced or less diversified food consumption (potentially resulting in deficiencies in calories and nutrients), and reduced health expenditures (potentially affecting the ability of the body to absorb the consumed nutrients). They may also constrain households to dig into their savings or sell assets or engage in risky or damaging behaviours, thereby reducing their capital and resilience and affecting their food and nutrition security in the medium run. The internationally agreed definition of food crises acknowledges these different dimensions. This definition (provided by the Integrated Food Security Phase Classification or IPC) is based on four "food security outcomes": food consumption, nutritional status, mortality and livelihood change (see IPC Global Partners, 2012). It states that there is a food crisis in a given area when "even with any humanitarian assistance at least one in five households in the area have the following or worse: i) food consumption gaps with high or above usual acute malnutrition *or* ii) are marginally able to meet minimum food needs only with accelerated depletion of livelihood assets that will lead to food consumption gaps". IPC also provides a classification of the severity of food crises, the most severe type being the famine.

After presenting the drivers of food crises (Section 3.1) and the set of possible interventions that can be implemented (Section 3.2), we will consider the role of FR for managing two major drivers of food crises: income collapses (Section 3.3), and shortages or price surges on food markets (Section 3.4). We will then conclude on implications for the design of FR (Section 3.5).

3.1 Drivers of food crises

3.1.1 Two major drivers

The classical framework of food and nutrition security presented in Chapter 1 identifies three drivers for food crises: collapses in i) physical access to food (lack of availability), ii) economic access to food (sharp increase in food prices and/or collapse in the income of many households) and iii) utilisation of food. The last category (utilisation) is related to situations where people are not able to cook and consume the food they have (for instance the lack of drinkable water) or where their body is not able to absorb the consumed nutrients (epidemics). It has very few connection with FR and will therefore not be considered in this report. We will therefore focus our attention on the two first drivers.

For the purpose of analysing and managing food crisis, the distinction between problems related to physical access to food (lack of availability) and economic access to food is not really relevant. First, there is a large overlap between the two because when the availability of food in a given area is not sufficient to cover the needs of the population, it often results in high food prices that generates economic access problems for the poorest households. Second, there is a strong heterogeneity among the factors that lead to a limited economic access to food. Some of them are related to food markets (increased food prices), whereas other are related to the collapse in income of specific categories of households.

Therefore, instead of using the classical distinction between problems of physical and economic access to food, we will consider **two main drivers: i) a collapse in the income of some categories of households and ii) a tension on food markets resulting in shortages and/or sharp increases in food prices**. The two drivers result in sharply reducing household access to food. But they may affect different households.

The two drivers can play jointly or separately. Sen (1981) showed the theoretical possibility of crises only provoked by income collapses, although this type of crisis seems to be rather infrequent. Typical examples of crises due only to food price increases are crises provoked by a spike in international prices (as occurred in 2008). Crises due to internal causes generally encompass both income collapse for some categories of households and increased food prices. For instance, major droughts, affecting production, often result in increased staple prices. But they usually also reduce the endowments of farmers (surplus farmers have less to sell; deficit farmers have more to buy) and pastoralists (many animals die or become thinner because of the lack of water and pasture). The price of animals usually goes down: animals became thinner and their supply is increased because, due to increased staple prices, pastoralists have to sell more animals to get the same quantity of staple. From farmers and pastoralists (the first categories hit), the food crisis may spread to their employees (e.g. agricultural workers) and all categories that sell them goods and services.

3.1.2 A typology of food market situations

As we will see, taking into account the situation of food markets is critical for designing an adequate response to food crisis (and determining the role for FR in this response). Table 2 below provides a typology of possible situations of food markets during food crises.

Table 2 Possible situations of food markets during food crisis

Situation 1: No sharp increase in food prices
Situation 2: Food prices sharply increased and stabilised at a higher level (the supply can be increased at a constant cost)
Situation 3: Food prices are sharply increasing Situation 3a: the supply can be increased but at an increasing cost Situation 3b: the supply cannot be increased (or cannot be increased enough)
Situation 4: No food products available on the markets of the considered area

Source: Authors.

Situation 1 refers to food crises without any tensions on food markets. As already mentioned, Amartya Sen highlighted the theoretical possibility of such type crises (only due to income collapses), although they seem to be rather infrequent (even the examples provided by Sen have been challenged, see for instance Devereux 1988).

Situation 2 refers to situations where the shock that initially provoked an increase in food prices is absorbed. Therefore prices are higher but stable. This is typically the situation of (importing or exporting) countries hit by an increase in international prices. This is also the situation of countries that, because of a bad harvest, have to import food at a higher (but stable) price.

Situation 3 refers to situations where food price are sharply raising because the supply on the domestic market i) can be increased only at an increasing cost (Situation 3a) or ii) cannot be increased or only to some extent (Situation 3b). These situations are typical of food products non-traded on international markets: they can be found on regional markets but only to some extent and often at an increasing cost, because increasing imports means attracting the supply from more remote producing areas. An example is provided by the 2012 food crisis in Sahel countries (see Box 7): millet and sorghum were in Situation 3b (the bad harvest hit all the West African producing area impeding recourse to imports), whereas maize was in Situation 3a (importing was possible at an increasing cost until the price level in the Sahel was enough to attract the maize from West Africa coastal area). Situations 3a and 3b are also typical of the situation of big importing countries (countries whose imports account for a significant share of the quantity traded on international markets). These countries may face difficulties to found on international markets the quantity they need and, of course, the higher this quantity, the more they have to pay for it. Situation 3b is typical of importing countries facing long timelines to get imports either because they are landlocked or big countries. Or because international markets are in crisis, as happened in 2008 in Bangladesh because of the crisis on the international rice market (see Box 4).

Situation 4 refers to situations where some food products are completely absent of the markets of the considered area. This usually corresponds to situations where natural disaster or political conflicts generate isolated areas or a disruption in supply chains.

Situations 2, 3a and 3b represent a problem of economic access to food for the poorest households. Situations 3b and 4 encompass a problem of physical access to food. Note that the physical access to food implies not only that stocks are enough to cover the needs, but also that a significant share of these stocks is supplied on markets. Situation 4 for instance does not mean that nobody in the considered area hold the food products missing on markets. It rather means that nobody is willing to sell them: people hoard stocks because they want to speculate or because they fear for their own future consumption. Similarly, in Situation 3b, prices can increase more than would be justified by the level of availability because in a situation of uncertainty, people hoard their stocks (this is probably what happened for rice in Bangladesh in 2008, see Box 4). This is something important to note because,

in these situations, having enough food stored in FR is likely to discourage stock hoarding, thereby exerting a leverage effect on the release of private stocks.

Among food markets, a specific attention should be given to staples (cereals, roots and tubers that provide a significant part of the dietary calories). This is because, in developing countries, staples often account for an important share of households' total expenditures (Table 3). Therefore, sharp increases in staple prices endanger not only the consumption of staples (and thereby the caloric intake) but also the consumption of other foods: many households have to reduce the diversity of their consumption in order to maintain their staple consumption level. Some households may also reduce their health expenditures or their capital and savings (thereby becoming less resilient to face future crises). As most food insecure households are net staple buyers (including in rural areas), sharp increases in staple prices are very damaging for food and nutrition security.

Table 3 Proportion of grain in the diet and household expenditures in Mali

	Proportion of grain in dietary calories	Proportion of grain in food expenditures	Proportion of grain in total expenditures
Average for rural households	**86.0%**	**51.1%**	**34.9%**
Average for the poorest 20% of rural households	88.6%	57.6%	44.3%
Average for the richest 20% of rural households	82.0%	44.1%	26.5%
Average for urban households	**73.1%**	**31.9%**	**18.4%**
Average for the poorest 20% of urban households	78.6%	38.5%	27.3%
Average for the richest 20% of urban households	68.0%	27.4%	13.6%

Source: Bocoum (2011).

Of course, among staples, the attention should be paid to the market situation of the staples most consumed by the poor.

3.2 Possible interventions for managing food crises

Managing food crises means implementing interventions to protect the food insecure households affected. For individuals with severe acute malnutrition, actions of nutritional rehabilitation (therapeutic feeding programmes) have to be implemented. FR do not have a decisive role to play in this area, although having stocks of highly nutritional food products may in some occasion be useful (it is for instance planned that 5% of ECOWAS Regional Food Security Reserve should be made of enriched flours). But, of course, it is better to manage food crises through earlier interventions aiming to maintain the access to food of poor and vulnerable households. Two types of interventions can be used for that: emergency transfers targeted to food insecure households and measures to mitigate food price increases.

Emergency transfers. Contrary to permanent transfers used to fight against chronic malnutrition (analysed in Chapter 2), emergency transfers are activated only in a period of crisis (or even during peaks in a prolonged food crisis). Like permanent transfers, emergency transfers can be provided in food or cash, the choice between these two options depending on their comparative cost-effectiveness for improving recipient food consumption and nutritional status. If permanent transfers (safety nets) are already in place, they may be used as a basis for emergency transfers (although they need some adaptation: the amount transferred to the recipients hit by the crisis should be increased and new recipients should be included). Emergency transfers are necessary to support the food insecure households whose income collapsed (they often belong to specific categories such as farmers, agricultural workers or pastoralists). They can also be useful to support the food insecure households hit by increased food prices (because they are net buyers of the considered food products).

Interventions to treat shortages or mitigate food price increases. Countries can mitigate shortages and price surges on food markets by increasing the quantity available on the domestic market. Three types of interventions can be implemented: measures to restrict exports, measures to stimulate imports and FR releases. Table 4 below summarises the different types of interventions that can be implemented to manage food crises.

Table 4 Possible interventions to manage food crises

Emergency transfers
Cash or voucher transfers
Food transfers
Market interventions to increase availability and mitigate price increases
Measures to restrict exports
Measures to stimulate imports
FR releases

Source: Authors.

Potential inflationary effect of emergency transfers. Note that, **when implemented in a context of raising prices, emergency transfers may result in exacerbating the price increases. This is especially the case when transfers are provided in cash or vouchers**: these transfers increase recipients' purchasing power, thereby generating an additional demand for food products (especially staples) that exert an upward pressure on prices. This is also the case when food transfers are provided, if the food is purchased at the last minute on the domestic market (as public purchases exert an upward pressure on prices). The inflationary effect of emergency transfers is highly problematic because it generates detrimental effects for the households non-covered by the transfers. As part of these households are food insecure (they were not covered by the transfers because of the imperfectness of the targeting or because it is the inflationary effect of the transfers that render them food insecure), this raises both food and nutrition security issues and ethical issues. The inflationary effect of transfers is likely to be negligible in a context of stable prices, both when prices remained stable during the crisis (situation 1 described in Table 2) or when prices increased and then stabilised at a higher level (situation 2). However, in a context of increasing prices (as is often the case during food crises, (situations 3a and 3b), it should be taken into account, and managed.

Potential roles for FR in implementing interventions to manage food crisis. This brief overview of possible interventions to manage food crises shows that the potential roles of FR are the following ones:

- Supply emergency food transfers;
- Back cash or voucher transfers with food sales (at the same moment, in the same localities) in order to compensate for their inflationary effect;
- Increase food availability in periods of shortages;
- Mitigate food price increases.

3.3 Principles of intervention

Three general principles should guide the choice of interventions:

- *Principle 1*. The physical access to food should be guaranteed, meaning that i) the quantity of food available in the considered area is sufficient to cover the needs of the population and ii) a significant share of these stocks is supplied on markets (we will see that in some situations stock hoarding may occur, even when stocks are enough to cover the needs).
- *Principle 2*. The problem of economic access to food generated by food price increases should be managed. As explained above, this may mean i) providing food insecure households with emergency transfers, ii) implementing market intervention to mitigate price increases or iii) combining both.
- *Principle 3*. When transfers are implemented, their potential inflationary effect should be managed (for the reasons explained in Section 3.2). This implies that, when an inflationary effect is feared (because food prices are increasing), either the transfers should be provided in food (and supplied through imports or FR) or when, for some reasons, cash or voucher transfers are preferred, they should be backed by public sales to increase availability in the considered area.

3.4 Which role for food reserves in managing food crises?

A preliminary remark is that when the crisis is due to income collapses, there is no need for FR: these income collapses can be treated through emergency transfers in cash, voucher or food procured through just-in-time purchases. The role for FR in managing crises is therefore related to the existence of tensions on food markets (shortages or sharp price increases)**.**

More precisely, the role of FR in managing food crises depends on:

- *The trade status of the country for the considered food products*: this status determines the available options to manage the tensions on domestic food markets, as the country's ability to release these tensions by regulating exports or imports strongly depends on whether the considered food products are exported, imported or not traded on international markets.
- *The magnitude of the tensions on food markets*: in case of shortages (situations S3b and S4) or sharp price increases (situations S3a and S3b), it is necessary to increase availability in order to comply with Principles 1 and 3. In some situations, this may require increased need for FR.
- *The elected policy mix between emergency transfers and market interventions to comply with Principle 2*: generally speaking, market interventions require a higher quantity of food than transfers (cash and voucher transfers do not require food and food transfers require a lower quantity of food because they are targeted). This means that the need for FR may increase with the weight of market intervention measures within the policy mix. Note that, although this policy mix is strongly constrained by the country trade status and the tensions on food markets, it is not determined by them: there is therefore a space for a policy choice. This choice is in fact a trade-off: less market interventions means higher food prices and results in a higher number of food insecure households that should be covered by emergency transfers. Correspondingly, emergency transfers covering only a low share of food insecure households render more necessary the mitigation of food price increases.

We will consider successively the case of food products exported on international markets, imported from international markets and not traded on international markets (non-tradable products such millet and cassava). For each category of products, we will present the need for FR, depending on the situation of food markets and the weight of market interventions within the country policy mix.

3.4.1 The case of exported food products

Possible market tensions. By definition, there is no shortages in the country for these products (no problems of physical access to them) and transfers are unlikely to provoke inflationary effects. However, there may be problems of economic access to these food products because their price may be high and increasing, depending on the level and dynamics of international prices.

Possible policy responses. The country has a very powerful mean to stabilise or reduce the price of these products: restricting exports. Export restriction measures (which are fully allowed by the WTO) usually allow for mitigating staple price increases effectively, almost immediately and at a zero cost for the government. If for instance the government wants to hold the price of product A below the level P*, the only thing it has to do is to implement a tax on A exports in order to align A export parity price (A international price minus taxes on exports) with P*. These kinds of policy may have some inconveniences: they may affect the country's foreign currency reserves; they may be circumnavigated (for the example of rice in India in 2008, see Timmer, 2010); they may contribute to exacerbating the increase in international prices (as occurred with the rice market during the 2008 crisis, see Chapter 6). However, export restriction measures are the only way the country has to release tensions on its domestic food market. The only alternative it has is accepting high domestic prices, which means substituting part of its free price stabilisation policy by costly emergency transfers.

Role for FR. Whatever the policy mix elected by the country, **FR are useless**: the only way to stop price increases is implementing export restriction measures (FR releases would just result in increasing exports); if the country chooses to implement food transfers, it can supply them through just-in-time purchases.

3.4.2 The case of imported food products

Possible market tensions. Two situations should be distinguished because they require a different policy response (and a different role for FR). Let us call them A and B. In both situations, food prices sharply increase on the domestic market but in situation A the domestic price P_D is equal to the import price cost P_M, whereas in situation B, it is higher.

Situation A (where $P_D = P_M$) describes the case where food prices are increasing on the domestic market because international prices are increasing (or because the country's exchange rate is decreasing). In this case, there is no shortage on the domestic market and emergency transfers are unlikely to generate inflationary effects.

Situation B (where $P_D > P_M$) describes the case where food prices are increasing on the domestic market because of a bad connection with international markets. This bad connection may stem from quantitative restrictions on imports or longer than usual import timelines: there may be a crisis on international markets (as occurred in 2008 on the rice and wheat markets), the country import needs may be higher than usual (because of a very bad harvest) or the country or concerned area may be isolated by conflicts or natural disasters. In situation B, private stocks may be insufficient (or believed to be insufficient) to cover the needs of the population, which may lead to panic purchases and stock hoarding behaviours (by traders but also farmers and consumers). These behaviours are motivated either by speculation or by the fear of not being able to satisfy the food consumption of the family. They may provoke or exacerbate shortages.

Possible policy responses. When the domestic food market is in situation A, there is no shortages and transfers are unlikely to generate inflationary effects. Therefore there is no issue related to Principles 1 and 3. A policy response is nevertheless necessary to comply with Principle 2 (guarantee the economic access to food to vulnerable households). This can be done either by providing them transfers or by reducing the level of the domestic price (or by a mix of these two options). The best way to reduce the domestic price P_D is to reduce import taxes (or even subsidise imports). If for instance the government wants to hold the price of an imported product Y below the level P*, the only thing it has to do is adjusting the Y import tax rate t_M: reducing t_M (possibly until it becomes negative, which means subsidising imports) in order to align Y import parity price P_M (Y international price plus import taxes or minus import subsidies) with P*. In some occasions, these measures are ineffective: importers may not pass on the tax reduction in their selling price (especially when the grain import sector is not competitive as is often the case in developing countries) or the product imported with subsidies may be re-exported to other countries (especially when the country is unable to secure its borders). Even when effective, these measures are costly: imports are less taxed or even subsidised. In some occasions, this may justify a lower reduction in the domestic price and more reliance on emergency transfers. Whatever the elected policy mix, FR are generally useless in situation A: varying import taxes and/or providing transfers is enough and, if food transfers are provided, they can be supplied through just-in-time purchases. The only case where FR can be useful in situation A is for big importing countries (countries whose imports account for a significant share of the quantity traded on international markets). For these countries, it may be relevant to rely more on FR and less on imports because when they increase their imports, this is likely to increase the international price, thereby rendering imports more costly.

When the domestic food market is in situation B, shortages may occur and transfers are likely to generate inflationary effects. It is therefore necessary to increase the quantity available on the domestic market to comply with Principles 1 and 3. This means removing quantitative restrictions to import if any (see Box 4 for the experience of Bangladesh in 1998). The problem is that importing takes time (this is for instance the challenge faced by MENA wheat-importing countries, see World Bank and FAO, 2012). Meanwhile, the only way to cover shortages, prevent any inflationary effect of transfers and maintain domestic prices at reasonable levels is recourse to FR.

Note that situations may occur where the problems of situation A and situation B coexist: the domestic price is higher than the import parity price ($P_D > P_M$) *and* P_M is too high. This is especially the case when there is a crisis on international markets: P_M sharply increases and import timelines may become longer and uncertain, which may lead to $P_D > P_M$ (as happened in some countries during the 2008 crisis). In these situations, the policy responses of situations A and B should be mixed: imports taxes should be removed, while FR are used to manage import timelines.

Role for FR: managing import timelines. In situation A, there is no need for FR: reducing import taxes and/or providing transfers is enough (except perhaps in the case of big importing countries for which relying on FR may be a relevant option because, for these countries, increasing imports may result in increasing the international price and thereby the cost of imports). In situation B, **the role of FR is supplying transfers and markets during import timelines to end shortages, to prevent any inflationary effect of transfers and, if possible, to reduce the domestic price** (ideally to its parity price level). This can be illustrated by the following example. Let us assume that the domestic price is 140 whereas the import parity price (in line with the international price) is 100. This means that i) imports are impossible or delayed and ii) local supply is not sufficient to cover import timelines (either because private stocks are not enough or because there is stock hoarding). When imports will arrive in some months, the domestic price will be reduced to 100. But meanwhile shortages are likely to occur, transfers are likely to generate inflationary effects, and the domestic price is likely to remain at a high level (or even to increase more). In this situation, there is a need for FR to supply markets during import timelines. The quantity released by the FR should at least be enough to remove shortages and prevent any inflationary effect of transfers (by supplying food transfers or accompanying cash or voucher transfers) but it can be higher in order to reduce the domestic price. The price target can for instance be 130 or 110 or 100 but it should remain superior or equal to 100 (reducing it below 100 would mean that the traders that previously imported food would lose money). The choice of the level of the target price has of course strong implications for the required size for FR (the lower the target price, the higher the need for FR). Note also that aligning a domestic price with its parity price level does not imply that FR should cover 100% of the needs during import timelines: private stocks are usually not nil and FR interventions are likely to have a leverage effect on private supply by discouraging stock hoarding. The experience of Bangladesh in 2008 illustrates the need for significant FR when import timelines become longer and uncertain (see Box 4).

3.4.3 The case of food products non-traded on international markets

Possible market tensions. This is the situation where products essential for the food and nutrition security of poor households are not traded on international markets (e.g. millet, sorghum, cassava, specific variety of maize). For these products, shortages and sharp price increases are more likely to occur. This is because their prices are not capped by an import parity price (because they are not traded on international markets). Sometimes, they may be capped by the parity price of substitutes traded on international markets, but often at a very high level: in 2005, in Sahel countries, the price of millet and sorghum stabilised when it reached the price level of imported rice, but it was after a 150% price increase (see Box 7). Of course, in this context, emergency transfers are likely to generate inflationary effects.

Possible policy responses. There is a need to increase availability to end shortages, to compensate for the inflationary effect of transfers and, if possible, to mitigate sharp price increases. As these products are usually traded on regional markets, there is some room for manoeuvre to increase their availability by regulating imports and exports. However, the stabilising effect of regional markets is often quite limited. *First*, export restriction measures are likely to be circumnavigated (for an example, see Staatz et al., 2008). *Second*, the quantities available for import may not be sufficient, especially since neighbouring countries are likely to be hit at the same time by the same natural hazards (as illustrated by the case of millet and sorghum in Sahel countries during the 2005 and 2012 crises, see Box 7 and ECOWAS Regional Reserve case study). *Third*, transport cost and delays are often high: increasing imports often requires attracting the supply of more remote producing areas, meaning that increased imports result in higher prices (as illustrated by the case of maize in Sahel countries during the 2012 crisis, see Box 7). Therefore there is a need for FR.

Role for FR. FR should at least compensate for shortages and manage the inflationary effect of transfers. FR should also, if possible, mitigate food price increases. Therefore **the role of FR is the same as for imported products except that the period where FR are needed is likely to be much longer (the entire crisis period instead of import timelines)**. This implies that the required size for FR is likely to be higher for these products.

3.4.4 Synthesis on the role for food reserves in managing shortages and price surges on food markets

The role of FR in managing shortages and price surges on food markets is summarised on Table 5 below.

Table 5 Role of food reserves in managing shortages and price surges on food markets

		Role for FR depending on the situation of food markets
Trade status of the considered food products	Exported	No need for FR: no shortages, no inflationary effect of transfers, no effectiveness of FR for mitigating price increases (the only way to do so is restricting exports)
	Imported	Need for FR to manage import timelines in situations where private stocks are not sufficient to meet the population needs during these timelines (shortages on markets, price higher than the import price cost). In these situations, FR should be used to: ➔ Supply markets (in case of shortages) ➔ Supply food transfers or back cash or voucher transfers with sales in the concerned localities While the domestic price is higher than the import price cost, FR can also be used to: ➔ Supply sales aiming to reduce the domestic price (if possible until it reaches the level of the import price cost) *For big importing countries, the need for FR can go beyond managing import timelines: it may be relevant to substitute part of the required imports by FR releases*
	Non-traded on international markets	Need for FR during the entire crisis period in situations where food prices go on increasing. In these situations, FR should be used to: ➔ Supply markets (in case of shortages) ➔ Supply food transfers or back cash or voucher transfers with sales in the concerned localities FR can also be used to: ➔ Supply sales aiming to reduce the domestic price

Source: Authors.

Therefore, the need for FR depends on:

- The trade status of the considered food products: no need of FR for exported products, possible need of FR during import timelines for imported products, possible need of FR during the entire crisis period for non-tradable products;
- The situation of food markets: existence of shortages (situations S3b, S4), probable inflationary effect of emergency transfers (situations S3a, S3b), magnitude of price increases;
- The respective weights of market interventions and emergency transfers within the policy mix to manage the food and nutrition security issues generated by sharp price increases: market interventions usually require greater quantities and therefore potentially higher FR.

Note that, whereas the first two parameters are exogenous variables for the country government (at least in the short run, during the crisis), the third one is a matter of policy decision. Indeed, the government can choose to rely more on mitigating price increases (which results in less food insecure households and allow reducing the coverage of emergency transfers) or on the contrary invest more in emergency transfers which allows affording higher food prices. Here below are the main criteria for determining the weight of market interventions within the policy mix:

- *The weight of food insecure households within the total population:* the lower this weight, the higher should be the weight of emergency transfers. When food insecure households account for a small share of the population, transfers are likely to be more relevant because market interventions (that are non-targeted) generate a high level of what can be considered as “leakages” from the point of view of food and nutrition security.

- *The cost-effectiveness of emergency transfers* (in the considered country). It depends on several parameters (including the form, value and timing/frequency of the transfers) but one of its main determinants is related to the cost-effectiveness of targeting. From a general point of view, targeting tends to be very costly (in terms of surveys) and have a limited effectiveness (see for instance Brown et al. 2016). In fact, there is a trade-off between the inclusion error rate, the exclusion error rate and the cost: reducing one of them often implies increasing at least one of the two others. This is why the "targeting obsession" (aiming to reduce the error of including non-food insecure households among the recipients) has been criticised by many experts. Note that the difficulties related to targeting are not only (sometimes not mainly) technical: targeting is also likely to generate political economy issues as decision-makers are likely to receive pressure to provide transfers to specific social groups. Whatever the reasons may be, many cases have been reported where the targeting is very poor, particularly in emergency situations. Last but not least, targeting can generate social costs. These costs can be expressed through social resistance to targeting, due to its potential damaging effects on local communities. In the Sahel for instance, many cases have been reported where, in order to release tensions, when the persons in charge of implementing the transfers have left the village, all the transfers are bulked and allocated equally between all the members of the community (see Annex 2). In other situations, the fact of being classified as 'poor' or 'food insecure' may generate stigmatisation issues. Therefore, depending on the social context, emergency transfers may be more or less difficult to implement, and generate more or less social costs. And, of course, these dimensions should be taken into account when determining the weight of emergency transfers with the policy mix to manage the food and nutrition security issues generated by increased food prices.
- *The length of the period during which FR sales are necessary*: as mitigating food price increases requires higher quantities of food than emergency transfers, it is obviously more feasible when the period is limited to import timelines than when it covers the entire crisis period (as is often the case for non-tradable food products).

3.5 Designing food reserves to manage food crises

In the previous sections, we analysed the role of FR in managing crises. We showed that this role is limited in time depending on the trade status of the considered food products: no role for exported products, potential role during import timelines for imported products and potential role during the entire crisis period for non-tradable products. We showed that the role of FR depends on the situation of food markets: in case of shortages, FR have a decisive role to play in supplying markets; in case of tensions on the market price (price higher than the import price cost for imported products, continuously increasing prices for non-tradable products), FR have a role to play to manage the probable inflationary effect of emergency transfers. This applies both to the transfers to food insecure households whose income collapsed and to food insecure households hit by sharp food price increases. FR can be used to manage the inflationary effect of transfers either by supplying food transfers or by supplying food sales in the localities where cash or voucher transfers are implemented. Finally FR can also be used to supply market interventions aiming to further reduce food prices.

Some experts recently argued that every time FR seem to be useful or necessary to manage food crises, an alternative option is increasing the level of private stocks by subsidising private storage. This option has been recently debated by experts and international organisations (see for instance OECD 2015a). It therefore deserves to be discussed, although it appears that it is not really convincing (for more details on this issue, see Annex 1). The only case where relying on supporting private storage may work is the case of very small importing countries where strategies to guarantee a minimum level of private stocks may be implemented (see Box 6).

Until now, all the considerations of this chapter have been about how existing FR can be used to manage crises. However, the problem is not only how to use for FR when a crisis occurs but also which FR should be built in anticipation of crises. Apart from technical issues such as the physical management of the FR (not dealt with in this report) and governance issues (dealt with in chapter 5), designing FR encompasses three main dimensions: the choice of the products to be included in the FR (Section 3.5.1), the determination of the quantities that should be stored (Section 3.5.2) and the determination of the rules to trigger the use of the FR (Section 3.5.3). We will consider successively these three dimensions.

3.5.1 Choosing the products to be included in the food reserves

From the previous sections, it appears clearly that **the products to be included in FR should satisfy three criteria: i) be important for the food and nutrition security in the considered country, ii) be imported or non-tradable and iii) be vulnerable to shortages or sharp price increases**. The first two criteria are quite clear but the third one deserves some comments: what does it mean for a food product to be "vulnerable to shortages or sharp price increases"?

Imported products are vulnerable to shortages or sharp price increases if, in some occasions, private stocks may become unable to cover the needs and the demand during import timelines. This situation occurs when import timelines become longer and uncertain. A possible situation is *when the country or specific areas within the country become isolated because of conflicts or natural disasters. In this situation, FR should cover the main food products that are usually imported and important for their food and nutrition security.* However, this situation is likely to be rather exceptional.

For most countries, the risk of private stocks being unable to cover the needs during import timelines exists only for specific food products. This is in particular the case of:

- *The products for which the country's import volume accounts for a significant share of the quantity traded on international markets*. For these products, the country may have difficulties to get the quantity it needs on international markets: it may fail or, at a minimum, face long import timelines. When it succeeds, it often has to pay a high price because when it increases its imports it pushes up international prices. For these products, the country's interest is to rely less on imports and more on FR (doing so is also a good thing for the stability of international markets, see Chapter 6).
- *The products whose international markets are vulnerable to shortages*. In practice, the products concerned are mainly cereals. This is because shortages on international markets are often provoked by trade policies such as export restrictions and panic imports (see Chapter 6 for the example of the 2008 crisis on international rice and wheat markets), and because these policies are often motivated by the high importance given to cereals in many countries (for food security and political stability purposes).
- *The products whose production is highly sensitive to natural hazard in the considered country* (rendering the harvest volume highly unstable).

Non-tradable products "vulnerable to shortages or sharp price increases" have the same characteristics as vulnerable imported products but on the regional – instead of international – market. However, the probability of having these characteristics is much higher for non-tradable products: it is much more frequent for a country to be a big country on its regional market than on international markets. And the risk of disruption in supplying sources is higher on regional markets than on international markets because bad harvests are more likely to be correlated in neighbouring countries. This is the situation experienced by Niger in 2005: during many years, Niger used to compensate for its structural deficit in millet and sorghum by importing from Northern Nigeria. As Niger needs are small compared to the production in Northern Nigeria, there was a high confidence in the stability of this supplying source. However, in 2005, the harvest was really bad both in Niger and in Northern Nigeria, resulting in this region *importing* sorghum from Niger, thereby exacerbating the crisis in Niger (for more details, see ECOWAS regional Reserve case study).

The problem is more complex however than suggested by this "product by product" analysis. Indeed, **in some occasions, it is possible for the country to solve food and nutrition security issues generated by market tensions on a food product by acting on another food product.** Two cases should be considered:

- *Release the tensions on the market of a food product by acting on the price of a substitutable food product*. In Section 3.4, we saw that it is easier to release market tensions for exported products than imported products, and for imported product than for non-tradable products. It may therefore be interesting for countries to reduce the price of an imported food product by acting on a substitutable exported product. This is exactly what India did in 2008 when it decided to tax (and then to ban) its non-basmati rice exports in order to stop the increase in the price of imported wheat (this proved to be effective but it seriously destabilised the international rice market, see Chapter 6). It may also be interesting for a country to reduce the price of a non-tradable product by acting on a substitutable imported food product. This is what Mali tried to do several times when it removed taxes on rice imports with the aim of stopping the increase in millet and sorghum prices (the staples most consumed by the poor, especially in rural areas). However,

this policy was not really effective, partly because the tax removal was not (fully) passed on by importers in their selling price and partly because the correlation between the price of rice and the price of millet and sorghum is quite low (for more details, see Box 7 and Galtier et al., 2009).

- *Maintain the purchasing power of food insecure households in several food products whose price is increasing by acting on the price of a food product that accounts for a high share of their expenditures*. This is typically the case of cereals and other staples (such as cassava) that provides a high share of the caloric intake, while accounting for a high share of poor households' expenditures. If policies are implemented to stop the increase in staple prices, the price of the other food products may go on increasing but their consumption is nevertheless supported: as less money is spent in buying staples, it is saved for other uses.

Note that, whereas the first option is relevant both for solving problems of shortages and price increases, the second one is only relevant for price increases. It cannot solve the problems of shortages because they are not only related to economic access to food but also to physical access: compensating for shortages requires to provide the missing product or a substitute with an equivalent nutritional content. However, as shortages are rather infrequent and as the first option often has a limited effectiveness (because imperfect substitutability between products), the second option is much more used. This is the reason why, in practice, FR are often mainly or exclusively made of cereals or other staples (such as milled cassava).

The practical implication is the following:

- *It is necessary to guarantee the supply of all food products essential for food security and for which shortages are feared*. When it is not possible to guarantee this supply by regulating imports or exports of the considered products (or of their substitutes), these products should be included in FR. In practice, apart from the specific case of countries or areas at risk of becoming isolated, the range of relevant product is limited to products vulnerable to supply chain disruption or for which the country's imports are high (compared to their supplying sources) and/or unstable (because of the sensitivity of the country production to natural hazards).
- *Conversely, when sharp food price increases are feared, it is possible to restore food insecure households' purchasing power by acting only on the cost of the staples much consumed by the poor* (by reducing their price or providing staple transfers). As these staples account for a high share of food insecure households' expenditures, reducing their cost increases their purchasing power, thereby allowing them to maintain their consumption of other foods (even if their price go on increasing).

3.5.2 Determining the quantities to be stored

The quantities to be stored depend on the length during which FR may be necessary (import timelines for imported food products and the entire crisis period for non tradable-products). This is why, for non-tradable product, the quantity to be stored is usually higher than for imported food products. This also explains why for imported products, the required quantity to be put in FR is usually higher for landlocked countries (which have longer import timelines).

Things are more complicated anyway because it is sometimes possible to supply interventions with substitutable food products instead of using non-tradables provided by FR. If, for instance, the government of a Sahel country (or an NGO) wants to provide cereal transfers to food insecure households, it can either distribute millet and sorghum (supplied by FR) or imported rice. Therefore, recourse to rice imports is a way to reduce the required size for FR. However, the effect on food prices is likely to be different in both cases. Contrary to transfers made of millet and sorghum, rice transfers have an uncertain effect on the price of millet and sorghum (the staples most consumed by the poor) because of the low substitutability between these two groups of cereals. If the rice received is resold by recipient households to buy much less expensive millet, the rice transfers may even have an inflationary effect on the millet price. Therefore, interventions (transfers or sales) made of the staples most consumed by the poor are likely to be much more effective for mitigating the price increases of these staples. But on the other hand, supplying all the transfers with non-tradable staples (during the entire crisis period) may on some occasions requires huge FR (and therefore be a too expensive solution). This is the reason why countries may limit the size of their non-tradable FR to the quantity necessary to manage import timelines and then supply their interventions with imported food products (see Box 2 below for an example).

Apart from the characteristics of the considered country (landlocked or not) and the considered good (imported or non-tradable) **the quantity required in FR depends on its objectives (which are related to the situation of food markets): supplying markets in case of shortages; supplying food transfers or backing cash or voucher transfers with food sales; mitigating food price increases**. The quantity stored should at least be enough to cover the supply-needs gaps and manage the inflationary effect of transfers. It can also be higher in order to allow interventions aiming to further mitigate price increases.

The quantity required to compensate for shortages on markets is difficult to estimate in advance: in practice, the FR is used to supply markets until shortages disappear and the necessary quantity is therefore only known ex post. The best way to estimate the required quantity is therefore to build on past experiences of shortages.

The quantity required to manage the inflationary effect of transfers is also difficult to estimate. The inflationary effect of transfers depends on the increase in the demand for different food products. These demand increases can be estimated (with high margins of errors) by using data on households' consumption (assuming that, after their income being increased by the transfers, recipient households will have the same consumption than non-recipient households with the same income level). It is complicated, data-consuming and not very accurate. But even when these data are available, they are not very useful for interventions: compensating the effect of transfers on the price of many food products would require providing transfers made of many different food products or backing transfers with sales of many different food products. A simple solution to this problem is based on focusing food transfers (or sales that back cash or voucher transfers) on the staples most consumed by the poor. As these staples usually account for a high share in food insecure households' expenditures, mitigating the increase in their price is likely to support not only staple consumption but also the consumption of other food products (the vast majority of food insecure households are net buyers of the staples most consumed by the poor, including in rural areas). A simple rule is that, in a context of increasing food prices, emergency transfers should be provided in staples and that 100% of these transfers should be supplied with FR or imports (no purchases on the local market in periods of increasing prices). This rule implies that FR should be enough to cover 100% of the staple transfers at least during import timelines and possibly during a longer period when the staples most consumed by the poor are non-tradable in order to have a stronger mitigating effect on the price of these staples. If, for some reasons, cash or voucher transfers are preferred, in a context of increasing food prices, their inflationary effect should be mitigated by staples sales (ideally sales of the staples most consumed by the poor). A possible rule is that staples sales should account for the quantity equivalent to 50% to 100% of the amount transferred through cash and voucher transfers.

The quantity required to manage food price increases. As explained in section 3.4, it may be relevant to adopt *a more ambitious price increase mitigation policy* (going beyond covering shortages and the inflationary effect of transfers). As already explained, the right weights of price mitigation measures and emergency transfers depends on factors such as the percentage of food insecure households, the cost-effectiveness of transfers (including the social costs of targeting) and the feasibility of price mitigation (which is higher for imported than for non-tradable food products). It may therefore be justified to build bigger FR than the quantity required to covering shortages and the inflationary effect of transfers.

The practical implication of these considerations is the following simple rule:

- *For the imported food products included in the FR, the quantity stored should be sufficient to cover a given percentage of the needs during import timelines*. This percentage should be estimated on the basis of past experiences where private stocks were not enough to cover import timelines, generating shortages and/or sharp price increases. The quantity stored should at least be enough to cover 100% of the transfers that may be necessary during import timelines.
- *For the non-tradable food products included in the FR, the quantity stored should be sufficient to cover a given percentage of the inter-annual variability of production in the country* (which can be measured for instance by the standard deviation of the production). This percentage should be estimated on the basis of past experiences where bad harvests provoked shortages and/or sharp price increases. The quantity stored should at least be enough to cover 100% of the transfers that may be necessary during the import timelines of substitutable staples traded on international markets.

Box 2 shows how the needs of FR have been estimated for each ECOWAS country by the feasibility study of the ECOWAS Regional Reserve.

Box 2 Estimating the needs for food reserves: the case of ECOWAS countries

The feasibility study of ECOWAS Regional Reserve estimated the need for FR of each ECOWAS country.

The underlying assumptions were the following:

- FR are used exclusively for supplying staple transfers
- During rice import timelines, 100% of the emergency transfers should be covered by FR (no just-in-time purchases in periods of crisis).

The resulting method for estimating country needs for FR has been the following: i) taking the percentage of population affected by the major crisis experienced by this country between 2000 and 2012; ii) multiplying this percentage to the estimated population for 2020; iii) applying the WFP norm (needs = 15 kg per head per month); iv) assuming that 3 months of these annual needs should be met regionally for landlocked countries and 1.5 months for coastal countries (in order to manage the timelines for mobilising international aid).

This provides the estimated needs for staple FR, country by country.

Table 6 Estimating the needs of FR of ECOWAS countries

ECOWAS Country	Population in 2020 (000s)	Population Affected following Most Serious Crisis (%)	Quantity required to supply emergency transfers (tons)	Import timelines	Country needs for FR (tons)
Benin	11 523	4%	82 966	1.5 months	10 371
Burkina Faso	22 150	18%	717 660	3 months	179 415
Cape Verde	544	7%	6 482	3 months	1 621
Côte d'Ivoire	24 503	4%	176 422	1.5 months	22 053
Gambia	2 242	36%	145 282	1.5 months	18 160
Ghana	30 325	4%	218 340	1.5 months	27 293
Guinea	12 765	4%	91 908	1.5 months	11 489
Guinea-Bissau	1 863	8%	25 989	1.5 months	3 249
Liberia	5 166	13%	120 884	1.5 months	15 111
Mali	20 537	23%	850 232	3 months	212 558
Niger	22 071	53%	2 118 286	3 months	529 572
Nigeria	203 869	4%	1 467 857	1.5 months	183 482
Senegal	15 998	7%	201 575	1.5 months	25 197
Sierra Leone	7 178	4%	51 682	1.5 months	6 460
Togo	7 343	4%	52 870	1.5 months	6 609
ECOWAS	388 077		6 328 433		1 252 637

Source: adapted from ECOWAS (2012).

Note that the total estimated need for FR at ECOWAS level (around 1 250 000 tons) accounts for around 3% of ECOWAS production of millet, sorghum and maize.

Source: ECOWAS Regional Reserve Case study.

3.5.3 Rules for triggering the use of food reserves

When they are evidences of shortages on the markets of the considered area, FR should be used to supply markets (while the evidences of shortages persist).

When food prices are increasing and transfers are implemented, FR should be used to supply the food transfers (made of the staples most consumed by the poor). If, for some reasons, cash or voucher transfers are preferred, FR should be used to back them with sales of the staples most consumed by the poor (in the localities where the transfers are provided).

When food prices are too high, FR can be used to supply sales of the staples most consumed by the poor in order to reduce their price. For imported food products, these sales can be implemented if the domestic price is higher than the import parity price (price cost of imported staples). They should be stopped when the domestic price falls

to the level of the import parity price. For non-tradable staples, market interventions can be implemented when the price of the staple most consumed by the poor is at a too high level (a level considered to be damaging for food and nutrition security). They should be stopped when there are evidences of an increase in exports to the neighbouring countries (as in this case, the quantities provided by FR to the domestic market flow abroad).

Recommendation Box 2

Building and using food reserves to manage food crises

The role of FR strongly depends on:

- whether some of the food products important for the food and nutrition security of the considered country are vulnerable to shortages or sharp price increases (when this is not the case, there is no need for FR to manage crises);
- the trade status of the considered food products: for exported products, no role for FR; for imported products, potential role during import timelines and, for non-tradable products, potential role during the entire crisis period;
- the situation of food markets: in case of shortages, FR have a decisive role to play in supplying markets; in case of tensions on the market price (price higher than the import price cost for imported products, continuously increasing prices for non-tradable products) FR also have a role to play in mitigating food price increases (at least to manage the probable inflationary effect of emergency transfers).

Two practical simplifications allow reducing the need for FR:

First, shortages of essential food products can be treated through imports: even when the missing food products are non-traded on international markets, it is always possible to import substitutes. Therefore, the need for FR to manage shortages is always limited to import timelines.

Second, mitigating the price increase of the staples most consumed by food insecure households is often an effective way to support not only their staple consumption, but also their consumption of other food products. This is because these staples usually account for a high share in their expenditures: therefore, allowing them to save money on staples results in giving them the means to maintain their consumption of other foods. This argument also holds for the objective of mitigating the inflationary effect of emergency transfers. It leads to the simple rule is that, in a context of increasing food prices, emergency transfers should be provided in staples and that 100% of these transfers should be supplied with FR or imports (no purchases on the local market in periods of increasing prices). This rule implies that FR should be enough to cover 100% of the staple transfers at least during import timelines, and possibly during a longer period when the staples most consumed by the poor are non-tradable (in order to have a stronger mitigating effect on the price of these staples: distributing imported staples will always have a weaker effect). If, for some reasons, cash or voucher transfers are preferred, in a context of increasing food prices, their inflationary effect should be mitigated by staples sales in the localities where cash or voucher transfers are implemented (ideally it should be sales of the staples most consumed by the poor).

Therefore, it is necessary to **build FR made of all food products essential for food and nutrition security for which shortages may occur**. In practice, it may concern many products only in the very specific situations where the country (or specific areas within the country) may become isolated (for instance by conflicts or natural disasters). But, most of the time, the list of the products vulnerable to shortages is quite limited (products whose production is highly sensitive to natural hazard, products for which the country's import needs may become high compared to its supplying sources, products vulnerable to a disruption in supplying sources). The quantity stored should be sufficient to cover a given percentage of the needs during import timelines. This percentage should be estimated based on past experiences where private stocks were not enough to cover import timelines, generating shortages.

It is also necessary **to build FR made of the staples most consumed by the poor in case the price of these staples may increase sharply** (when the concerned staples are imported, the criterion is that their price may go above the import price cost, thereby revealing that private stocks are not sufficient to manage import timelines). These FR will not only be used to compensate for shortages (if any) but also to manage the inflationary effect of transfers (by supplying food transfers or backing cash or voucher transfers with staples sales). And possibly to supply additional sales aiming to further reduce the price of these staples. *When the staples most consumed by the poor are traded on international markets*, the quantity stored should be sufficient

to cover a given percentage of the needs during import timelines. This percentage should be estimated based on past experiences where private stocks were not enough to cover import timelines generating domestic prices above import price costs. *When the staples most consumed by the poor are not traded on international markets*, the quantity stored should be sufficient to cover a given percentage of the inter-annual variability of production in the country. This percentage should be estimated on the basis of past experiences where bad harvests provoked sharp price increases. The quantity stored should at least be enough to cover 100% of the transfers that may be necessary during the import timelines of substitutable staples traded on international markets.

When a crisis occurs, FR:

- **should be used to supply markets when there are evidences of shortages** on the markets of the considered area;
- **should be used to supply staple transfers when staple prices are increasing**. If, for some reasons, cash or voucher transfers are preferred, FR should be used to back them with staples sales (in the localities where the transfers are provided). This applies both to the transfers provided to i) the food insecure households whose income collapsed and to ii) the food insecure households hit by sharp food price increases;
- **can be used to supply sales of the staples most consumed by the poor** in order to reduce their price when it is too high. For imported food products, these sales can be implemented while the domestic price is higher than the import parity price (price cost of imported staples). For non-tradable staples, they can be implemented when the price of the staple most consumed by the poor is at a level considered to be damaging for food and nutrition security.

3.6 Illustrations

The boxes presented below aim to illustrate some of these recommendations.

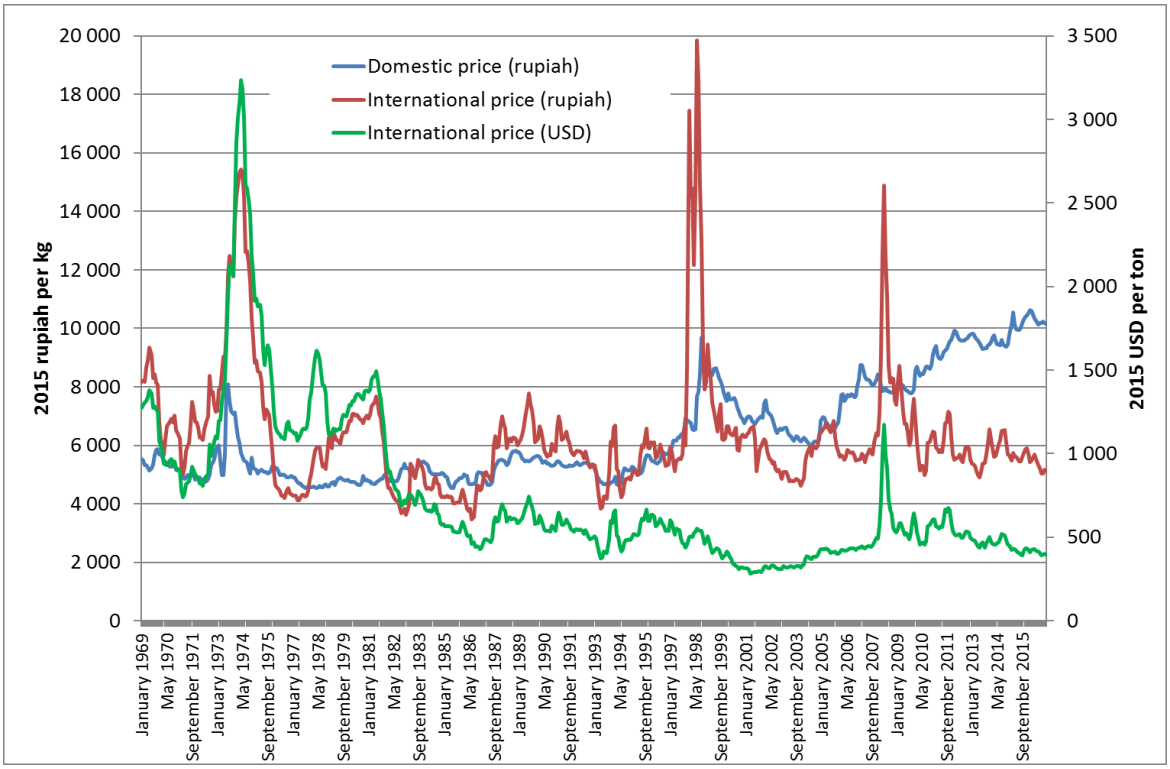
The first four boxes are on the use of FR by importing countries to manage food crises. Box 3 presents the Indonesian success story in stabilising the domestic price of rice between 1973 and 1997. This policy was based on regulating imports and using FR. Box 4 illustrates the needs for FR to manage import timelines: for many years Bangladesh succeeded in mitigating staple price increases only by allowing more imports. However, in 2008, the crisis on international markets resulted in longer and uncertain import timelines which seems to have provoked speculation (stock hoarding) and panic purchases, which resulted in exacerbating the increase in the rice domestic price. The government of Bangladesh understood the lesson: it nearly tripled the size of its FR. Box 5 is about the dilemma of using FR to supply targeted transfers or to mitigate staple price increases. It deals with Ethiopia policy during the 2008 crisis. Finally Box 6 shows how (for very small importing countries), contracts with private traders can be an alternative to FR for managing import timelines. This Box is on Hong Kong and Singapore experiences.

Box 3 Indonesia success story in stabilising the domestic price of rice by regulating imports and using food reserves (1973-1997)

In Indonesia, the food logistics agency (BULOG) was established the end of the 1960s to control rice prices, with a head who reported directly to the president, and with a line of credit at subsidised interest rates from the Central Bank. BULOG implemented a publicly announced floor and ceiling price for rice, with the margin between the two wide enough for the private sector to carry out most rice marketing activities. A rice buffer stock absorbed purchases at the floor price and provided rice to inject into urban markets to defend the ceiling price, with rice imports being an important balance wheel in the process.

The world food crisis in 1972/73 caught the Indonesian government, and BULOG, unprepared. After several years of price stability, rice prices spiralled out of control and the government quickly tried to arrange emergency imports from a world rice market that had completely disappeared for nearly a year. However, BULOG was quite successful in stabilising rice prices from late in 1973, when it regained control of domestic prices after a good rice harvest, until the Asian Financial Crisis in late 1997 (see Figure 9). After 1998, the objective of the Indonesian government appears to have shifted from stabilising the domestic price of rice to maintaining it permanently at a high level (see Box 10 for more details on that).

Figure 9 Real Rice Prices in Indonesia, Domestic (Rp) (blue), Imported from World (Rp) (red), and Imported from World (USD) (green)



Source: Data and graphics provided by David Dawe, FAO Bangkok.

Source: Indonesia case study report.

Box 4 The need for food reserves to manage import timelines: the experience of Bangladesh in 2008

In the first few years after its independence in 1971, Bangladesh was faced with massive food and nutrition security problems. Rice production fell sharply in 1971/72 and 1972/73 and rice imports were severely limited by a shortage of foreign exchange and very high international prices. Availability of cereals fell, resulting in the death of at least 30,000 people, though unofficial reports put the figure as high as 100,000. Liberalisation of wheat and then rice imports in the early 1990s provided substantial stability to cereal prices. In mid-1998, domestic rice prices rose along with floodwaters that ultimately covered two-thirds of the country. As domestic prices reached import parity levels, private sector rice imports flowed across the border from India, quickly adding to total market supplies, which resulted in keeping the domestic market price from rising above the import price cost. *This illustrates the decisive role of imports for mitigating staple price increases*. However, the 2008 crisis showed that allowing imports is not enough. In spite of significant rice imports (1.7 million tons in 2007/08), average wholesale rice prices in Bangladesh rose by 45 % in real terms between November 2007 and April 2008. Model simulations of the changes in net rice supply and consumption demand account for only 9 % of the actual 45 % increase in real rice prices actually observed. However, simulations of an increase in private stockholding of about 900,000 tons (equivalent to about two weeks of consumption) result in a simulated real price increase approximating the historically observed increase. These simulations suggest that an increase in private stockholding could have been a major factor in explaining the price increases of 2007-08. They also suggest that *ready availability of approximately 1 million tons of rice through drawdown of food reserves or imports would enable Bangladesh to handle similar disruptions* in the future. The government of Bangladesh understood the lesson: in the aftermath of the 2007/08 price shock, it again built up rice stocks: public rice stocks, which averaged 531,000 tons over the 2002/04 – 2006-07 period, were increased rapidly to an average of 1.032 million tons in the July 2008 to December 2009 period. Overall, public foodgrain stocks (including rice and wheat) nearly tripled from 617,000 tons in 2007/08 to 1.69 million in the July 2012 – February 2016 period.

Source: Bangladesh case study report.

Box 5 How to best use food reserves for managing food price crisis? To mitigate staple price increases or to provide targeted aids? Ethiopia's experience during the 2008 crisis

"In mid-2008, in an effort to lower domestic wheat prices, the government [of Ethiopia] intervened in domestic markets by importing wheat on a commercial basis and then selling 283 thousand tons of the wheat at fixed subsidised prices (generally 300 Birr/quintal, only about half of the wholesale price of wheat in Addis Ababa market). Most of this wheat (55 per cent) was sold to flour mills; 23 per cent of the subsidised wheat was sold to consumers through selected urban shops and 18 per cent of the wheat was sold to rural village-level consumer cooperatives. Overall, less than 2 per cent of the wheat (8,100 tons) was sold to wholesale traders, and none after September 2008, due to concerns that traders did not pass on the huge implicit subsidy to consumers.

Sales of government imported wheat reduced real wheat prices in domestic markets from July through October. […] October 2008 real prices were 26 per cent below a projected real price without the import intervention (the June price plus an estimated 2 per cent per month real seasonal price rise). These reductions in food prices are somewhat less than a simulated 34 per cent decrease using an elasticity of wheat demand with respect to wheat price of -0.8 (a level approximately equal to econometric estimates using cross-section household level data). […] These sales at the low official price also implied huge rents (excess profits) for traders and millers who were able to purchase wheat at 300 Birr/quintal and sizeable income transfer to poor households who were able to purchase government wheat directly. The total value of these rents and subsidies (which accrued to various actors according to their share in total subsidised wheat distribution) reached about 900 million Birr (about US$90 million).

[…] One alternative to this policy would have been to auction government wheat imports in domestic markets. Such a policy would eliminate rents accruing to recipients of subsidised wheat. It would also have generated additional government revenue (through sales at a higher price), while having essentially the same effect on market prices as government subsidised sales, since the volume of wheat injections into the Ethiopian wheat market would have been the same. […]"

Source: Dorosh and Ahmed (2009).

Box 6 Contracting with private importers to manage import timelines: Hong Kong and Singapore experiences

A great reliance on the private sector is followed in Singapore and Hong Kong, where rice production is zero. In these economies, the role of the government is simply to stipulate minimum levels of stocks that must be held by various private sector agents such as importers and supermarkets.

In Hong Kong, the government has moved away from a system of import quotas and somewhat restrictive licensing to a completely open system where anyone can import in any amount. The only stipulation is that licensed importers, as a group, must hold stocks equal to 15 days of consumption, which is equivalent to a ratio of stocks to consumption of about 4%.

In Singapore, there is a similar system (known as the Rice Stockpile Scheme) in which private sector importers are obliged to hold stocks in a government-owned warehouse. The stocks are the property of the importer, but must be rotated (rice cannot be held more than one year) and can be bought by the government if deemed necessary. The mandated level of stocks is much higher in Singapore than in Hong Kong, at approximately 17% of annual consumption.

Source: Dawe (2016).

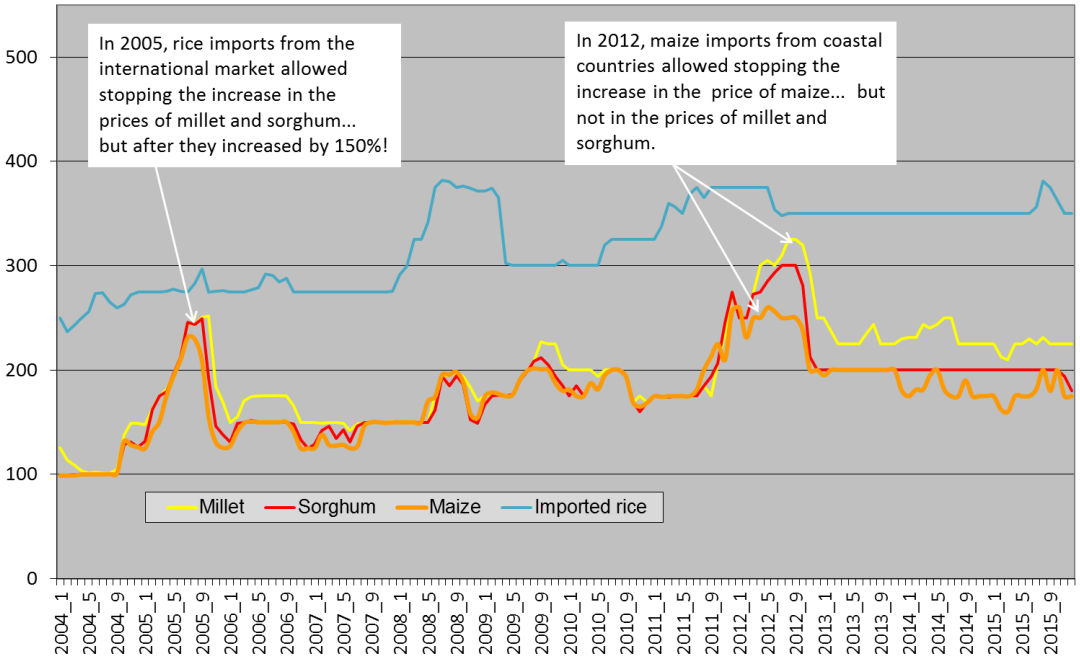
The last two boxes deal with countries weakly connected with international markets. Box 7 is on the case of Sahel countries. It illustrates the fact that, when the staples most consumed by the poor are not traded on international markets, trade is not helpful in mitigating staple price increases. This means that the burden rests on the shoulders of FR. An implication of this is that maintaining staple domestic prices below a predefined ceiling is likely to be difficult, meaning that food crises should mainly be managed through emergency transfers. However, if food transfers are implemented and 100% supplied by FR they are likely to have a mitigating effect on staple prices. This is illustrated by Box 8 for the case of Ethiopia (assumed to be weakly connected with international markets, which is often the case as imports are often restricted by the lack of foreign currencies or other reasons).

It is shown that the effect of FR-supplied transfers on staple prices can be very significant if the size of the FR is large enough.

Box 7 The need for food reserves when the staple most consumed by the poor are not traded on international markets: the experience of Sahel countries

In Sahel countries, coarse grains (millet, sorghum and maize) are the main staples consumed by the poor: as their price is usually much lower than the price of rice, they provide the cheapest source of calories. However, their price is highly unstable provoking frequent food crises: in Mali millet price increased by +150% in 2005 and by +100% in 2012. The increase in the price of coarse grains can hardly be mitigated through imports from international markets: millet and sorghum are not traded on international markets; imported maize is only used to feed animals; rice is much more expensive than coarse grains rendering it ineffective to keep the prices of millet and sorghum at reasonable levels: in 2005, the increase in the price of millet and sorghum was stopped when it almost reached the price of imported rice... after having increased by 150%! Imports of coarse grain on the regional market can sometimes be an option: in Niger, in 2010, the deficit in coarse grain has been compensated by massive imports from northern Nigeria, allowing grain prices to remain stable in Niger. However, most of the time, droughts affect all Sahel countries at the same time (as happened in 2005 and 2012). Therefore, it is not possible to rely on the regional market to compensate for the country deficit in millet and sorghum. To some extent, the *regional trade of maize can contribute to regulating grain prices in the Sahel* (contrary to millet and sorghum that are only produced in Sahel countries and in the northern regions of coastal countries, maize is also produced in coastal areas that are much less exposed to droughts). However, as observed during the 2012 crisis, maize imports from coastal countries are likely to mitigate only the raise in maize price, without being able to stabilise the price of millet and sorghum, as can be shown of Figure 10.

Figure 10 Grain prices in Bamako, Mali



Source: OMA.

In this context, the only effective way to mitigate the increase in coarse grain price is using FR. However, maintaining staple prices below a predefined ceiling is likely to be very difficult and expensive (it would require huge FR). Emergency transfers are therefore necessary to protect food insecure households and, if they are made of coarse grains, they are likely to contribute to mitigating the price increase of these products. The on-going ECOWAS Regional Reserve project is following this rationale: it aims to increase national FR and create a mutualised Regional Reserve (mainly made of coarse grain) in order to supply emergency food transfers when a country is hit by a crisis. It will benefit from a favourable context as grains can be easily stored in the Sahel region (millet and sorghum can be kept 2 or 3 years without any quality deterioration).

Source: ECOWAS Regional Reserve case study report.

Box 8 Effect of food reserve-supplied transfers on staple prices: simulations for Ethiopia

It has been estimated for Ethiopia that grain distributions are likely to decrease significantly grain prices, providing that the quantity of food distributed is high enough. The comparison was between the current level of the FR (407,000 tons) and its potential future level (there was a project to raise the level of the FR to 1,500,000 tons). Whatever the value of the price elasticity of demand and the increase in consumption resulting from being recipient of food transfers (that is, the marginal propensity to consume or MPC), the effect on grain prices is always significant when 1,500,000 tons are distributed: between 12% and 27% when the food is distributed every month; and between 25% and 55% when distributions are concentrated on the six months of the lean season (see Table 7 below).

Table 7 Effect of grain transfers on domestic grain prices: simulations for Ethiopia

Marginal propensity to consume (MPC)	FR level (tons)	Price effect if the demand is relatively elastic (ep = - 0.6)		Price effect if the demand is relatively inelastic (ep = - 0.6)	
		When equal amounts are distributed every month	When equal amounts are distributed in six lean months	When equal amounts are distributed every month	When equal amounts are distributed in six lean months
MPC = 0	407,000	**-2.18%**	**-4.36%**	**-3.27%**	**-6.55%**
	1,500,000	**-18.42%**	**-36.84%**	**-27.69%**	**-55.26%**
MPC = 0.32	407,000	**-1.48%**	**-2.97%**	**-2.23%**	**-4.45%**
	1,500,000	**-12.53%**	**-25.05%**	**-18.79%**	**-37.58%**

Source: Rashid and Lemma (2011).

Source: Rashid and Lemma (2011).

CHAPTER 4 WHICH ROLE FOR FOOD RESERVES IN PROVIDING INCENTIVES AND INCOME TO FOOD PRODUCERS?

4.1 Food reserves procurement as a way to provide incentives to producers

FR procurement is a way to send incentives to orient farmers' decisions towards production choice that contribute to improving food and nutrition security. The incentives are mainly provided through procurement prices (P_{PROC}). Incentives can be i) non-targeted (provided to all suppliers) through the standard procurement price or ii) targeted to specific categories of suppliers (e.g. small-scale farmers), production methods (e.g. organic products) or market tools (e.g. warehouse receipt system). In the second case, a specific procurement price (higher than the standard procurement price) is provided. By crossing the two types of incentives, we get the four options represented on Table 8.

Table 8 Types of incentives that can be provided to producers through food reserve procurement

		DO FR PROCUREMENT PROVIDE NON-TARGETED INCENTIVES?	
		No	Yes
DO FR PROCUREMENT PROVIDE TARGETED INCENTIVES?	No	**Standard P_{PROC} = Market price** No incentive provided	**Standard P_{PROC} > Market price** Incentives provided to all the producers of the considered good
	Yes	**Specific P_{PROC} > Standard P_{PROC} = Market price** Incentives provided to specific categories of suppliers, production methods or market tools	**Specific P_{PROC} > Standard P_{PROC} > Market price** Incentives provided to all the producers of the considered good + stronger incentives provided to specific categories of suppliers, production methods or market tools

Source: Authors.

To keep it simple, only price incentives have been indicated on Table 8. But, of course, many other types of incentives can be provided. They can be for instance related to more favourable conditions of delivery and payment. The existence of a regular demand for their products can sometimes be a sufficient incentive for producers, as illustrated by Brazil's experience of procuring food from small-scale farmers to supply social transfers and school feeding (see Box 12).

4.2 Rationale for providing non-targeted incentives to producers

When proposing a standard procurement price higher than the market price, a FR agency is providing a non-targeted incentive whose aim is almost always to **generate a floor for the domestic market price**.

However, for FR procurement to succeed in holding the domestic price above a floor, specific conditions should be satisfied. First, **the quantity procured should account for a significant share of the quantity traded on the domestic market**. Meaning that this kind of policy can only be implemented when a high quantity of food is required either to supply permanent food transfers (see Chapter 2) or to manage food crises (see Chapter 3). Second, the quantity removed from the market thanks to FR procurement should not be compensated by a reduction in exports or an increase in imports. This means that **it can only work for non-tradable staples or when accompanied by trade measures to restrict imports or boost exports**. Except for big exporting countries that can try to use public procurement to support the international price… but they are likely to fail (as illustrated by the attempts of Thailand for rice and, in another context, of Côte d'Ivoire for cocoa, see Poapongsakorn and Pantakua, 2015 and Gombeaud et al. 1990). Third, FR purchases should be timely, predictable and transparent (the procedures used for FR procurement should allow a fair competition between market players, see Chapter 5).

Other tools can be used to support farmers' income and boost their investment in food production: export subsidies, import restrictions, direct aids to farmers (on a permanent basis or when prices collapse, as in the US deficiency payment system) or private storage subsidies. However, all these tools have their limitations. Export subsidies or import taxes alone are not enough to guarantee a floor price (in order to do so, these subsidies or taxes should be indexed on international prices, which is forbidden by the WTO). Moreover, even when not indexed, these measures are restricted by the WTO (as is also the case for FR procurement, see Chapter 7). Direct aids are difficult to implement in developing countries as they require a huge (regularly updated) database on farmers' activities and incomes. When the aids depend on the level of international prices (countercyclical aids), they are also restricted by the WTO. Policies based on subsidising private storage are likely to be ineffective (for reasons explained in Annex 1). This is why there may be a role to play for FR in providing a floor price to farmers.

The rationale for providing a floor price is stimulating farmer investment in food production. Note that **stimulating investment does not require a permanent support of producer prices: this kind of support would generate higher consumption prices that would be highly damaging for food and nutrition security** (as illustrated by the examples of Philippines and the recent experience of Indonesia, see Box 10 in this Chapter). What matters is providing a price support when the price collapses in order to reduce the risk generated by investments: if investing is then less risky (and perceived as less risky), i) farmers are more willing to invest and ii) banks or microfinance institutions are more willing to lend them money (in developing countries, farmers usually have a very limited access to credit because agriculture is a highly risky activity). As a matter of fact, FR procurement played an important role in the success of the green revolution in Bangladesh, India and Indonesia.

The benefits expected from increased investment in food production are:

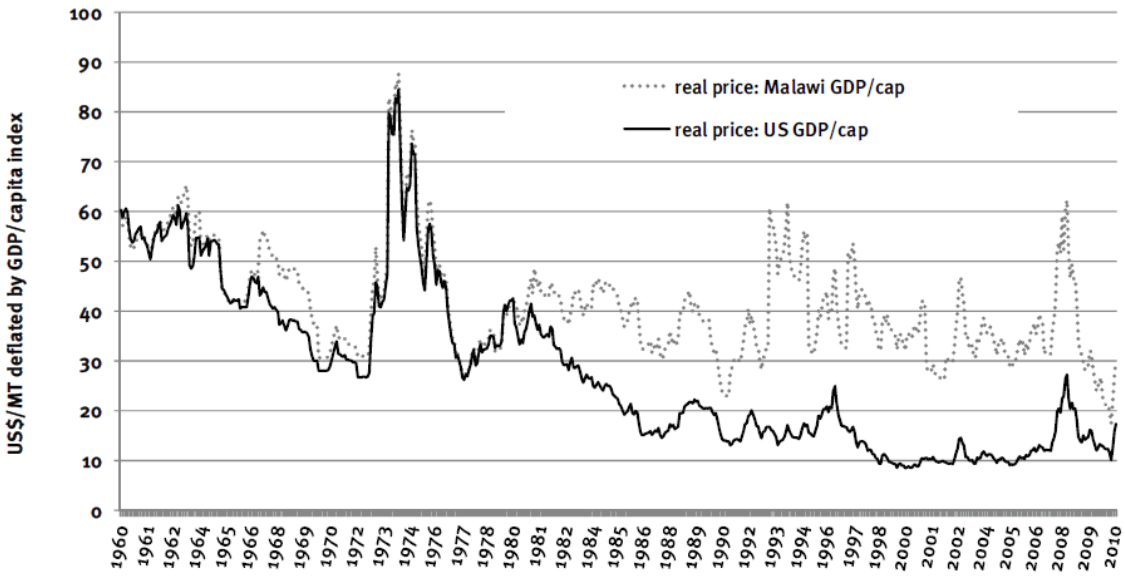
- Higher and less variable staple production (resulting in reducing the frequency and magnitude of food crises);
- Higher productivity of staple production (resulting in reducing the cost of staples but also, by saving land and agricultural labour, of other foods);
- Higher farmer incomes (resulting in reducing food and nutrition insecurity in rural areas).

However, these benefits are not automatic. They will be only achieved if the resources and techniques to increase and stabilise production and improve productivity are available and if farmers have access to them (which may require research, extension, credit or subsidies). These benefits may also not be sustainable if they rest on production models that generate scarcities in some of the resources used (e.g. water for irrigation) or too high level of pollution of soil, water and plants, generating food safety issues (HLPE, 2011). On the other hand, if there is a lack of available land or agricultural labour, incentives to increase staple production may result in reducing the production of other foods, thereby being detrimental to the diversity of food consumption.

Note that countries may benefit from the productivity gains achieved in other countries because they may result in decreasing the price of imported staples. However, this effect is not automatic as it strongly depends on the dynamics of the country exchange rate with the US dollar (which gives the international price converted in local currency) and the general inflation level within the country. Therefore, it may well occur that for certain countries the real price of staple has not decreased during the last decades, as illustrated in Figure 11 by the example of Malawi.

Last but not least, the effect on rural poverty and farmer food and nutrition security crucially depends on the size distribution of farms. If the incentives are not targeted to small-scale farmers, they are likely to benefit more to big farmers: in Zambia, around 5% of the farms account for 50% of total maize sales. As a matter of fact, farmers with less than 1 hectare of land (2/3 of farmers in Zambia), only account for 6% of the sales to the FR agency. Moreover, in developing countries, many farmers do not produce enough staple to feed their family and are therefore net staple buyers: for instance, staple deficit farmers account for 73% of small farmers in Ethiopia and 63% in Kenya (on this topic, see Losch et al. 2012, HEA Sahel 3013 and Table 9 below).

Figure 11 Wheat real price in the USA and Malawi



Source: Dorward (2011).

Table 9 In Sub-Saharan Africa, a large proportion of small-scale farmers are staple buyers (or net buyers)

	Zambia *(maize)*	Mozambique *(maize)*	Kenya *(maize)*	Ethiopia *(maize and teff)*
Sellers only	21%	13%	18%	13%
Buyers only	33%	51%	55%	60%
Buy and sell	8%	12%	19%	25%
including net buyers	*3%*	*n.a.*	*7%*	*13%*
Neither buy nor sell	39%	24%	8%	2%

Source: Jayne et al. (2006).

Of course, the major part of food insecure households in rural areas is within this category. For them, higher staple prices are not a good thing. This is an additional reason why price support should not be implemented permanently but only to mitigate an excessive fall in prices. This gives also arguments for providing specific incentives to small farmers.

4.3 Rationale for providing specific incentives to small farmers

Special conditions can be defined to increase the participation of small-scale farmers to FR procurement. The final objective is, of course, to reduce rural poverty and by this way improve food and nutrition security. A specific quantity (quota) can be reserved for small-scale farmers. They can also benefit from higher prices or from more flexible conditions than other suppliers regarding quality requirement, place of delivery, delays, minimum quantity requirements or payment. For practical reasons, procurement from small-scale farmers is usually made mainly through producer organisations. Therefore, defining special conditions to strengthen the participation of small-scale farmers to FR procurement also stimulates the development of collective marketing through POs, with expected additional benefits such as: i) allowing small farmers to anticipate the right moment to sell (avoiding to sell during the post-harvest period when prices are depressed), ii) increasing farmer bargaining power, iii) reducing storage costs and iv) reducing transaction costs through economies of scale. In the medium run, POs' learning by doing may also generate increased marketing skills and open the access to more demanding markets.

However, providing specific incentives to small-scale farmers is challenging, as many implementation issues have to be overcome. Purchasing from small farmers is likely to generate higher transaction costs (as shown by the experience of WFP Purchase for Progress programme, see WFP 2011a). POs may have low marketing capacities or be poorly governed (policies may be required to strengthen their capacities). Purchasing directly from POs does not always guarantee that only small-scale farmers will benefit. Last but not least, government or bureaucrats may be tempted to use FR procurement to develop political patronage.

Many national FR agencies procure part of their purchases with small-scale farmers (usually through POs), the most famous example being Brazil's Food Acquisition Programme (see Box 12 below). The WFP is doing the same through its Purchase for Progress (P4P) programme (WFP 2011a; WFP 2014a). Although these programmes are not perfect (many cases have been reported where POs were unable to deliver the right quantity), they are likely to produce many benefits in the long run (farmer empowerment, reduction in rural poverty).

4.4 Rationale for providing specific incentives to environmental-friendly production models

The shift to more environmental-friendly production models is likely to contribute to food and nutrition security both in the short run (by improving health) and in the medium run (by increasing the sustainability of food production). In the short run, the main effect is through food safety and water quality (pesticides and other inputs used by conventional agriculture are dangerous for human health). Health is crucial for nutrition as it conditions the ability of the body to absorb the nutrients consumed. In the long run, pollution of soils and water tables, the reduction in soil fertility and the scarcity of water for irrigation and some components of fertilisers (such as phosphates) may compromise the sustainability of food production in different regions of the world.

Many municipalities around the world developed programmes to supply school canteens with organic food products. The objective is both to provide children with safe food and incentivise farmers to convert to organic production, in order to preserve the quality of soils and water. Up to now, these programmes are not very common in developing countries, but they may develop in a close future. In 2011, a programme of this kind was developed by the Municipality of Seoul and it proved to be very successful: almost all the farmers of the valley that supplies the major part of the water used in Seoul converted to organic production. These experiences are not focused on FR (the considered products are usually not stored for a long time), but they show how public procurement can play an effective role in improving food security by promoting environmental-friendly production models.

4.5 Rationale for providing incentives to specific market tools

The development of specific markets tools such as warehouse receipt systems (WRS) and commodity exchanges can contribute to improving food and nutrition security by leading to more transparency (on stocks and prices), thereby improving market efficiency. WRS are based on using stocks as collateral to obtain credit from a bank or a microfinance institution. This implies that stocks are located in an accredited warehouse. In some countries, warehouse receipts can be sold, meaning that several transactions (transfer of property rights) may occur without moving the product. A commodity exchange is based on selling warehouse receipts on organised markets (where all the supply and all the demand are centralised). Apart from their expected effect on market transparency and efficiency, WRS may also increase the level and the length of farmer storage and, through this way, contribute to improving farmer food and nutrition security during the lean period.

Part of FR procurement can be channelled through these specific market tools. The simple fact to address a regular demand on significant volumes to specific market tools is a way to support them, as it is likely to generate economies of scale and learning processes. The support to specific market tools may also contemplate a price support in order to help them attract more quantities (in many cases, a price slightly higher than the market price is likely to be enough). A good example of this is provided by the modalities implemented by the WFP for procuring grain in Eastern and Southern African countries, as it procures significant quantities on commodity exchanges or Warehouse Receipt Systems (for instance ECX in Ethiopia and ZAMACE in Zambia, see WFP 2011a). However, until now, the involvement of national FR agencies in this area seems quite limited.

Recommendation Box 3

FR procurement is a way to send incentives to orient farmers' decisions towards production and marketing choices that contribute to improving food and nutrition security. The idea is to stimulate farmer investment and orient their decisions toward specific products, production models (e.g. organic agriculture) or market tools. The expected benefits are: increased, less variable and safer food production, lower production costs, increased availability of land and agricultural labour for other foods (thanks to productivity gains) and higher incomes for

poor farmers (resulting in reducing food and nutrition insecurity in rural areas).

FR procurement can sometimes be used for providing a floor for the domestic market price. The rationale behind this idea is that such a floor price boost investment by rendering farmers more willing to invest and banks or microfinance institutions more willing to lend them money. As a matter of fact, FR procurement played an important role in the success of the green revolution in some Asian countries. It is worth noting that **stimulating farmer investment in food production does not require a high floor price**: what matters is preventing price collapses. The floor can therefore be fixed at the mid-term average level of international prices or even at a slightly lower level (a high floor price generates a high consumption price that is highly damaging for food and nutrition security, as illustrated by the examples of Philippines, Zambia and the recent experience of Indonesia).

Floor price policies are not relevant for all countries: they can generate poor consequences such as scarcities in some of the resources used (e.g. water for irrigation) or too high level of pollution of soil, water and plants, generating food safety issues. In addition, if there is a lack of available land or agricultural labour, incentives to increase staple production may result in reducing the production of other foods, thereby being detrimental to the diversity of food consumption. The effect on rural poverty and food and nutrition security is also context-dependent because floor price policies may benefit mainly big farmers and be detrimental for deficit farmers.

When floor price policies are relevant there is not always a role to play for FR, as other tools can be used for the same purpose. In fact, FR procurement can be useful to guarantee minimum prices to farmers only for non-tradable staples or importing countries where imports are restricted. In all cases, the quantity procured should account for a significant share of the quantity traded on the domestic market. This means that FR procurement can be used to provide a floor price only if a high quantity of food is required to supply permanent food transfers (see Chapter 2) or to manage food crises (see Chapter 3).

FR procurement can also be used to provide targeted incentives. The objective is then to support specific farmers (e.g. small-scale farmers), production models (e.g. organic agriculture) or market tools (collective marketing through producer organisations, warehouse receipt systems or commodity exchanges). There are several ways to provide such targeted incentives: a quantity quota can be reserved for specific categories of suppliers and they can also benefit from higher prices or for more flexible conditions regarding quality requirement, place of delivery, delays, minimum quantity requirements or payment.

The expected benefits are numerous. *Supporting collective marketing through production organisations* may allow farmers to receive higher prices (increased bargaining power, increased ability to expect the right moment to sell), to reduce their costs (storage and transaction costs) and to increase their marketing skills. *Supporting warehouse receipt systems* may result in more transparency (on stocks and prices) and increase farmer storage, this way contributing to improve farmer food and nutrition security during the lean period. *Supporting more environmental-friendly production models* is likely to contribute to food and nutrition security both in the short run (by improving health) and in the medium run (by increasing the sustainability of food production). In all these cases, what is allowed through the targeted incentives provided by FR procurement is learning by doing and increased skills.

However, providing targeted incentives through FR procurement is challenging because many implementation issues have to be overcome, the main one being the risk that policy-makers or bureaucrats may be tempted to use FR procurement to develop political patronage.

4.6 Illustrations

The boxes presented below aim to illustrate some of these recommendations. The first three boxes show what happens when FR and other complementary tools are used to maintain permanently domestic prices at high levels (i.e. when the floor price is fixed above the word price mid-term average level). Box 9 presents the consequences for (poor) Indonesian farmers of the high price policy implemented by Indonesia since 1998 and shows that they did not really benefit from it. Box 10 presents the consequences for consumer food and nutrition security of high price policies implemented in Indonesia (since 1998) and the Philippines. In both cases, the effects have been damaging in spite of the fact that targeted transfers (safety nets) have been put in place to

protect food insecure households. Box 11 presents the budgetary consequences of high price policies coupled with targeted transfers (or consumer subsidies). The cost for the budget proved to be extremely high.

More positive experiences are presented in Box 3 (in Chapter 3) and Box 12 (below). Box 3 describes a successful example (Indonesia from 1973 to 1997) of using FR procurement to protect farmers *during price collapses*. Box 12 provides an illustration of public procurement focused on small farmers: Brazil's Food Acquisition Programme (PAA) and National School Feeding Plan (PNAE).

Box 9 Which Indonesian farmers benefit from high rice prices?

In Java, 45 percent of all rural households do not own any land other than perhaps a house plot. While not all of these households are poor, the great majority of them are in the lower rungs of the income distribution. Another 20 percent own less than one-quarter hectare of land, which is just enough to provide the average per capita consumption of rice for a family of five (if the land in its entirety is planted to rice and not to other crops). *Together, these two groups account for nearly two-thirds of rural households on Java*. By and large, they are much poorer than farmers with larger amounts of land, and they are not likely to be net sellers of rice. *For these households, lower rice prices mean higher real incomes and less poverty*.

Indonesia's larger landowning rice farmers are not wealthy in absolute terms, but in relative terms most of these households fall in the middle (third) quintile of the overall income distribution. In Java, only one-third of *rural* households own enough land to produce a surplus of rice for a family of five. These are clearly not the poorest of the poor, although poor farmers can rent rice land and be just as dependent on the harvest price as larger land-owning farmers. Permanently higher rice prices, however, just drive up the rental price of land, leaving renters no better off than before.

Source: Indonesia case study report.

Box 10 The damaging effects on food and nutrition security of maintaining permanently high staple prices: lessons from Indonesia and the Philippines

In **Indonesia**, the Food Logistics Agency (BULOG) has been successful in stabilising the domestic price of rice from 1973 to 1997 (see Box 3). Since 1998 (and the establishment of democracy), BULOG has not been very successful at stabilising rice prices, but high rice prices seem to be the political objective rather than stable or efficient prices. This has led the government to restrict imports, resulting in sharp increases in the price of rice on the domestic market (see Figure 9 in Box 3).

For instance, by February 2006 domestic rice prices in real terms had risen by 25 percent, whereas equivalent rice on the world market had fallen in price by 11 percent. In March 2007, the SUSENAS report on poverty in Indonesia reported a significant increase in the poverty headcount, despite fairly rapid economic growth nationwide. A vigorous debate developed in Indonesia in 2006 over the causes of the increase in poverty (the fuel subsidy was also reduced in 2005 and cash transfers were arranged for poor households in compensation). The role of high rice prices, and the import ban, was heavily contested. Regardless, the vigorous and open debate late in 2006 over the impact of the rice import ban led to discussions of how to arrange imports in a timely fashion to prevent further price increases and harm to the poor. Options for managing the impending rice crisis by arranging emergency rice imports were prepared for the Minister of Trade, who immediately requested Presidential permission to start the import process. An *INPRES* was issued on December 9, 2006, authorising imports. Unfortunately, there was enough political and bureaucratic opposition to prevent rice imports from arriving until late February, which was far too late to prevent a sharp spike in rice prices in December, 2006 and January/February, 2007. By March 2007, domestic rice prices were 57 % higher than world prices. Poverty rates stayed high, and the number of "near poor" increased significantly.

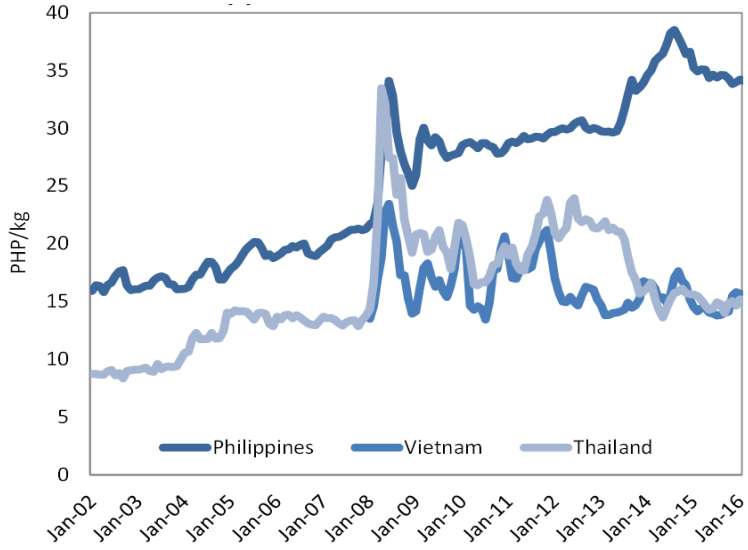
The food transfer programme (Raskin) is of course not sufficient to fully compensate the effects of high rice prices on poor consumers—all the more that Raskin's targeting is very bad (see Banerjee 2016 and Indonesia case study). Note also that high prices do not really benefit poor farmers (see Box 9).

In the **Philippines**, the FR agency (NFA) has a monopoly on rice imports and it manages them in order to maintain the domestic price at a high level (see Figure 12). NFA also procures rice mainly with local farmers, at

a price usually higher that the market price, thereby providing an additional support to farmers. The record indicates that the NFA has been able to buy only up to 5% of paddy production on an annual basis in the last 10 years while its support price has been within 0.98% to 1.25% of average farm-gate prices.

At the same time, NFA releases rice on the domestic market at a subsidised price in order to protect the consumers. The NFA releases rice to its market outlets to keep consumer prices at affordable level. Records show that, in proportion to total rice consumption, the intervention ranges from a low of 3% of rice consumption to a high of 22%. The NFA's release price is set lower than the prevailing wholesale rice price. Outlets sell NFA rice to consumers at a price set by NFA, which is on average 13% lower than average prices for regularly milled rice at the wholesale level. In some periods, the price discount reached 32%. The release price has been less than the average market price even after controlling for the quality, which reflects the fact that NFA may not have the volume of stocks to stabilise the market price of rice around its target price. Another possible explanation is that retailers may not have released 100% of the subsidy received in their selling price.

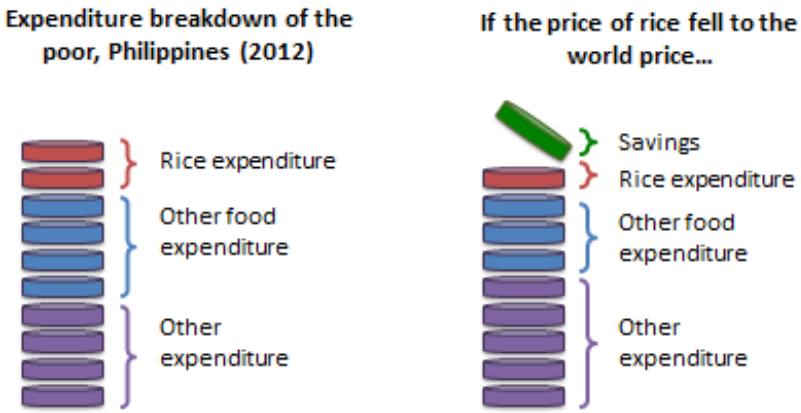
Figure 12 Rice wholesale prices in the Philippines, Vietnam and Thailand



Source: Philippines case study report.

This policy finally resulted in the rice domestic price being around twice the level of the import parity price (see Figure 12). Aligning the domestic price with the import parity price would allow poor consumer to save 10% of their income (see Figure 13), which could allow them to diversify their food consumption.

Figure 13 Aligning the domestic price with the import parity price would allow poor consumer saving 10% of their current expenditures



Source: Philippines case study report.

The lessons from Indonesia and Philippines experiences are the same: maintaining high domestic prices (much above the level of international prices) while trying to mitigate the consequences through transfers targeted to poor consumers is unlikely to be an effective policy. The transfers are not able to protect poor consumers, while high prices benefit mainly the biggest farmers.

Source: Indonesia and Philippines case study reports.

Box 11 Supporting permanently the producer price *and* the consumer price is likely to generate huge budgetary costs

The Philippines experience. As explained in Box 10, the Philippines FR agency (NFA) maintains high domestic prices (by restricting imports) and releases rice on the domestic market at a subsidised price. As already mentioned, this policy proves to be rather ineffective in protecting poor consumers: only about 25 % of the poor have availed of the NFA rice subsidies, while nearly half of those who were able to purchase NFA rice at its official prices are non-poor. But this policy also proved to be costly (for every dollar that NFA provided as rice consumption subsidy, it spent $2.21 assuming there is no leakage of benefits of the programme in 2008, see Table 10). Jah and Mehta estimated that the operational cost of the NFA rice subsidy programme (i.e. price support and targeted rice distribution) is 2.5 % of the Philippine GDP. “In 2009, NFA was estimated to have lost $785 million even with the subsidy included. It had the greatest level of borrowings of any state corporation and was the largest loss-making government corporation and the largest recipient of a government subsidy in the Philippines (Jha and Mehta 2008).” (World Bank, 2012, p. 17)

Table 10 Philippine rice subsidy: cost-benefit calculations

Measure	Unit	2006	2007	2008
Effective NFA programme cost	billion pesos	16.4	18.6	68.6
Maintenance and other operating expenses	billion pesos	6.4	1.6	4.2
Less: Net Profit (loss) from sales	billion pesos	-10	-17	-64.4
Consumer price subsidy = retail price of rice – NFA rice retail price	pesos/kg	5.6	6.5	12.4
Imputed volume of NFA sales	million metric tons	1.6	1.9	2.5
Total consumer subsidy	billion pesos	8.7	12.4	31
Cost-benefit ratio = NFA cost/consumer subsidy		1.89	1.5	2.21
Cost-benefit ratio, assuming 50% leakage		3.77	3.01	4.42

Source: Jha and Mehta (2008) cited in the Philippines case study report.

Relying more on imports to supply NFA would be a way to strongly reduce the cost of consumer rice subsidy (as the international price accounts for only half of the domestic price) and to have a stronger decreasing effect of the domestic consumer price. But it would also reduce the level of the domestic producer price and it seems that maintaining this price at a high level is the priority of the government.

The Zambia experience. The Zambia stockholding programme proved to be extremely expensive. Its cost has been estimated at 352.8 million USD, accounting for 8.2% of total budget expenditures and 1.9% of the GDP. One of the main reasons for its high cost was the difference between the procurement price and the release price (maize is purchased from the farmers by the FR Agency at a high price and sold to millers at a subsidised price). This price gap generated a cost of 150 million USD, accounting for 42.5% of the total cost of the FR programme. This measure is not even effective, as it appears that millers do not really pass on the subsidy in their selling price (World Bank, 2012 and Zambia case study).

Synthesis. The results presented above for the Philippines and Zambia are convergent with the result obtained for India and Indonesia after 1998. It appears that when countries aim to support both producer price and consumer price permanently, the overall cost of FR can be substantial compared to the cost of other public spending. Table 11 below compares the cost of FR (expressed as a percentage of GDP) with the cost of spending on agriculture and with the cost of agricultural research and development. It appears that the cost of FR may account for a large share of spending in agriculture and may be much higher than spending in agricultural research and development. Meaning the opportunity cost of FR is huge, as expensive FR result in crowding out public spending on other public goods.

Table 11 When used to support both the producer price and the consumer price permanently, food reserves generate prohibitive costs, that crowds out public spending in other public goods

Country	Spending on FR programs (% of GDP)	Spending on agriculture (exclusing FR) (% of GDP)	Spending on agricultural R&D (% of GDP)
India	**1.0%** (2004/05) to **1.5%** (2008/09)	**1.2%** (2008-09)	**0.06%** (2008-09)
Indonesia	**0.5%** (2008-10)	**0.8%** (2008)	**0.05%** (2003)
Philippines	**0.4%** (2005/06) to **1.0%** (2009)	**0.8%** (2005)	**0.06%** (2002)
Zambia	**0.3%** (2009) to **1.9%** (2011)	**0.6%** (2010)	**0.15%** (2010)

Source: World Bank (2012).

However, when FR objectives are limited to preventing price collapses and spikes, FR costs are likely to be much lower. This can be illustrated by the example of Indonesia before 1997: it has been estimated that in 1991 ("a year when BULOG was actively managing the price stabilisation effort solely on the basis of its domestic buffer stock", according to Timmer 2013b), its cost was only accounting for 0.11% of total GDP. Therefore, only 22% of its current cost (see Box 1 in Chapter 1 for more details).

Sources: World Bank (2012), Philippines case study report, and Zambia case study report.

Box 12 Procuring food with small-scale family farmers: Brazil's Food Acquisition Programme (PAA) and National School Feeding Plan (PNAE)

Public purchases from family farmers are currently based on two programmes which are key components of Brazil "Zero Hunger" strategy: the Food Acquisition Programme (PAA) and the National School Feeding Plan (PNAE). Both programmes aim to increase the income of family farmers (among whom the poverty rate is extremely high: 21.8% compared with 13.2% for the general population). They also aim to improve the quality of the food used for school feeding and other social programmes (more fresh food, more organic food, more local food, and more food attuned to local culture, habits and preferences).

The PAA was created in 2003. It is the product of a long evolution. The first step was the recognition that traditional instruments of Brazil's agricultural policy (subsidised credit, guaranteed minimum prices) are not very useful to small-scale family farmers: they do not have the resources and the borrowing capacity to take advantage of them. The demand for specific or adapted instruments was articulated through social movements (including the landless workers' movement) and resulted in the creation of the National Programme for the Strengthening of Family Farmers (PRONAF) in 1995 and the establishment of the Ministry for Agrarian Development (MDA) in 1999. The next step was the creation of the PAA in 2003 as part of the Zero Hunger strategy of Lula's government.

The category "family farmers" (which are eligible to specific programmes such as PRONAF, PAA and PNAE) was defined when PRONAF was launched. It is based on four criteria:

- the land size should be less than four fiscal modules (the size of a fiscal module varies between municipalities);
- the labour used on the farm should mainly derive from the family;
- the majority of the income is sourced from the property (agriculture, fishing, gathering…); and
- the farm is managed by the family.

Within the category of family farmers, different categories are prioritised for specific programmes such as the PAA and PNAE. For example, the most vulnerable families are in group A: *Quilombolas* (slaves' descendants), reform settlers, women heads of households and the extreme poor (per capita monthly income inferior to R$70). Other groups (B and A/C) are defined based on the level and security of family income.

The PAA's objectives were defined as follows:

- incentivise family farm production;
- incentivise the consumption of family farm production;
- promote access (in quantity, quality and regularity) to food for populations in situations of food and nutritional insecurity;
- build FR;
- assist the creation of food stocks by farmer organisations; and
- strengthen local and regional networks for food marketing.

The PAA is mainly focused on organising public purchases from family farmers. It is based on simplified procurement procedures which bypass the bidding legislation that, for different reasons, makes it almost impossible for small-scale family farmers to compete with larger producers and companies. The PAA benefited from the previous experience of Brazil's FR agency (Conab): many of the PAA modalities were adapted from the existing instruments operated by Conab to guarantee minimum prices or build FR. However, new modalities were introduced. A very innovative one is the Direct Purchase for Simultaneous Donation (CDDS) where farmers or farmer organisations make a proposal to directly deliver their produce to food-insecure populations they have identified in nurseries, public hospitals, schools, community restaurants etc.. Six modalities coexist today (see Table 12).

Table 12 Modalities of the Food Acquisition Programme (PAA)

Modality	Way to access	Purchase limit / Year	Budget resource	Implementing agency	Purchased products
Direct Purchase for Simultaneous Donation (CDDS)	Individually	R$ 6,500	MDS	Conab, States, Municipalities	fruits, vegetables, honey, meats and eggs, milk and milty products, cereals, fishes, sugar…
	Through farmer organizations	R$ 8,000			
Support to Stock Building by Farmer Organizations (CPR Estoque)	Through farmer organizations	R$ 8,000	MDS/MDA	Conab	juices, beans, millet, rice, wheat, chestnuts, honey, sugar…
Direct Purchase to Familiar Agricuture (CDAF)	Individually or through farmer organizations	R$ 8,000	MDS/MDA	Conab	beans, powder milk, wheat…
Public Adquisition of Milk (PAA Leite)	Individually or through farmer organizations	R$ 8,000	MDS	States of North and Northeast regions	milk
Aquisition of Seeds	Through farmer organizations	R$ 8,000	MDS	Conab	seeds, young plants
Institutional Purchases	Individually or through farmer organizations	R$ 20,000	Concerned administrations	Concerned administrations	

Sources: MDA website, IPC-IG and WFP (2013), and Brazil case study report.

Depending on the modality, the resources are provided by the MDA and/or the Ministry of Social Development and Fight against Hunger (MDS) and the implementing agencies may differ. Conab is managing more than 50% of PAA's overall purchases, states around 33% and municipalities around 15%. Each modality has its own specificities. The second one is not strictly speaking for public purchases as, in this case, the PAA does not procure food: it rather provides resources to farmer organisations in order to help them purchase food to build stocks. In the fifth modality (implemented since 2016), family farmers are the suppliers of the seeds and young plants that will benefit other family farmers. The last modality (launched in 2012) is a way to expand the coverage of the PAA without increasing its budget: the right has been given to administrations (at the federal, state or municipal level) to use PAA's procurement procedures to purchase food (with their own resources).

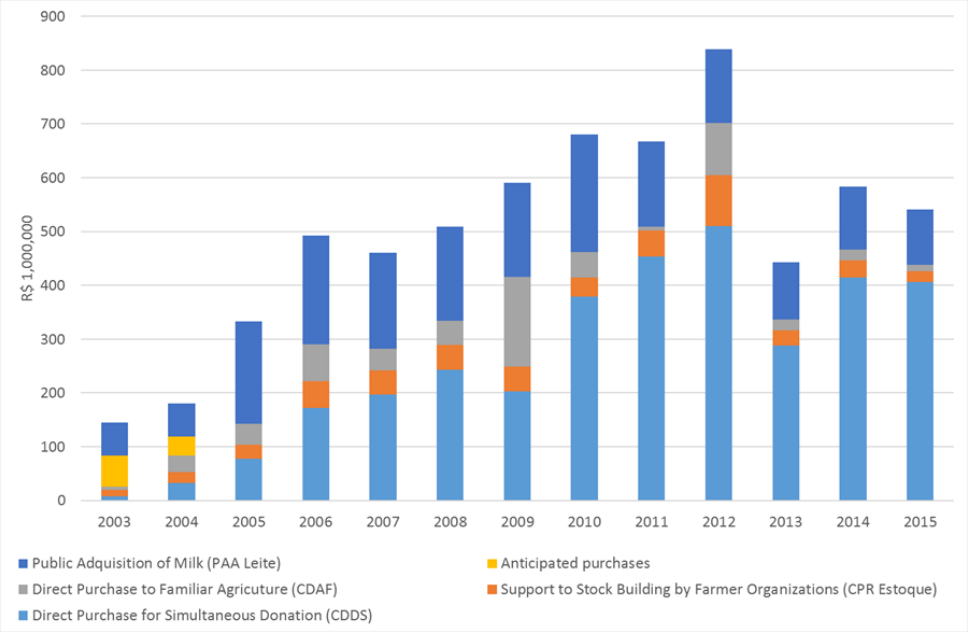
The use of the food procured varies depending on the modality. CDDS and PAA Leite are used for donation to vulnerable or food insecure populations. Institutional Purchases are used to meet the regular demand of administrations (hospitals, army, universities, day nurseries etc.). The CDAF modality is activated when prices are decreasing too much (in which case the food purchased is stored in FR) or when there is the need to provide support to food insecure populations.

For each modality, the quantity a family can sell to the PAA is capped, the level of the ceiling depending on the modality (see Table 12). Note that, for CDDS, the ceiling is higher when the farmer applies through a farmer organisation: this is a way to incentivise them to be part of FOs (and thereby to strengthen them). A given family can apply under several modalities, thereby increasing the quantity it can sell to the PAA during a year.

The procurement prices applied by the PAA are generally not much higher than the prices prevailing on regional markets: the theory of change is that a guaranteed demand may be enough to boost and improve the production of small-scale farmers. However, since 2011, the procurement price is 30% higher for organically certified or agro-ecologically produced products.

The dynamics of PAA's resources (by modality) is displayed in Figure 14 below. The last two modalities are not represented: the "acquisition of seeds" modality was only launched in 2016 and no data on institutional purchases are available at the country level.

Figure 14 PAA's resources (by modality)

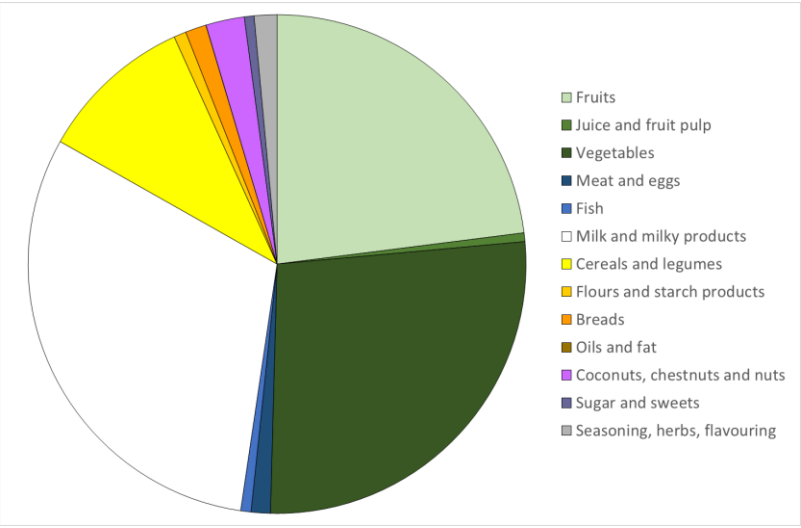


Source: PAA database.

Since the launching of the PAA in 2003, its resources have strongly increased, and stabilised in 2013 around R$ 500 million (equivalent to 121 million euros at September 2018 exchange rates). Note that the weight of the modalities used to supply free distributions (CDDS and PPA-Leite) increased considerably.

The products purchased are highly diversified with a high percentage of fresh products (Figure 15).

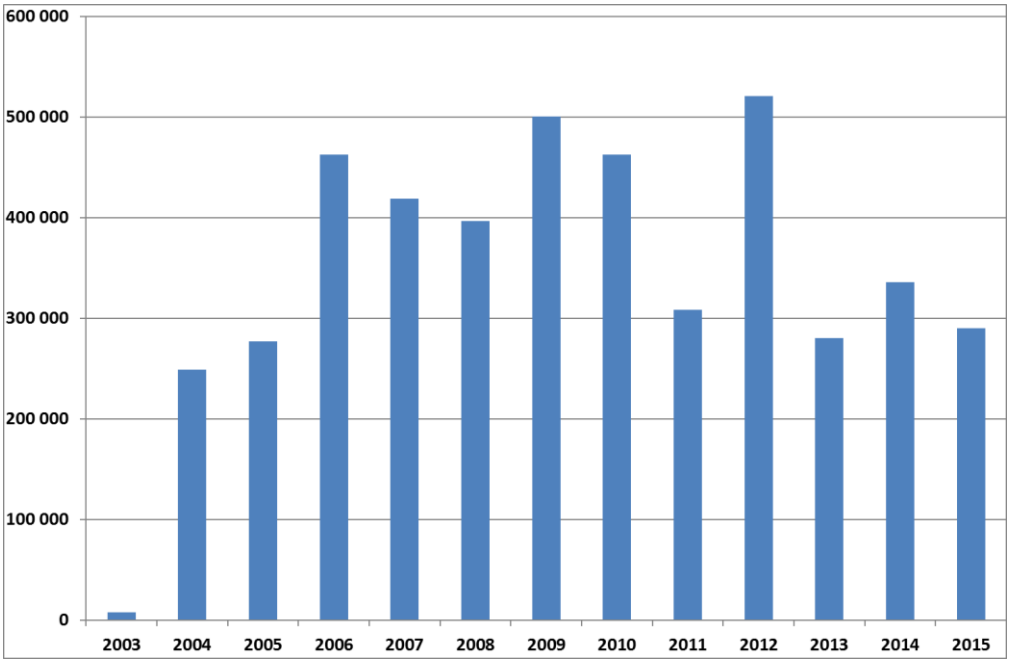
Figure 15 Weight of food product categories in PAA's quantity purchased (in 2016)



Source: PAA database.

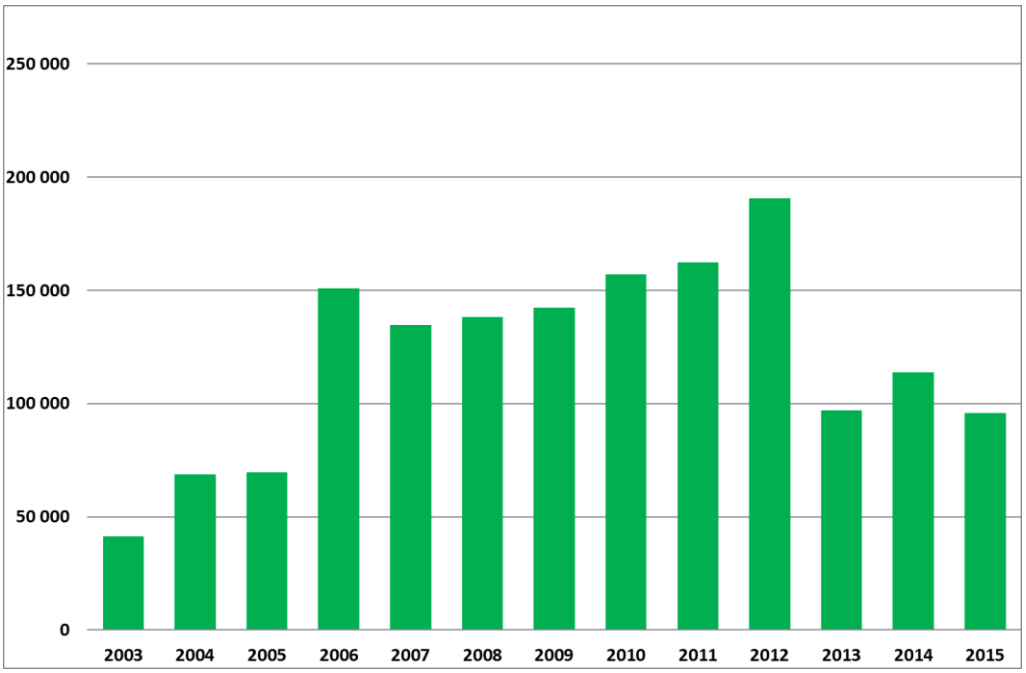
Note that grains and beans are not a significant component of PAA's purchases. As a consequence, the PAA's contribution to the building of grain reserves has been limited: according to Conab's data, over the period 2003-2015, it has been around 1.4% for the rice reserve, 0.3% for the maize reserve and 2.4% for the wheat reserve. The situation is different for beans: the PAA's contribution was 19.2% over 2003-2015 but this is only because the level of the bean reserve is small (around 47 000 tons on average compared to 1 900 000 tons for maize, 755 000 tons for rice and 400 000 tons for wheat).

Figure 16 Quantity of food purchased by the PAA (in tons)



Source: PAA database.

Figure 17 Number of family farmers supplying the PAA



Source: PAA database.

The quantity purchased by the PAA regularly increased (see Figure 16), following the increase in the PAA's financial resources displayed on Figure 14. Note that the quantity procured under the "institutional purchases" modality is not included in Figure 16. This is because no data on institutional purchases are available at the country level. This quantity is likely to be significant, especially since 2016: a decree from June 2015 specified that, from 1st January 2016, all public federal administrations (direct and indirect) should use at least 30% of their resources dedicated to the purchase of food products to buy products from family agriculture. And PAA's "institutional purchases" modality is often the best-suited way to do that. Note also that for "institutional purchases" the purchase limit is higher than for other PAA modalities (R$ 20 000 / year / family / purchasing administration).

The number of participating family farmers (displayed in Figure 17) increased regularly but less than the resources and quantity purchased, reflecting the fact that the purchase limit by family has been regularly increased since the launching of the PAA in 2003. After reaching 190 000 in 2012, the number of family farmers supplying the PAA is now stabilised around 100 000, around 2-3% of Brazil total number of family farmers. Note however that this figure is underestimated, as the "institutional purchases" modality is not included.

PAA's impacts. No quantitative study has yet been performed to assess the PAA's impacts at the national level. However, several studies have been implemented, often in specific regions. These studies (reviewed by IPC-IG and WFP, 2013) identify some impacts of the PAA, including the following:

Prices. Although the PAA purchase prices are in line with the prices available on regional markets, they nonetheless often result in higher prices for farmers. The reason for this is imperfect competition: a study in three municipalities of Bahia state showed that, before the PAA was implemented, all farmers that are now supplying the PAA were at the mercy of a single trader. In a municipality of Saõ Paulo, the PAA prices were more than 45% higher than the average offered by intermediaries. Sometimes, the PAA purchase price played the role of a reference price. For instance, it has been observed in Rio Grande del Norte state, that the PAA had the effect of increasing not only the price received by its suppliers but also the price received by farmers who sold to private traders.

Production. A 2007 study showed that one-third of PAA beneficiaries increased their cultivated area and two-thirds increased the level of technology in crop production. The same study showed that the PAA has reignited the production of many crops that were no longer produced in many regions of Brazil. This increase in the diversity of production is confirmed by other studies: according to a 2013 review of 29 evaluation studies of the PAA (cited in IPC-IG, 2013), 72% of the studies reported an increase in the diversity of production; and 52% also reported an improvement in the quality of the products.

Farmer organisation and marketing channels. Several studies showed that the PAA resulted in the revival of local farmers' markets and the development of new marketing channels, as well as the strengthening of farmer organisations.

Income. A study in three municipalities of the state of Panará showed that the income of PAA suppliers increased by 25% for producers that had accessed family farm credit and by 43% for those who did not receive credit (smaller in income and land area). Also, the PAA generated a steady flow of income throughout the year, as opposed to one or two payments per year at harvest time when the production was sold to private traders. However, the poorest farmers (those who consume most of their production), can hardly participate in the PAA.

The PNAE is also the product of a long history. The first government programmes related to school feeding were launched in 1945. They were initially based on food aid received from the international community and driven through partnerships, especially with UNICEF and USAID. At that time, the focus was clearly on food and nutrition, meaning that no attention was paid to the cultural adequacy of the food provided. The results were not really satisfactory: the coverage was not national (as it was supposed to be) and the frequency of supply of food to schools was very irregular. In the 1970s, the school feeding programme switched towards substituting national food for imported food. In 1976 it was integrated into the Second Food and Nutrition National Programme (II PRONAN) and renamed PNAE in 1979. Note that PRONAN II encompassed a broader set of interventions not only focused on school-age children but also on workers, mothers and young

children, especially those living in the poorest areas of the country. The intention to support "local farmers" was explicitly mentioned. This programme was not fully successful and its limitations were explained by the centralised procurement process: logistical bottlenecks related to transportation and storage (resulting in delayed deliveries), the same menu for all regions in the country (disregarding regional habits and preferences), public purchases mainly benefiting large companies specialised in processed food that can be stored easily (according to Fialho 2009 cited by IPC-IG and WFP 2013, in 1993 only two companies were supplying 48% of the food purchased by the PNAE). The next switch in Brazil school feeding policy was the decentralisation of the process in 1994 (in the spirit of the 1988 Brazilian Constitution that stated the right to universal school feeding in public schools and that promoted a high level of decentralisation in the provision of social services, in particular education).

This decentralisation has been a decisive step in increasing family farmers' access to PNAE's public purchases. Since then, the Federal government has been transferring to states and municipalities resources earmarked to school meals (since 1998, the management of the programme is under the National Fund for the Development of Education or FNDE). The next step came in 1998 when a decree established the reduction in the number of processed or easy-to-prepare food items on the list of products that can be purchased with federal resources. It was supplemented in 2001 by another decree stipulating that 70% of the FNDE's resources for school feeding should be used to purchase foods that meet the regional/local eating habits and the availability of local crops. This vision was strengthened in 2003 with the launch of the Zero Hunger strategy where the concepts of 'food culture' and 'local solutions' were highlighted. In 2007, a survey showed that municipalities and states were actually purchasing locally but not always from small-scale family farmers. At that time, the idea of expanding the legal framework developed by the PAA was already being pushed by civil society and debated in the federal government.

This led in 2009 to a law stating that at least 30% of the products purchased for school meals with federal resources should be bought from smallholder farmers or their organisations. The previous experience of PAA played a decisive role in demonstrating that it was feasible to procure food from small-scale family farmers providing that the procurement laws were revised. Criteria of eligibility and priority to supply the PNAE under the 30% modality were also copied from PAA (including the priority given to organic food and food produced via agroecological practices).

The rules and procedures of PNAE define the following steps:

1. The federal government transfers resources for school meals to states and municipalities;
2. Dietitians prepare menus taking into account nutritional requirements and products produced locally by smallholder farmers, which determines the amount of each product to be purchased;
3. A purchase price is determined taking into account the prices prevailing on local markets and transportation costs;
4. An open call details the products, prices and quantities required;
5. Family farmers respond to this call by sending a sale proposal (the limit being R$ 20 000 per year);
6. Proposals are evaluated and selected (including quality control);
7. Contracts are signed (which specify the dates for delivery and payment); and
8. The products are delivered.

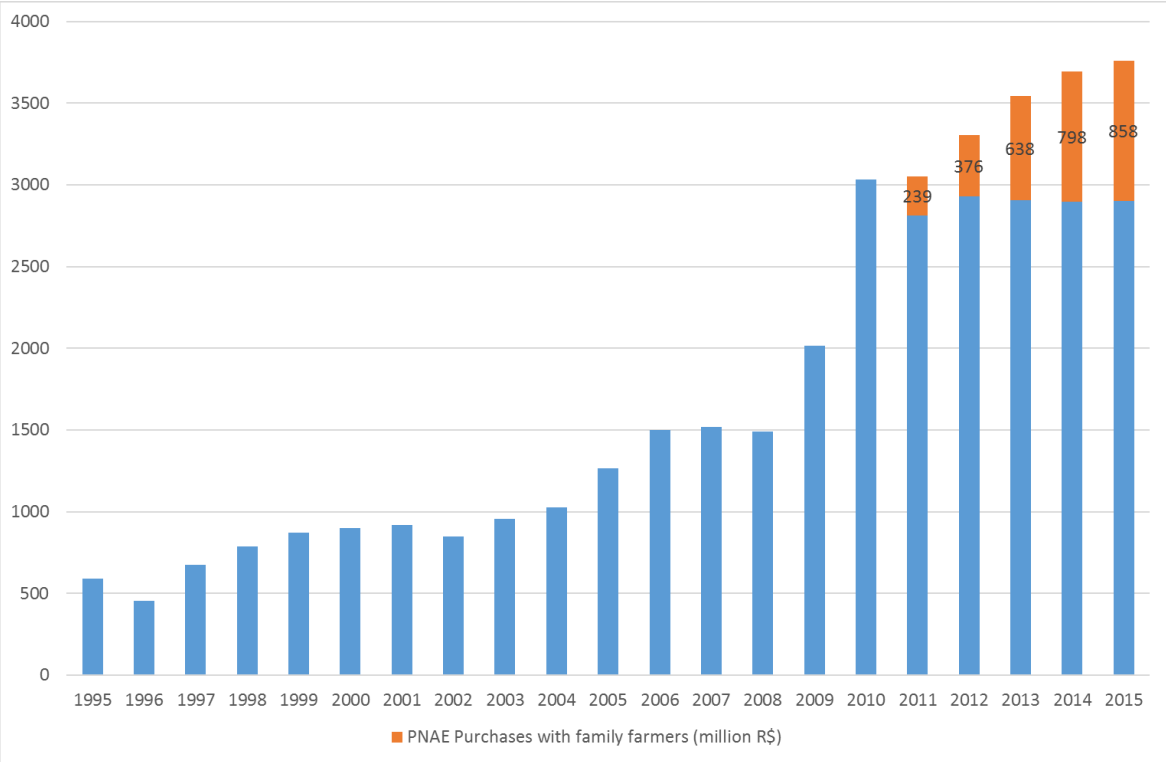
PNAE's budget has increased regularly over the years (see Figure 18) both because its coverage has increased (for instance, secondary school students were included from 2009) and because the amount transferred for each school meal has also increased. In 2015, the PNAE budget reached R$3750 million of which R$858 million is dedicated to purchases from family farmers (equivalent to 208 million euros at September 2018 exchange rates), more than the budget of the PAA (around R$500 million).

PNAE data shows that, for now, the minimum requirement of 30% of food purchases made with family farmers is not fully enforced in all municipalities. In fact, there is a great heterogeneity among regions, with the percentage of food procured from family farmers varying from 22% in the North to 37% in the South (see Figure 19 below).

On average, at the national level, the percentage of PNAE's resources used to purchase food from family farmers increased regularly over time: from 7.8% in 2011 to 22.8% in 2015 (see Figure 20). The percentage of municipalities complying with the 30% rule also increased regularly: from 26.6% in 2011 to 44.4% in 2015.

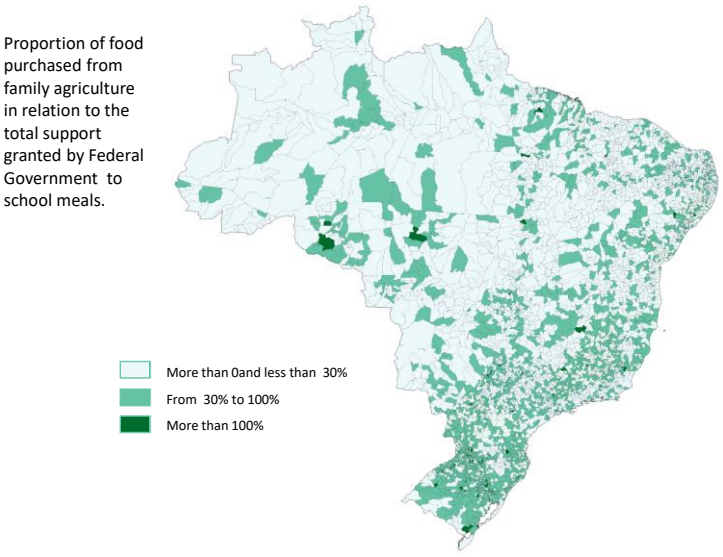
This means that the percentage of food purchased from family farmers is likely not only to reach but to surpass 30%: the 30% rule should be implemented by all municipalities and, since many of them already go beyond, the average percentage will be higher than 30%. The practical implication is that the quantity of food purchased from family farmers under the PNAE should increase in the next years, even if the PNAE overall budget does not increase (and even more if, as probable, the budget goes on increasing).

Figure 18 PNAE's resources and purchases from family farmers (in million R$)



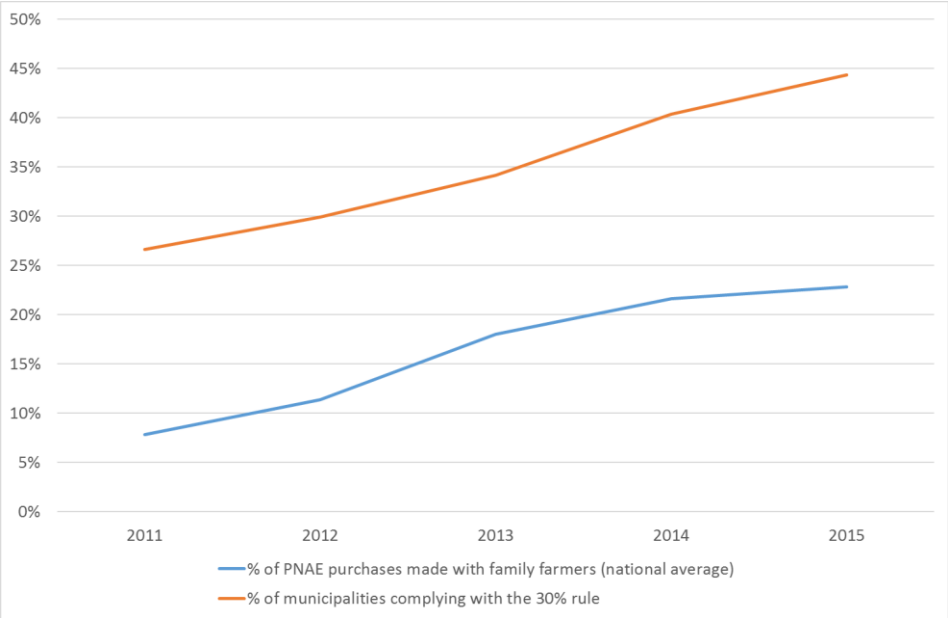
Source: PNAE database.

Figure 19 Share of the resources transferred by the federal government for school meals used for purchases from family agriculture (by municipality)



Source: MEC – FNDE cited in Brazil case study report.

Figure 20 Share of PNAE's purchases made from family farmers



Source: PNAE database.

Synergies between the PAA, the PNAE and the other components of the Zero Hunger strategy

To a large extent, the PAA and the PNAE are complementary, with 100% of the PNAE and part of the PAA used for school feeding, and 100% of the PAA and part of the PNAE supplied by family farmers. Empirical evidence shows that previous experience with the PAA facilitated purchases from family farmers when the PNAE's '30% rule' was introduced in 2009 (54.5% of the municipalities where PAA's purchases were implemented in 2009 were able to use PNAE's resources in 2010, compared to 42% for the other municipalities). Family farmers can apply both to the PAA and the PNAE, but the PNAE is more suited for less small farmers (who are able to supply a regular demand).

Evidence shows that the income gap between family farmers and the rest of the working population has been reduced between 2001/2002 and 2009/2011. Over the same period, the extreme poverty rate decreased by 60% for family farmers compared with 39% for the rest of the population. According to IPC-IG and WFP (2013), PAA and PNAE have contributed to this result, in conjunction with other social programmes. Note however that both PAA and PNAE face difficulties to reach the poorest family farmers (who don't generate marketable surpluses and are often not members of farmer organisations). These difficulties are illustrated by the lower participation of the Northeast region in PAA and PNAE.

PAA and PNAE are component of a broader policy framework: the Zero Hunger Strategy (see Figure 21 below) and their role on food security can only be understood within this framework. For instance, about 43% of the PAA-CDDS suppliers are registered in the single registry (CadÚnico) and most of those registered are beneficiaries of Bolsa Familia.

The Zero Hunger Strategy is based on addressing the different components of food and nutrition insecurity through intersectoriality (as can be seen on Figure 21). It is also based on a governance framework that allows this intersectoriality and the involvement of civil society. This governance framework mainly rests on the Extraordinary Ministry for Food Security (MESA) and the National Food and Nutritional Security Council (CONSEA).

Other key factors of success were learning and experience sharing: as explained in this Box, both the PAA and the PNAE are the products of a long history. And the PAA benefited from the experience of Brazil's FR agency (Conab). Later on, by demonstrating that purchasing from family farmers was feasible, PAA's experience made possible the implementation of the rule that at least 30% of resources provided under PNAE

should be used to purchase food from family farmers. And this '30% rule' was recently extended to the food purchases of all public federal administrations (thereby boosting the 'institutional purchases' modality of the PAA).

Figure 21 PAA and PNAE within the Zero Hunger Strategy

The Zero Hunger Strategy is based on the following components:

1. Access to food
Bolsa Familia (conditional cash transfers)
School Feeding programme (PNAE)
Vitamin A and iron supplementation
Food assistance for vulnerable groups
Food and nutrition education
Food and nutrition system (SIVAN)
Workers' food programme (PAT)
Local and regional networks (popular restaurants; community kitchens; fairs; food banks)
Cisterns for water

2. Strengthening family farmers
Subsidised credit (PRONAF)
Rural insurance and crop insurance
Food Acquisition Programme (PAA)

3. Income generation
Training (PLANSEC)
Solidarity and productive economy
Inclusion microcredit
Regional structures for food and nutrition security

4. Social mobilisation and social accountability
Centre for social assistance (CRAS)
Programme for family care (PAIF)
Other social programmes

Source: Aranha (2013), cited in IPC-IG and WFP (2013).

Sources: IPC-IG and WFP (2013), and Brazil case study report.

CHAPTER 5 HOW TO GOVERN FOOD RESERVES?

5.1 Defining clear, relevant and realistic objectives

FR can be used to provide support to consumers and producers. In both cases, this support can be i) permanent or activated only in periods of crisis and ii) non-targeted or targeted. A simple rule is that all permanent supports should be targeted. This implies that **prices should not be maintained permanently at low or high levels: domestic prices should follow the mid-term trend of international prices**. In other words, interventions on staple prices should be implemented only to prevent price collapses or surges. Maintaining permanently prices at a low level is costly and discourages production (it is the "urban bias" issue experienced by many African countries during the 1960s and 1970s). Similarly, maintaining permanently prices at a high level is likely to be very damaging for food and nutrition security, even if subsidies are implemented to support (poor) consumers (as illustrated by the current experiences of the Philippines, Zambia and, since 1998, Indonesia, see Box 10 in Chapter 4). It is also likely to be extremely costly (see Box 1 in Chapter 1 and Box 11 in Chapter 4), thereby generating high opportunity costs in terms of healthcare and education.

FR can therefore be used for several objectives such as i) providing permanent transfers to food insecure households (Chapter 2), ii) supplying or backing emergency interventions in periods of crisis (Chapter 3), iii) stimulating farmer investment in food production by protecting them against price collapses and by providing specific incentives related to the way to produce or market food products (Chapter 4). Of course, as seen in the previous Chapters, **the relevance of the objectives (and the usefulness of FR to reach them) strongly depends on the situation of the considered country.** Whatever the elected objectives, **they should be clearly specified.**

5.2 Rules for a good governance of food reserves

Good governance is crucial in order to allow FR to reach their food and nutrition security objectives, while minimising their budgetary cost and the distortions they may provoke on food markets.

1. The composition, size and location for the FR should be chosen carefully in order to meet the FR objectives and the specificities of the context. For instance, as seen in the previous Chapter, the right size for the FR strongly depends on whether the considered food products are traded on international markets, whether the considered country is an exporter or an importer, and on import timelines.

2. The physical management of the stock (treatments, rotation etc.) should avoid losses, quality deterioration and diversions

3. FR interventions should be rules-based and the rules should be publicly known (transparency of the rules). This allows rendering interventions predictable by market players, thereby reducing the crowding out effect on private storage and private trade. This also allows a more rapid response in situation of emergency (many countries have designed "contingency plans" defining the actions that should be implemented when specific conditions are met). These rules should specify i) the triggers and ii) the modalities of FR interventions. These aspects are detailed in points 4 and 5 below.

4. FR interventions should be triggered by relevant criteria. *For interventions to mitigate price increases,* the simplest rule is to trigger FR interventions when the domestic price reaches a predefined ceiling. This ceiling price should not be set at a level which is too low in order to avoid crowding out private storage. *For interventions in the form of food transfers,* specific triggers have to be defined. They are usually based on food and nutrition security indicators (provided by early warning systems in the case of emergency transfers). These indicators usually aggregate data on the causes of food crises (pluviometry, production forecasts, lack of pasture, price surges, income collapses…), on malnutrition and on the coping strategies implemented by households when they began to be in difficulty (migration…). *FR procurement can be triggered when the price reaches a minimum predefined level (when the aim is to hold the price above a floor) or when there is a need to replenish the reserve.* The period of procurement should be announced in advance, as well as the quantity desired and the procurement price. For all types of FR interventions, the triggers should be defined carefully and regularly updated. A good way to do this is to adopt an approach based on i) data and empirical evidences and ii) discussion forum with the participation of

representatives of different categories of market players (such as the *plateforme riz* successfully implemented in Madagascar, see David-Benz, 2013).

5. FR purchases, sales and distributions should guarantee fairness among market players and potential recipients. When FR are used for transfers, the nature and quantity of the food products transferred should be clearly defined, as well as the targeting rules. When the FR agency purchases or sells on the domestic market, the modalities of these market operations should be open and transparent. For instance, tenders can be organised to guarantee a fair competition between market players, which does not prevent defining specific conditions for specific categories of market players (such as farmer organisations), providing that these conditions are the same for all market players within a category. The interventions of national FR should also take into account the existence of local FR (such as Sahel *banques de céréales* which are managed by municipalities or local communities): as a matter of fact, FR procurement or distribution can generate huge problems for local reserves. On the contrary however, a good articulation with local reserves can increase the cost-effectiveness of national FR. This articulation can for instance take the form of contract allowing the national FR to procure or distribute grains through local reserves (for more details, see the Burkina Faso case study).

6. The conditions for an effective implementation of the planned interventions should be created:

- *Information on the triggering indicators* should be available, not only for the FR agency but for all market players (this transparency of the indicators is complementary to the transparency of the rules highlighted in point 3).
- *The FR agency should have the means to react quickly* when it appears that an intervention is useful or necessary (in terms of staff, infrastructures, equipment and budget). Timely interventions condition the cost-effectiveness of FR. For instance, early procurement (during the post-harvest period) often allows for reducing the cost of food purchased (see Chapter 2) but they are possible only if appropriate rules and procedures do exist and if the FR agency has a working capital. Above all, emergency interventions should be implemented very quickly, which implies that the size, composition and location of physical reserves are adequate to manage the shocks that are likely to occur in the considered country.
- *Conditions should be created to guarantee that the subsidised food provided to consumers actually reach them*. This may mean providing the subsidised food products to consumers directly (through a public distribution system) or designing institutions to lead traders to pass on the subsidies in their selling price. These institutions may take the form of contracts between the government and the market players who receive the subsidies, accompanied by monitoring system to guarantee their enforcement.
- *The management of its staff by the FR agency should create the conditions for a good enforcement of the rules* (monitoring and evaluation system, incentives).

7. FR activities and interventions should be monitored and evaluated

- *Data on FR interventions and their effects should be regularly produced and disseminated* in order to guarantee the transparency on FR interventions and to allow for regular improvement in the management of interventions.
- *Monitoring the costs of FR*. All the costs generated by FR activities (storage and operations such as purchases, sales and distributions) should be registered. These costs should include monetary cost but also an estimation of opportunity costs (if the FR agency purchases with its own money, the resulting loss in financial interest should be estimated using the current interest rate; if the FR agency uses its own warehouses, the loss resulting for not renting the warehouses should be estimated). The cost should be expressed not only in the categories used in accountability (wages, energy, transport…) but also by activities (procurement, storage, distribution etc.). This is necessary if the monitoring aims to improve the management and reduce the costs.

5.3 Articulating food reserves with private stocks

An important dimension of the governance of FR is to guarantee their good articulation with private storage. FR should not discourage private storage, as may occur when poorly managed FR implement unpredictable and untimely interventions. And private storage cannot substitute FR, even when subsidized (see Annex 1 for more details). To strengthen the synergies between private and public storage, FR should be well managed (see Recommendation Box 4).

Recommendation Box 4

Policies based on subsidising private storage would be difficult to implement and may generate unfair competition between market players. Their effects on price stability are rather uncertain and can even be negative. Policy-makers should therefore be very cautious before implementing this kind of policies.

However, private stocks play an important role for food and nutrition security and policies should rely on them when possible and create an enabling environment for private storage. It is for instance possible to rely on private stocks to supply food transfers: this is the case every time just-in-time purchases are implemented. Private storage can also be supported indirectly by providing support to warehouse receipt systems (through projects or public purchases as is already done by the WFP in some countries, see Chapter 4). And an enabling environment for private storage may be created if policy interventions are rules-based: this especially applies to interventions to mitigate food price increases that should be triggered by a predefined, publicly known and not to low ceiling price (see Chapter 5).

II. INTERNATIONAL DIMENSIONS: THE EFFECT OF NATIONAL FOOD RESERVES ON GLOBAL FOOD AND NUTRITION SECURITY AND RELATED ISSUES

CHAPTER 6 EFFECT OF NATIONAL FOOD RESERVES ON GLOBAL FOOD AND NUTRITION SECURITY

From the point of view of the EU, other donors or international organisations the (positive or negative) effects of policies implemented by a given country on other countries should be taken into account. These effects are usually mediated through international markets for tradable goods and regional markets for non-tradable goods. First, we will consider the need for stocks to guarantee the stability of international markets. We will then consider the different options for stimulating storage and show the decisive role of grain FR in importing countries (especially big importing countries).

6.1 The need for stocks to guarantee the stability of international prices

6.1.1 Theoretical stabilising effect of stocks on international prices

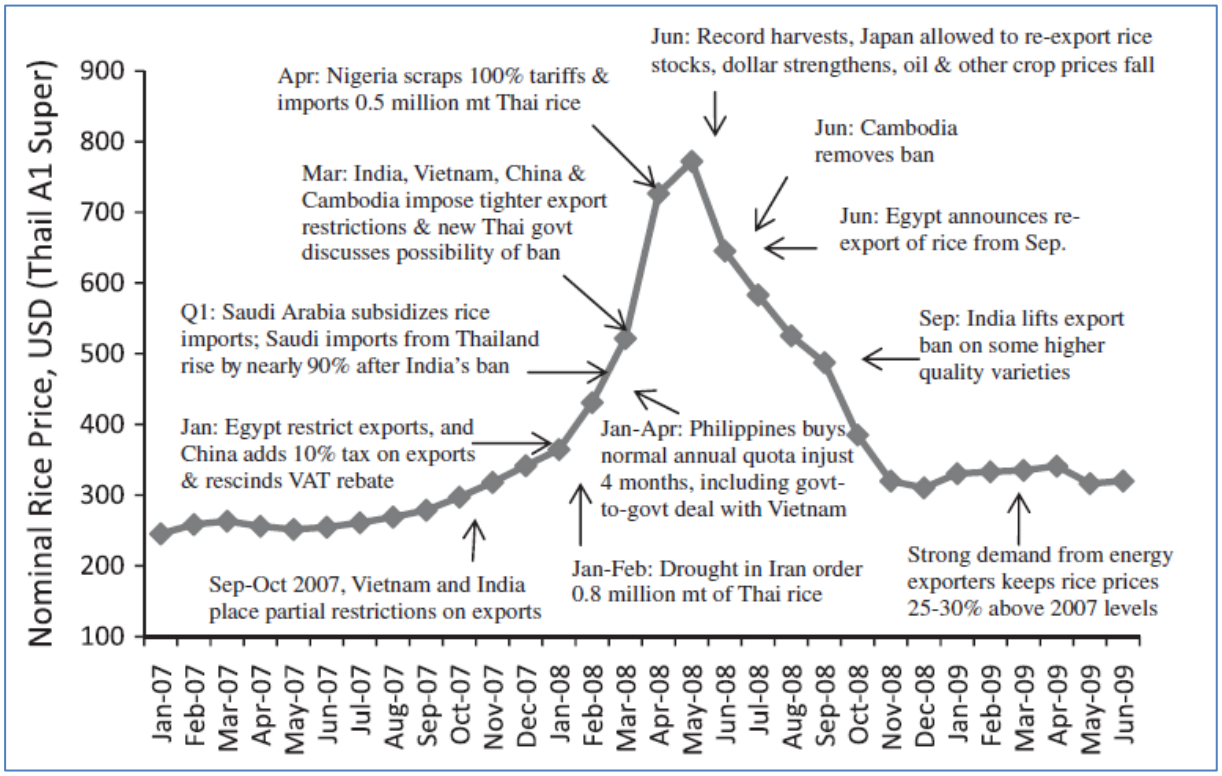
To figure out the effect of stocks on international prices, let us imagine a world without stocks. When hit by a production shock, countries would immediately increase their imports or decrease their exports, thereby exporting the instability on international markets. This would happen even without any measure to regulate external trade: the increase in the domestic price would automatically make it more profitable to import or less profitable to export. Moreover, policies aiming to help vulnerable households to cope with increased food prices would likely exacerbate the transfer of instability to international markets. For instance, emergency cash transfers would result in maintaining the demand for (basic) food products which, in a situation of low stocks and reduced production, would lead either to increase even more the domestic price, to increase imports, or to decrease exports. Therefore, regarding the impact on international markets, providing emergency transfers in a context of low stocks is not very different from implementing policies to restrict exports or stimulate imports (HLPE, 2011; Do, Levchenko, and Ravallion 2013).

Holding stocks changes everything. *Affected countries* can absorb shocks by their internal means instead of exporting the instability on international markets (by reducing their exports or increasing their imports). For instance, an importing country hit by a bad harvest can use its stocks to compensate for part of its internal deficit, thereby exerting a lower pressure on international markets. This country will probably increase its imports later on to rebuild its stocks but it will try to do so when international prices are low. The stocks held by *not affected countries* may play the role of a buffer for affected countries (they can help in absorbing the shocks exported on international markets, as illustrated by the role played by the Japanese stock in 2008, see Box 13 below). Conversely, when importing countries do not hold stocks, they have to rely exclusively and immediately on imports when hit by a shock, which results in exporting the instability on international markets. For big importing countries, this effect can be significant and may increase international prices. The situation can even be worse, as importing countries that do not hold enough stocks may panic if the food products they need become scarce on international markets: they then increase their imports, thereby exacerbating the increase in international prices. This is exactly what happened in 2008 on the rice market.

6.1.2 Lessons from the 2008 crisis

During the 2008 crisis, several big countries restricted their exports (for instance, India export ban on non-basmati rice resulted in India rice exports falling from 6.45 to 2.48 million tons), whereas some big importing countries panicked and increased their imports (for instance, Philippines rice imports jumped from 1.8 in 2007 to 2.43 million tons in 2008). As the international rice market is rather thin (around 30 million tons compared to 100 for maize and 120 for wheat), the 2008 decrease in India exports accounted for more than 13% of the quantity traded on the international rice market and the increase in Philippines imports for around 5% of it. As the first policies implemented exacerbated the increase in international prices, they led other countries to implement the same kind of policies. According to Headey (2011), around 50% of the bubble was due to export bans and 50% to panic imports. The chronology of the crisis is displayed on Figure 22 below.

Figure 22 Chronology of the 2008 crisis on the international rice market



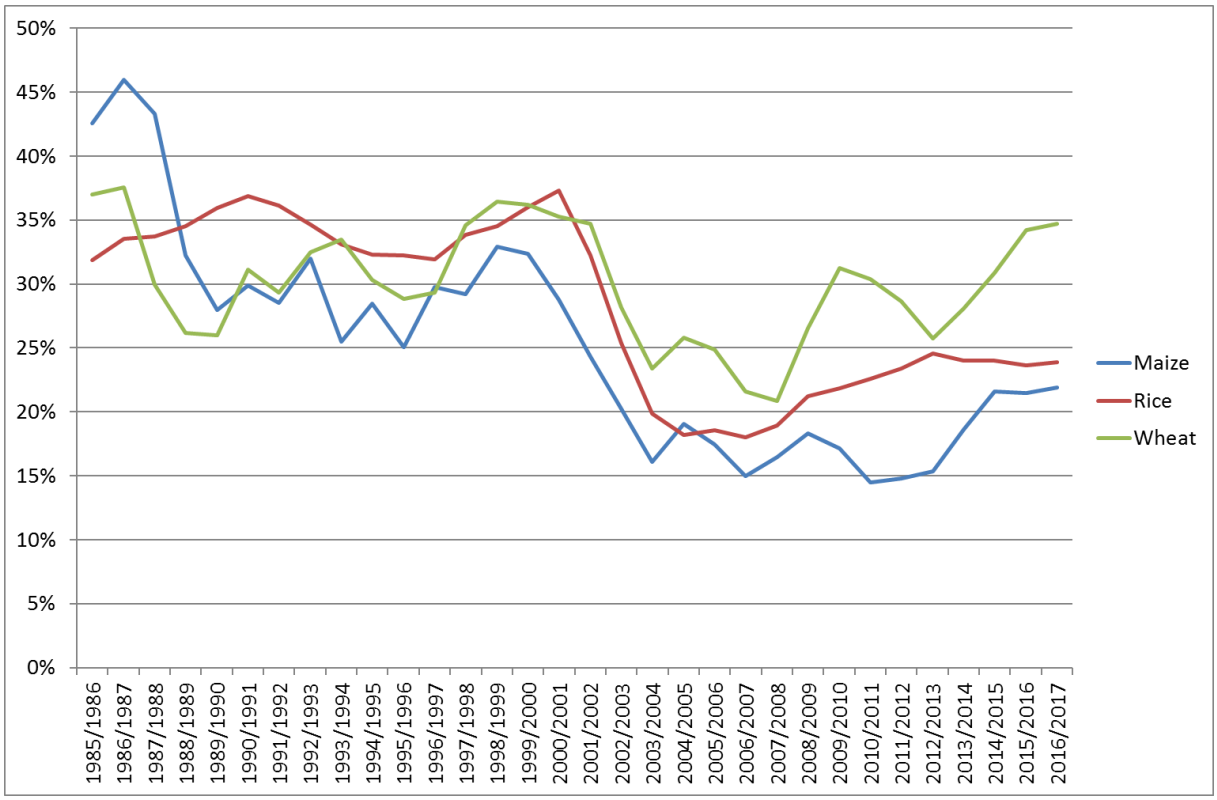
Source: Headey (2011).

The fact that the 2008 crisis was allowed by the low level of global stocks appears clearly from a prediction made in 2005 regarding the high probability of a crisis on international grain markets. This prediction was based on the observation of the decreasing trend in Chinese, European and US grain stocks:

> […] China, the European Union (15) and the United States accounted for a combined 48 percent of world grain production, 69 percent of world grain stocks, and 56 percent of world grain exports during 1990-99. All three have had major grain stock policy changes in the past two decades. China has only recently changed its stockholding policy, but it has reduced stocks quickly from very high levels. The United States changed its policy in 1985 and reduced government stockholding significantly in the following years. The European Union changed its grain policy starting in 1992 and has reduced total and intervention stocks. The combined impact of policy change in these countries has been to reduce their stocks by more than half since the recent highs in 1999. World grain stocks have also been affected, with the level of stocks falling from 31 percent of total use in 1999 to 18 percent in 2003—the lowest level since the mid-1970s. These reductions in stocks in the United States and the European Union have not yet had an apparent impact on price variability, at least in part, because of the relative stagnation in world grain trade since 1980. However, this is likely to change because the stagnation was caused in large part by the increase and subsequent decline of imports by transition countries (the former Soviet Union and Eastern Europe) which accounted for nearly one quarter of world imports at their peak in 1981, and now account for about 3 percent. When excluded, imports by the rest of the world have grown at double the world rate of 0.8 percent per annum since 1980. If these trends continue, and China no longer has large stocks to buffer changes in demand and supply, then world grain imports could become more variable and grow more rapidly than in the past. […] It seems […] likely that lower grain stocks and more rapid and variable import growth will lead to greater grain price variability. (Mitchell and Levallée, 2005, p. 2)

The prediction of Mitchell and Levallée became reality in 2008: whatever the direct (controversial) triggers of this crisis, it is rather consensual that it would not have occurred if global grain stocks would have been significantly higher (Wright, 2009; Wiggins and Keats, 2010; Bobenrieth *et al.* 2012). As a matter of fact, global grain stocks (expressed as a percentage of annual uses) strongly decreased until 2007 and then began to increase again (see Figure 23), which can be interpreted as countries' reaction to the 2008 crisis.

Figure 23 Global grain stocks since 1985 (as a percentage of annual uses)



Source: USDA PSD.

Last but not least, it seems that, in 2008, the Japanese stock played an important role in ending the bubble and provoking a reversal of the increasing trend in rice prices. We are referring here to Japan “minimum access rice reserve”. Under the minimum access quota system, Japan is committed with the WTO to importing every year a given quantity of rice (in 2007, this quantity was equal to 770,000 tons of unmilled rice). This imported rice is usually not consumed by the Japanese people: it is stored and then donated to other countries in the form of food aid, sold to food processors or used to feed animals. Japan is of course not allowed to reexport this rice. However, in 2008, because of the international rice crisis, Japan was exceptionally allowed to do so. The most interesting part of the story is that the mere fact of Japan being allowed to re-export its imported rice stock was enough to stop the crisis, even though these re-exports were never actually made (see Box 13).

Box 13 The role of Japanese stocks in ending the 2008 crisis on the international rice market

In May 2008, the Philippines secretly approached Japan for 200,000 tons of its imported rice, but Manila initially felt that Tokyo might not be forthcoming because of expected objections from the U.S. government. On May 9, a cloud formed over the fire with the Center for Global Development (CGD) publishing a paper “Unwanted Rice in Japan Can Solve the Rice Crisis – If Washington and Tokyo Act” which argued that world prices could be cut to $500-600/ton by the end of June if existing stocks in Thailand, China, and Japan were to be exported. (Tokyo was holding over 1.5 million tons of imported rice and the paper pointed out that Beijing had inventories which were equivalent to four months of consumption so it could easily double its 2007 export level of 1.4 million tons). That same day, the Philippines publicly disclosed that it was negotiating with Japan for 60,000 tons of its domestic rice. The proposal gathered momentum in Washington with questions raised in back-to-back congressional hearings on May 12 in both the U.S. Senate and House of Representatives. The next day, the U.S. publicly indicated that it would not oppose Japan's re-export of rice; privately Washington also told Tokyo that it would not press Japan to fulfil the balance of its 2007 buying commitments and those agreed upon for 2008 until after the crisis abated.

Suddenly the world market began to realise that Japan’s stocks of imported rice might come into play. While market fundamentals had not changed significantly, market sentiment was clearly beginning to shift.

Japanese Firefighters Fail To Respond To Alarms. While policymakers in the U.S. quickly responded to political and public pressure ignited by the CGD paper, giving Japan the green light to release its excess imported rice stocks, Tokyo's response was disappointing. At high level international meetings held in Rome in early June, Japan's P.M. Fukuda committed "to release in the near future over 300,000 tons of imported rice" to the world market. The public commitment, while more cautious than what was hoped for by the U.S. government and the CGD authors, was welcomed. Once the public spotlight faded and the political leadership changed in Tokyo, this pledge by Japan failed to be honoured. Unofficial trade data shows that Japan's food aid shipments of rice declined in 2008 to less than 117,000 tons – more than 5,000 tons below that shipped one year earlier. While releasing its stocks would have relieved its exchequer significant costs for storing unwanted inventory, Japan's rice aid exports in 2008 were 91,000 tons below that averaged in the preceding five-year period and were the lowest level shipped since 1997.

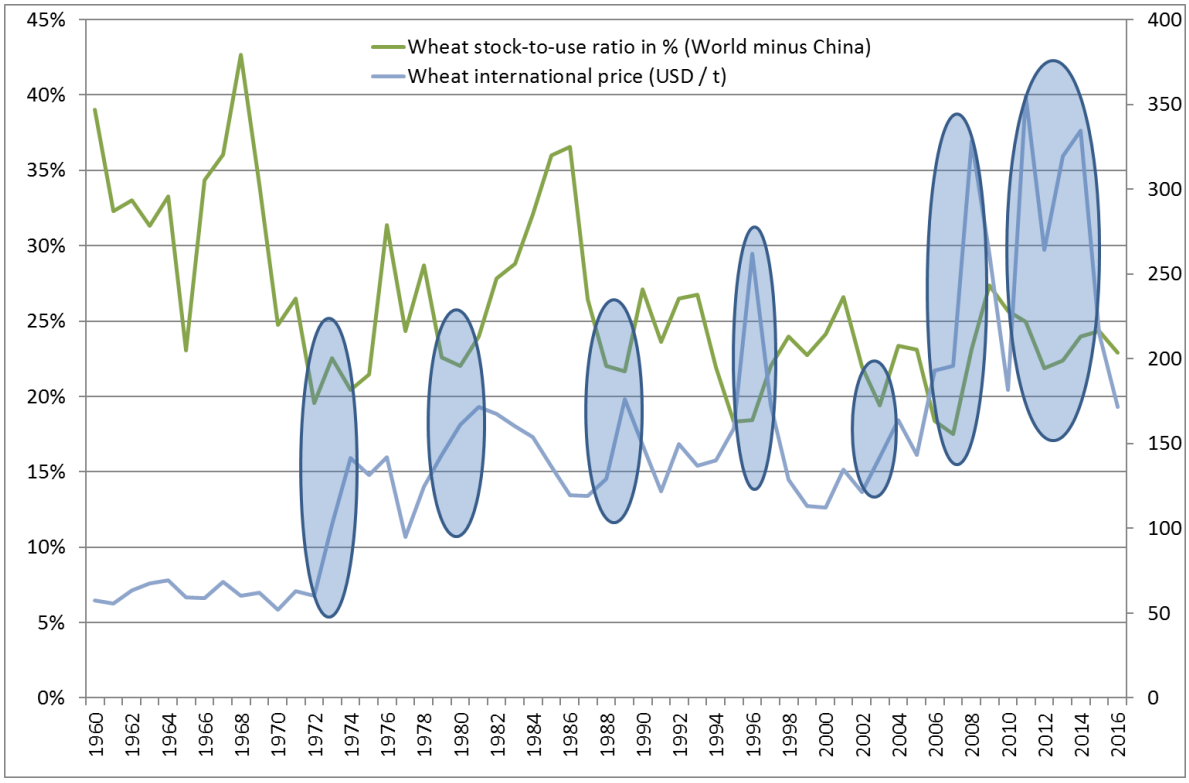
Source: Slayton (2009).

6.1.3 Long-term evidences of the stabilising effect of stocks on international prices

The stabilising effect of stocks (private stocks + public stocks) can be evidenced by plotting the global stock-to-use ratio (STUR) of a given grain against its international price. As illustrated on Figures 24, 25 and 26 below for the case of wheat, maize and rice, it clearly appears that price spikes only occur when the level of global stocks is low.

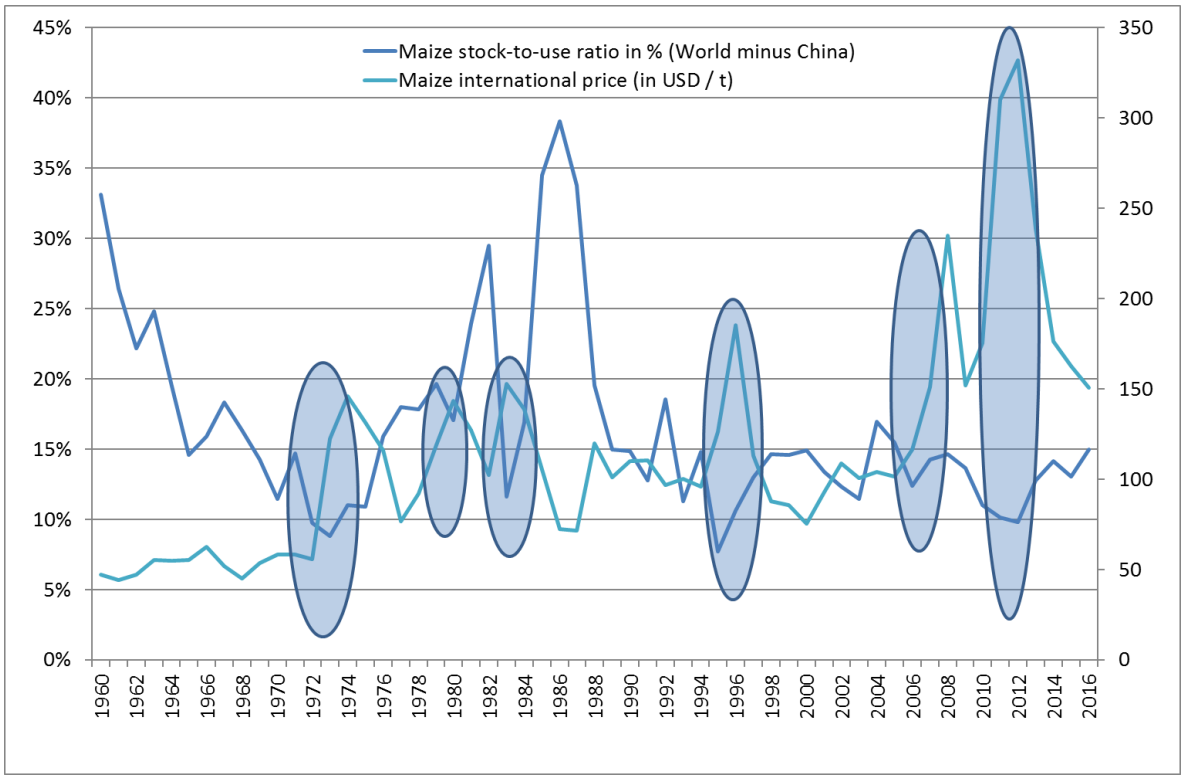
However, the price-stock relationship seems to be much less confirmed in the case of rice (see Figure 26). In 1981, 1995 and 2008 the international price of rice spiked in spite of rather high levels of stocks. According to Bobenrieth et al. (2012), this can be easily explained by the fact that wheat, maize and rice are substitutable to some extent: the price of rice may spike because the stocks of maize or wheat are low. As we have seen, this is what happened in 2008, when India banned rice exports to manage the spike in the price of wheat.

Figure 24 Wheat global stock and international price



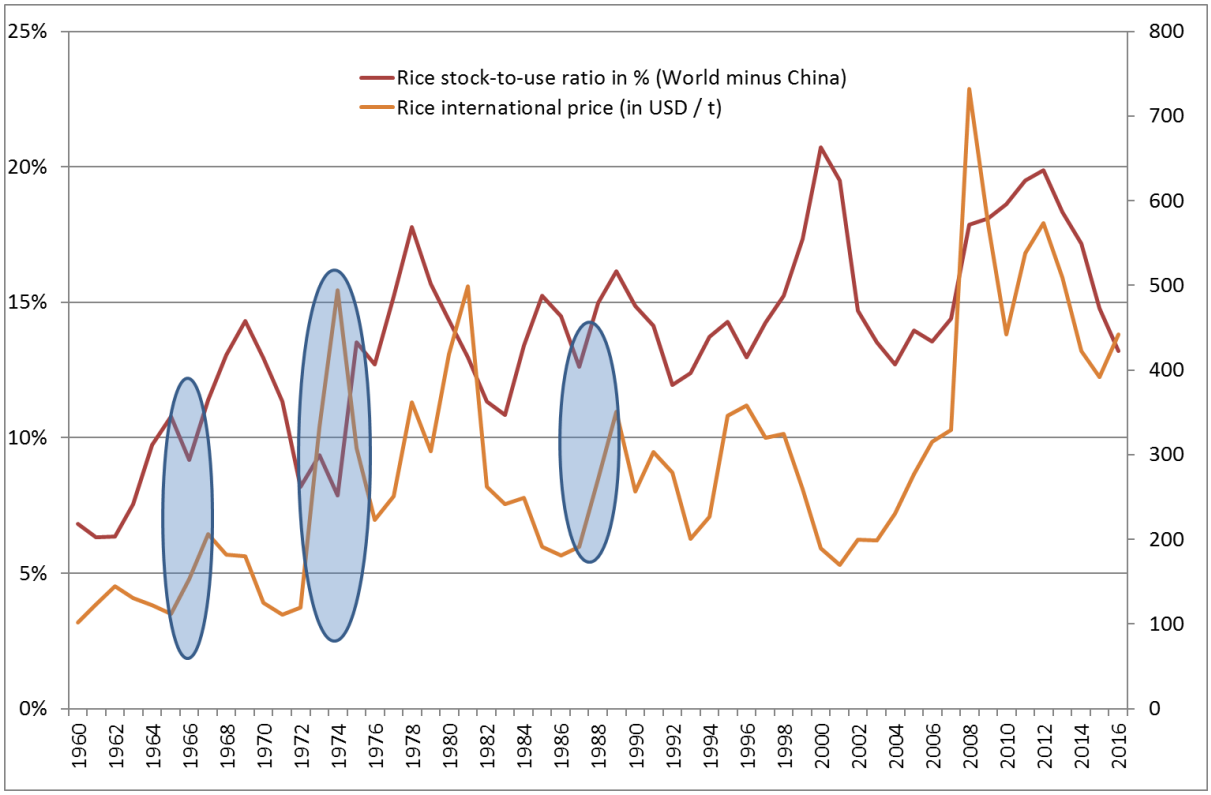
Source: USDA PSD for stock-to-use ratios and World Bank GEM for international prices.

Figure 25 Maize global stock and international price



Source: USDA PSD for stock-to-use ratios and World Bank GEM for international prices.

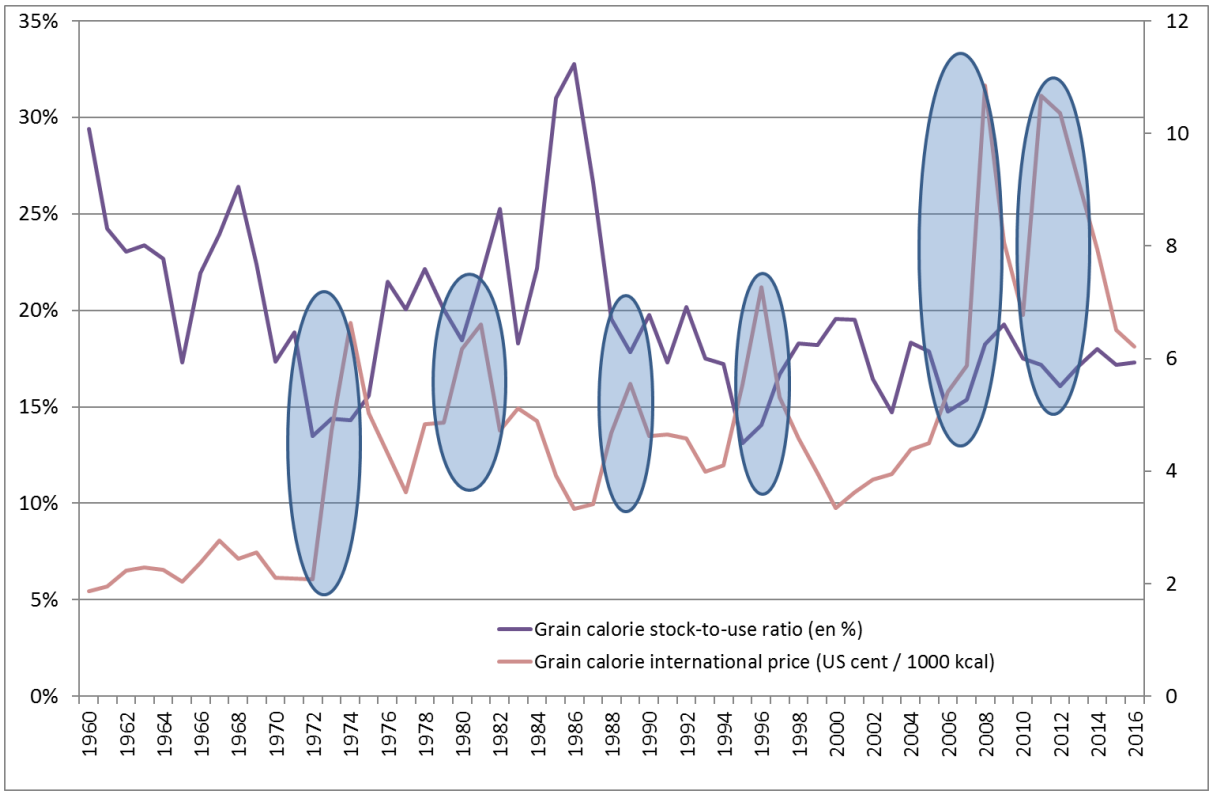
Figure 26 Rice global stock and international price



Source: USDA PSD for stock-to-use ratios and World Bank GEM for international prices.

Following the methodology proposed by Bobenrieth et al. (2012), it is possible to analyse the relation price-stock at the aggregate level of the three major grains (wheat, maize and rice). An aggregate stock-to-use ratio (in grain calories) can be estimated by using data on calorie content provided by USDA National Nutrient Database: 333.8 kcal per 100 g of wheat, 365.0 kcal per 100 g of maize and 362.2 kcal per 100 g of rice. Similarly, an aggregate price for grain calories can be estimated as average of wheat, maize and rice prices, weighted by their annual production level by calorie content. Aggregate stock-to-use ratio and price for grain calories are represented on Figure 27 below.

Figure 27 Grain calories global stock and international price



Source: USDA PSD for stock-to-use ratios and World Bank GEM for international prices.

The link between global stocks and international prices is so strong that it led FAO's Agricultural market Information System (AMIS)[1] to commission a study to investigate if it was possible to build an early warning indicator based on the level of global stocks (Bobenrieth et al., 2012).

The practical implication is that a policy that would succeed in holding stocks above a minimum level would theoretically be sufficient to avoid price hikes on international markets, even if the situation is in fact more complex as the localisation of stocks may matter, as well as their nature (private stocks *vs*. FR) and the way they are used. This raises the question of what can be done to increase the level of stocks.

6.2 The decisive role of food reserves in importing countries

The previous section shows the decisive role of stocks for the stability of international grain markets. However, we have two good reasons to think that, spontaneously, private storage is not sufficient to reach the level of stocks that would be optimum from the point of view of the stability of international grain markets and global food and nutrition security. First, storage generates positive externalities: it benefits not only those who hold the stock but all market players because it contributes to stabilise prices, thereby benefiting both sellers and buyers. As traders' storage behaviour is only driven by their own profit, the level of private stocks is likely to be lower than what would be optimum from a collective point of view. For grains, the gap is likely to be wide because grain price spikes generate huge food and nutrition security problems. There is a second reason why private storage is likely to be insufficient: storing is a highly risky activity and hedging tools are costly and often inexistent, or unable to offer an

[1] International information system on grain stocks and markets, hosted at the FAO.

effective protection to developing countries' farmers and traders (because of the "basis risk" linked to the weak correlation between local prices and prices on distant futures markets).

Three options are therefore available to increase the level of stocks: subsidising production, subsidising private storage and developing FR. The first option may be justified for some countries in some situations (see Chapter 4), but it may generate many negative effects such as pollution and structural overproduction leading to export subsidies (as illustrated for instance by the former EU Common Agricultural Policy). The second option is not highly convincing: subsidising private storage would be difficult to implement and may generate unfair competition between market players. Their effects on price stability are rather uncertain and can even be negative (in some occasions -speculative bubble or panics-, more private storage may even result in exacerbating price increases). For a detailed analysis of policies based on subsidising private storage, see Annex 1.

Building FR therefore appears to be the best option for maintaining global stocks at a satisfying level from the point of view of global food and nutrition security. Which countries can develop these FR? As shown in Chapters 3 and 4, exporting countries do not need FR (except for trying to regulate international prices, which is only feasible for very big exporters, see Chapter 4). FR are useful in importing countries (mainly to manage import timelines) and in countries that have weak connections with international markets because the staple they produce and consume are non-tradable. In the case of the latter, FR are likely to have a weak effect on international prices. Therefore, from the point of view of stability of international prices, what matters is importing countries' FR. Remembering that in 2008, 50% of the price crisis on the rice market was due to panic imports (the remaining 50% were stemming from exports bans, see Headey, 2011).

The stability of international grain markets therefore strongly depends on the FR held by importing countries (we refer here not only to structural importers but also to the countries that become importers when they face a bad harvest or that would become importers if they were not holding FR). Note that the FR held in a given country generate a positive externality: they benefit international market stability and thereby global food and nutrition security. Therefore, **in the absence of specific incentives, national FR are likely to be under the level that would be optimum from the point of view of global food and nutrition security**. There is therefore a need for specific incentives. These incentives can take the form of financial support provided by donors to FR (in particular in big importing countries).

Recommendation Box 5

Because grain stocks contribute to the stability of international grain markets, **there is a rationale for donors in supporting FR** (in particular in big importing countries). Note that here the category 'importing countries' covers not only structurally importing countries but also countries that import occasionally when facing a bad harvest.

However, this is likely to be insufficient. There is therefore a need for some kind of international governance of FR. Unfortunately, as we will see in Chapter 7, the current international framework is not adequate: WTO rules are providing wrong incentives, whereas there is a lack of transparency on stocks and a lack of coordination between national storage policies.

CHAPTER 7 THE NEED TO RESHAPE THE INTERNATIONAL GOVERNANCE OF FOOD RESERVES

As seen in Chapter 6, FR developed in a given country are likely to generate beneficial effects for global food and nutrition security by reducing the frequency and magnitude of price spikes on international markets. As the building of national FR is mainly driven by national policy objectives, national FR are likely to be undersized compared to what would be optimum from a global perspective. Moreover, some countries may be tempted to let the other countries share the burden of storage (free riding). Note also that poorly managed FR may generate negative effects such as depressed international prices. These are the reasons why some form of international governance of FR is necessary.

The current international governance of FR is mainly based on WTO disciplines, on a few mechanisms created after the 2008 crisis and hosted at the FAO (in particular the Agricultural Market Information System or AMIS) and on regional reserves.

However, this international governance is neither adequate nor sufficient. Current WTO rules are not providing the right incentives: they allow trade policies that may have a very destabilising effect on international prices (such as export restriction measures), whereas they put strong restrictions on FR (that are likely to have a stabilising effect). AMIS and regional reserves can be useful in some circumstances (and may deserve some support) but are not enough: there is a need to build international agreements to coordinate the building and the use of national FR.

We will consider successively the need to modify WTO disciplines (section 7.1), the need to improve the information on stocks (section 7.2), the usefulness of regional FR (section 7.3) and the need for international agreements to coordinate the building and the use of national FR (section 7.4).

7.1 The need to modify WTO disciplines

7.1.1 Issues related to WTO disciplines

In chapter 6, we saw that the 2008 crisis has been exacerbated by export bans and other export restriction measures. These measures resulted in a poor efficiency in the use of global stocks. However, export restriction measures are currently fully allowed by the WTO. After the 2008 crisis, the idea logically emerged to modify WTO rules in order to forbid export bans.

At the same time, the 2008 crisis highlighted the lack of stocks, particularly in big importing countries (see chapter 6). Remember that, according to Headey (2011), 50% of the price crisis that occurred in 2008 on the international rice market was due to export bans whereas 50% was due to panic imports. Therefore, it is worth analysing the potential contribution of increased storage policies in importing countries in avoiding panic imports and increasing the stability of international markets. As WTO disciplines on public stockholding programmes are very constraining for the building of FR, the idea logically emerged to relax them.

Therefore, it seems that two approaches could be followed to improve the contribution of WTO rules to more stable international food markets. The stability of food supply could be increased by forbidding or restricting the use of export restriction measures. And the stability of food demand could be improved by modifying WTO disciplines on FR. These two approaches are presented in sections 7.1.2 and 7.1.3.

7.1.2 Develop disciplines on export bans?

The proposal to develop disciplines on export bans has been made by 10 international organisations in a report that played the role as input for the G20[2] negotiation on managing the volatility of agricultural price (FAO et al., 2011). However, from the initial proposal to forbid export bans, the G20 action plan only kept the proposal to forbid export bans *on exports for WFP food aid* (G20, 2011). Finally, even this 'light' proposal (discussed during the 2011 Ministerial Conference) was not endorsed by the WTO.

[2] The Group of Twenty (G20) is an international forum for the governments from 19 of the world's largest economies and the European Union.

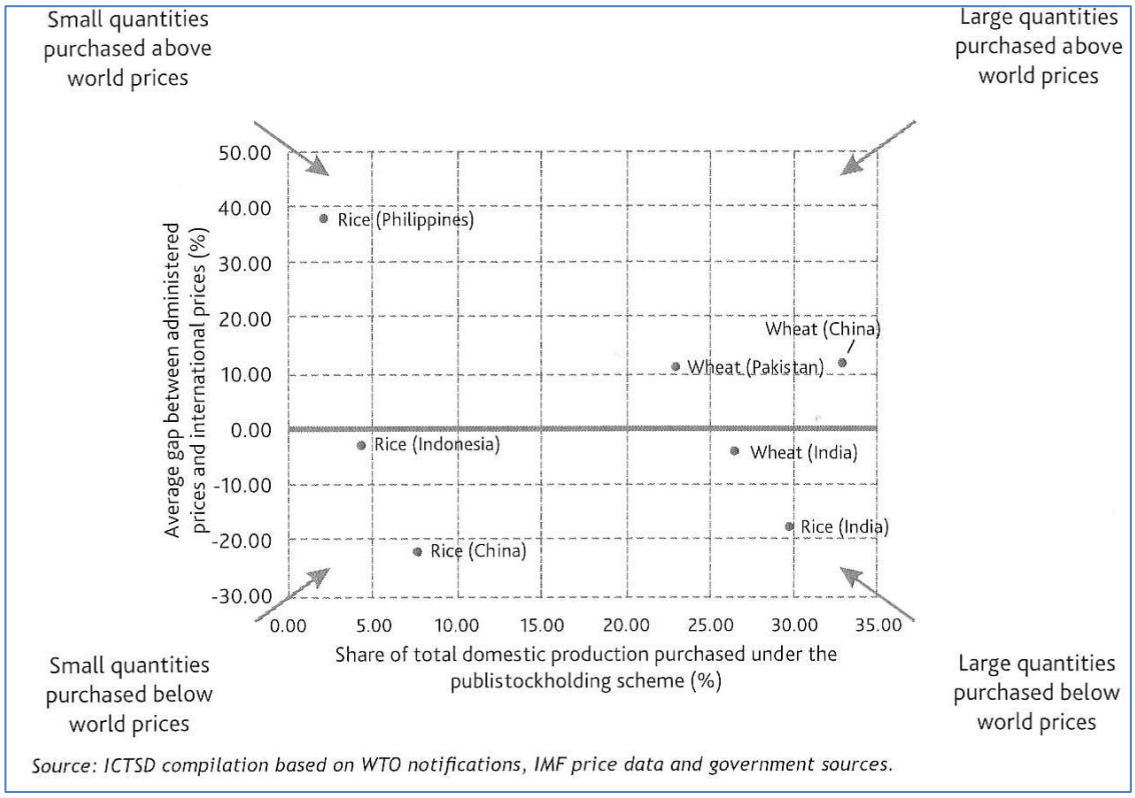
Apart from these feasibility issues, the effect of such WTO disciplines on global food and nutrition security is rather uncertain: it would contribute to reduce the instability of international prices but it would impede exporting countries from protecting themselves from the instability of international markets. For instance, the export ban on non-basmati rice implemented in India during the 2008 crisis allowed to maintain the stability of the Indian domestic price of wheat, in spite of the sharp increase in the international wheat price. This is not negligible as 25% of undernourished people in the World are living in India (Daviron and Douillet, 2013, p. 36). But this contributed to severely destabilising the international rice market. What was the net effect on global food and nutrition security? According to Anderson, Ivanic and Martin (2012), the balance between the benefits and the costs generated by the export restriction policies implemented in 2008 is slightly negative, meaning that WTO rules forbidding export restrictions (if enforced) would have only slightly improved global food and nutrition security.

7.1.3 Modify WTO disciplines on food reserves?

The proposal to modify WTO rules on "public stockholding programmes for food security purposes" (as FR are called in WTO terminology) has been under negotiation at the WTO since the Bali Ministerial Conference (December 2013).

To understand the stakes of these negotiations, the first step is to consider what is wrong with current WTO rules. These rules consider that, when a FR agency is procuring food at administered prices, a price support is provided to farmers. This support should be accounted for in the estimation of the domestic support provided by the country to its agriculture (which is bounded). In fact, these rules rest on a wrong assumption: many FR agencies procure food at administered prices for practical reasons (not to provide a subsidy to farmers): purchasing at the current market price would imply using many different procurement prices (depending on the locality) and updating them very frequently (every week or at least every month), which would considerably complicate the governance of purchases. In fact, purchasing at the market price is only manageable when the quantity procured is rather small. But using administered prices does not imply providing subsidies to farmers: for instance, in India, rice and wheat are most of the time procured at an administered price that is below international prices (see Figure 28 below).

Figure 28 FR procurement price compared to world price (average 2000-2015)



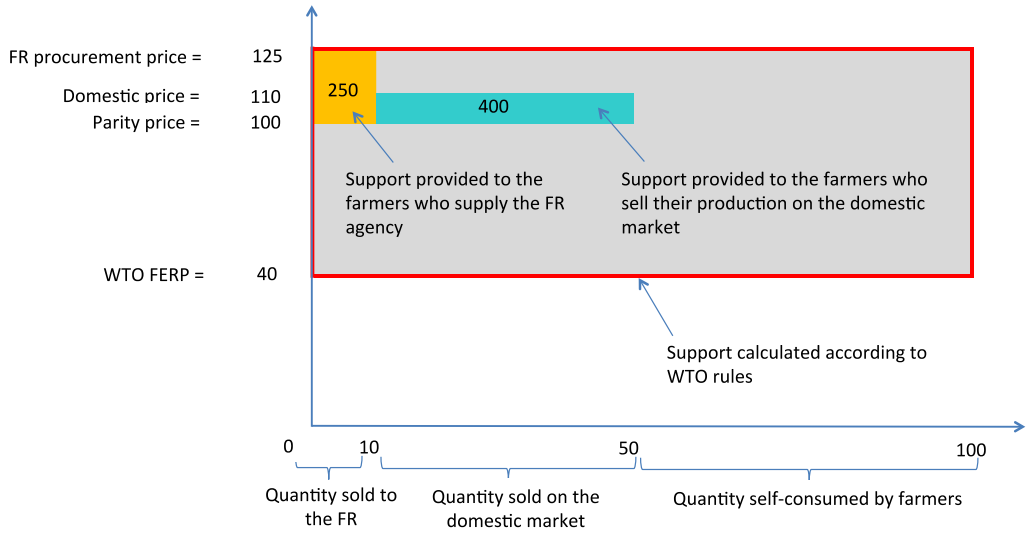
Source: ICTSD (2016).

But the main problem is related to the way the subsidy provided through FR procurement at administered prices is calculated. The price support is calculated by using as a reference not the current international price but the international price during a past 'reference period' (1986-88 for most countries, a period where grain prices were at 40% of their current level). Moreover, this price support is applied to the entire national production, even to the share self-consumed by farmers and to the share sold on the domestic market. The resulting biases in the estimation of the subsidy provided by FR are illustrated in Box 14 below. For grains, the support calculated according to WTO rules usually accounts for several times the support actually provided. The practical implication of WTO rules is therefore restricting drastically the right of countries to build FR.

Box 14 Illustration of biases in the WTO rules that specify how the subsidy provided by food reserves (or other types of public stocks) should be calculated

The following numerical example illustrates these biases. We consider the case of a country where the FR agency purchases at 125 whereas the international current price is 100. From the quantity produced (equal to 100), 50 is self-consumed by farmers, 10 is sold to the FR agency and 40 is sold on the domestic market. Let us assume that FR procurement, by reducing the quantity available on the domestic market, results in increasing the domestic price from 100 to 110. The real subsidy provided is equal to 650: 250 provided to the farmers who supply the FR ([125 -100] x 10) plus 400 provided to the farmers who sell their production on the domestic market ([110 – 100] x 40). However, the subsidy calculated according to WTO rules is much higher because the price support is calculated by using a fixed external reference price (FERP) – that is, a reference price used by the WTO to calculate the price support provided through FR procurement – equal to the international price during a past reference period (when it was equal to 40) instead of using the current international price (equal to 100). Moreover, this price support is applied to all national production, implicitly ignoring the share self-consumed by farmers and assuming that the share sold on the domestic market benefit from the FR procurement price. The resulting estimated subsidy is therefore equal to 8500 ([125 – 40] X 100), more than 13 times the real amount of subsidy provided.

Figure 29 Numerical illustration of the biases in WTO rules that specify how the subsidy provided by food reserves should be calculated



Source: Galtier (2017).

Three approaches are possible to give a country more flexibility in building FR. The first is correcting the biases in the rules that specify how the subsidy provided by FR should be calculated. The second is increasing the maximum allowed level of domestic support (at least for some categories of countries and products). The third is allowing countries to go above their maximum allowed level in specific circumstances (safeguard clauses).

These three approaches have been part of the international debates and negotiations since the first proposal made in November 2012 by a group of 33 WTO Member Countries led by India (the G33) to reshape WTO rules in order to allow developing countries using more FR to enhance their food and nutrition security. The Bali conference (December 2013) failed to produce an agreement on this issue: Members simply agreed on a peace

clause exempting the already existing public stockholding programmes from legal challenges until a "permanent solution" is found (WTO, 2013; Diaz-Bonilla, 2014). The need to find a permanent solution to the issue of public stockholding for food and nutrition security purposes was reaffirmed in December 2015 during the Nairobi Ministerial Conference (WTO, 2015). The topic was debated again during the Buenos Aires Ministerial Conference in December 2017, in a context marked by the US-China grains dispute (WTO, 2016; Yu, 2017). But no agreement has been reached yet.

7.2 Improve the information on stocks

After the 2008 crisis, the idea emerged that more transparency on stocks may be helpful in avoiding panics. In 2011, the G20 negotiations on managing agricultural price volatility proposed creating a global agricultural market information system (G20, 2011). This system (named AMIS for agricultural market information system) has been created and is hosted at the FAO. Its task is very challenging, as in many countries reliable data on private stocks do not exist and in some cases governments are reluctant to provide information on FR. EU delegations may help governments to monitor private stocks in their country and advocate for more transparency on FR. Countries and international or regional organisations can also provide some financial or technical support to AMIS.

7.3 Support the development of regional reserves

Theoretically, building international reserves (managed by the international community) may be a way to provide a cost-effective governance of FR. However, although supported by some NGOs, this idea does not currently benefit from a political support at the global level. After the 2008 crisis, two reports have been commissioned to study its relevance and both are quite sceptical with the idea, although they acknowledge the decisive role of global stocks for international markets stability (Wright, 2009; OECD, 2011). The main reasons for scepticism are related to governance issues and the controversial experience of International Commodity Agreements (ICAs) which tried to stabilise the price of coffee, cocoa, sugar and natural rubber during few decades in the second half of the 20th century (although this experience is not entirely relevant as the objective of these agreements was to support the producer price not to avoid price spikes, see Gilbert, 1996).

The same rationale may however be applied on a regional scale where governance issues are likely to be better managed than at the international level. *Regional FR* are mutualised reserves built collectively by a group of countries from the same region. Their goals are: i) to be a grain custodian, usable by Member countries if hit by natural disasters or food crises; and ii) to promote regional solidarity, with the cost of the grains provided to a country covered by the other countries.

Three regional grain reserves are currently functioning. Two of them are based in Asia: the SAARC Food Bank (SFB) and the ASEAN Plus Three Rice Reserve (APTERR). The target stock levels are 787,000 tons of rice for APTERR and 486,000 tons for SFB (comprising 60% rice and 40% wheat). Note that together these two reserves only account for about 3% of the annual international rice trade, 1% of world rice stocks and 0.25% of annual world rice consumption. They have never, however, been used as a grain custodian in the case of an emergency. The reason for this seems to be that they are not really competitive compared to international markets: commercial imports can often be arranged more quickly and at a similar or even lower cost (preferential prices have been discussed for the two reserves but are still not agreed upon). The only aspect that seems to be successful is the one based on regional solidarity (Tier 3 of APTERR). But the quantities involved are very small: for instance, in 2016, 240 tons of rice were distributed in the Philippines and 210 tons in Cambodia, while in 2017, 267 were distributed in Myanmar.

The third regional reserve (ECOWAS Regional Food Security Reserve) seems to be more apposite. It is focused on grains that are crucial for food and nutrition security, scarcely traded on international markets (millet, sorghum and specific varieties of maize) and whose local production is highly unstable, which renders a grain custodian extremely useful. It also benefits from a favourable context as grains can be easily stored in the Sahel region: millet and sorghum can be kept for two or three years without any quality deterioration. Finally, it is mainly based on regional solidarity: when a Member Country is hit by a crisis, it can receive for free a specific quantity of grains from the reserve. When surplus grains are available, Member Countries or NGO can also buy grains from the reserve.

The ECOWAS Regional Reserve is already operational. Its establishment has been delayed, but now the infrastructure is almost completely in place (FR agency, rules and procedures, contracts with national FR for

storage services, etc.). About 25,000 tons have been purchased and about 5,000 tons will be purchased in the coming months. 1,820 tons were provided to Nigeria and distributed in the North-East of the country during the 2016-2017 famine. Additional benefits have been an improvement in information systems on food crises (based on the *Cadre Harmonisé Bonifié*, a local version of international Integrated Phase Classification) and the provision of technical support to national and local FR. However, the Reserve is still facing many challenges. Up to now, all procurement has been covered thanks to EU funding. This will allow the physical reserve to reach 30,000 tons in few months, which is still a long way from its target level of 140,000 tons. The financial reserve is still zero, whereas its target level is equivalent to 260,000 tons of grain. To date, no financial contribution from ECOWAS has been provided and no sustainable source of funding has been created (a 0.5% "zero-hunger tax" on ECOWAS non-food imports has been discussed but never implemented).

7.4 Develop international agreements to coordinate the building and/or the use of national food reserves

Since the 2008 crisis, different proposals have been formulated in this area. In October 2008, Justin Lin (who was at that time vice-president and chief economist of the World Bank) proposed that "under the auspices of the United Nations, each country will hold a certain amount of public grain reserve […] not too large as a percentage of its domestic grain demand annually" and that "there should be a mechanism for releasing individual countries' public reserves onto the global market when a shock in supply and/or demand causes the global grain price to increase more than a certain limit."

In 2009, Wright made the proposal to provide governments with a pre-emption right (in case of sharp increase in food prices) on grains or oilseeds contracted by biofuels producers.

In 2011, in a policy brief disseminated during the G20 negotiation process on managing agricultural price volatility, Galtier built on Lin's proposal and on the Kyoto protocol to propose an international mechanism aiming to guarantee a minimum level of stocks at the global level, while sharing the burden of storage in a fair way. The basic idea is "to establish a minimum stock target by country and let countries choose the policy they consider most appropriate to reach it" (similar to the Kyoto protocol for greenhouse gas emissions). Some countries may choose to increase public storage while other may prefer support private storage (or a mix of both). The mechanism is the following:

> Global minimum stocks (in terms of months of consumption) would need to be established for each grain (wheat, corn and rice) by an expert committee on the basis of past movements in the markets for these products. Country stock goals would then be set by sharing the effort between countries in a redistributive manner: the effort requested would increase with the country's income (it could be imagined that DCs would not be asked to make an effort whereas emerging countries would be asked to make a moderate effort and developed countries a greater effort). This system would also have the advantage of obliging countries to be more transparent about their stocks. The governance of this mechanism (control system and sanctions) remains to be specified. (Galtier, 2011)

7.5 Concluding remarks on the international governance of food reserves

The proposals presented in this chapter aim to establish an international framework for the governance of FR. This framework could be very useful:

- *To optimise the use of existing stocks* (especially in periods of crisis) by improving the transparency on food stocks, developing WTO disciplines on export restrictions and building an international agreement for the coordinated use of FR in periods of crisis;
- *To maintain a minimum level of stocks at the global level* by rendering less restrictive WTO rules on FR and building an international agreement by which countries commit themselves to hold a minimum level of grain stock.

These proposals have been debated and, for some of them, negotiated at a high-level but, up to now, the only one that has been adopted is the creation of an international agricultural market information system (AMIS) to improve the information on stocks. A Rapid Response Forum has been created jointly with AMIS to coordinate countries' response to international food crises but, up to now, it has never met.

Recommendation Box 6

The current international governance of FR is mainly based on WTO disciplines. However, WTO rules are not providing the right incentives: they put strong disciplines on FR (that are likely to have a stabilising effect on international prices) whereas they allow without any restriction trade policies that may have a very destabilising effect, such as export restriction measures. Other issues are the lack of transparency on national stocks and the lack of coordination between national storage policies.

There is therefore a need to modify WTO rules. A first approach is based on developing disciplines on export restriction measures. However, this approach raises a feasibility issue (this proposal has been discussed –and rejected- during the 2011 WTO Ministerial Conference) and its relevance for improving global food and nutrition security is rather uncertain: it would contribute to reduce the instability of international prices but it would impede exporting countries to protect themselves from the remaining instability on international markets. Therefore, it is worth checking if part of the solution can be found on the other side of WTO rules, the ones related to FR.

It appears relevant to *modify WTO rules on FR*. It is at least necessary to correct the rules that specify how the support provided by FR should be calculated: current rules are biased and generally lead to a calculated support accounting for several times the support actually provided. The biases in WTO rules therefore result in strongly constraining countries' ability to build FR (with huge heterogeneities between countries: poor countries being usually more constrained, see Galtier, 2017). It is therefore necessary to correct these rules: having the right metrics is the first step. A second step *would be reflecting on the ceilings*: increasing the maximum allowed level of domestic support (at least for some categories of countries and products) or allowing countries to go above their maximum allowed level in specific circumstances (safeguard clauses).

It is also relevant for the EU, other donors and international organisations to *provide some financial or technical support to AMIS* (the global agricultural market information system hosted at the FAO) in order to contribute to more transparency on stocks (which may be helpful for avoiding panics). EU delegations may also *help governments to monitor private stocks in their country and advocate for more transparency on FR*.

Actions can also be developed for contributing to a better coordination between country storage policies. This can be done by *supporting regional reserves* when such initiatives are on-going (ASEAN Plus Three, ECOWAS, SAARC) or by *promoting an international agreement on the coordinated use of national FR when large-scale crises do occur* (following a proposal made in 2008 by Justin Lin, at that time chief economist of the World Bank).

CHAPTER 8 CONCLUSION: THE DECISIVE ROLE OF GOVERNANCE

As seen in this report, governments can use FR to activate three different pathways in order to improve national food and nutrition security. FR can be used:

- To fight against chronic food and nutrition insecurity by providing poor households with permanent food transfers (Chapter 2);
- To manage food crises either by providing emergency transfers to food insecure households or by mitigating food price increases (Chapter 3);
- To provide incentives to food producers, thereby contributing to long-run food and nutrition security (Chapter 4).

The relevance of using FR for these different purposes is highly context-dependent. Chapters 2, 3 and 4 provide detailed explanations on what to consider in determining whether or not to rely on FR. Ultimately, the right ways to use FR to reach these different purposes strongly depend on context. For instance, when a crisis occurs, deciding whether FR should be used to provide emergency transfers, to mitigate food price increases or for both purposes depends on the characteristic of the country and of the crisis. Chapter 3 provides information and details what variables should be considered to make such a decision. Similarly, Chapter 4 provides information on the relevance of targeting or not the incentives provided to food producers.

These three impact pathways are not automatic: they can only be achieved through well-designed and well-governed food reserves. The rules for a good governance of food reserves are presented in detail in Chapter 5. The main ones are summarised below:

- The objectives of a food reserve should be relevant, realistic and clearly specified. For instance, if a food reserve aims to act on food prices, its objective should be limited to prevent price surges or collapses but domestic food prices should still follow the mid-term trend of international prices (permanently high prices are highly damaging for food security whereas permanently low prices discourage production).
- The composition, size and location for the food reserve should be chosen carefully in order to meet the specific objectives of the food reserve and the specificities of the context.
- The physical management of the stock (treatments, rotation, etc.) should avoid losses, quality deterioration and diversions.
- Food reserve interventions should be rules-based and predictable. Discretionary and unpredictable interventions would crowd out private storage and private trade: traders would store less because they would fear public interventions might curb prices down. On the contrary, interventions triggered by clearly defined and publicly known rules do not disturb the market. This also implies that information on the triggering indicators should be available to all market players.
- The procedures used by the food reserve agency for purchases, sales and distribution should guarantee fairness among market players or potential recipients. For instance, when the food reserve agency purchases or sells on the domestic market, tenders can be organised to guarantee a fair competition between market players, which does not preclude defining specific conditions for specific categories of market players (such as farmer organisations), providing that these conditions are the same for all market players within a category.
- The food reserve agency should have the means to react quickly when it appears that an intervention is useful or necessary (in terms of staff, infrastructures, equipment and budget).
- Data on food reserve interventions, their cost and their effects should be regularly produced and disseminated in order to guarantee the transparency on interventions and to allow for regular improvement in the management of interventions.

An important dimension of the governance of FR is to guarantee their good articulation with private storage. FR should not discourage private storage, as may occur when poorly managed FR implement unpredictable and untimely interventions. Conversely, private storage cannot substitute for FR, even when subsidized (see Annex 1 for details). A good governance of FR is likely to boost synergies between private and public storage (Chapter 5).

Chapters 2, 3, 4 and 5 are related to how national governments can purposely activate the three above-presented impact pathways to improve national food and nutrition security. But the use of food reserves in a given country is likely to benefit other countries as well (especially importing countries) through a stabilising effect on regional or international markets. By avoiding or smoothing price surges on these markets, food reserves can contribute to improving food and nutrition security at the global level (Chapter 6).

This fourth impact pathway is not automatic. It can be strengthened thanks to external support to FR, or through the establishment or supranational reserves (such as ECOWAS or ASEAN+3 regional reserves). Establishing an international institutional environment for food reserves could also be very useful in two respects (Chapter 7):

- *To optimise the use of existing stocks* (especially in periods of crisis). Three main lines of action have been proposed: the creation of an international agricultural market information system (AMIS) to improve the transparency on stocks (this AMIS has actually been created and is hosted at FAO); developing WTO disciplines on export restrictions (such disciplines have been debated, and rejected, in 2011); and building an international agreement for the coordinated use of food reserves in periods of crisis (such an agreement was proposed in 2008 by Justin Lin, then chief economist of the World Bank, but has never been developed).
- *To maintain a minimum level of stocks at the global level*. Two main lines of action have been proposed: the modification of WTO rules on food reserves to make them less restrictive (negotiations on this topic have been on-going since 2013); and building an international agreement by which countries commit themselves to hold a minimum level of grain stock (an agreement of this kind, to share the burden of storage between countries – inspired by the Kyoto protocol – was proposed in 2011, but has never been developed).

ANNEXES

Annex 1 Can subsidising private storage be an alternative to food reserves?

We have seen that, in many situations, storage policies are necessary to mitigate staple price increases (Chapter 3) or collapses (Chapter 4). This is particularly the case for non-tradable staples because in this case it is not possible to use external trade to compensate for deficits or absorb surpluses. This is the reason why storage policies also appear to be necessary to regulate global staple availability and thereby contribute to the stability of international markets (Chapter 5).

But which storage policies? Policies based on FR? Policies based on subsidising private storage have been recently presented as an alternative to FR. This idea is clearly stemming from academic works based on 'competitive storage models' (see Box 15 below). However, the proposal to subsidise private storage is now circulating between policy-makers, especially through international organisations (see for instance OECD 2015a).

Rationale for subsidising private storage. We have two good reasons to think that private storage is usually not sufficient compared to what would be optimum from a collective point of view. First, storage activity generates positive externalities because it benefits not only to the one who holds the stock but to all market players: by removing quantities from the market when prices are low and releasing quantities on the market when prices are high, they contribute to stabilising prices benefiting both sellers and buyers. As traders' storage behaviour is only driven by their own profit, the level of private stocks is likely to be lower than the level that would be optimum from a collective point of view. The gap is likely to be wide for staples as staple price spikes generate huge food and nutrition security problems. There is a second reason why private storage is likely to be insufficient: storing is a highly risky activity and hedging tools are either inexistent, or costly and not able to offer an effective protection to developing countries' farmers and traders.

The classical answer to this problem is building FR to compensate for the lack of private stocks. However, FR are suspected to crowd out private storage as, when the government holds FR, traders may fear a public intervention on the market that pushes prices down and thereby may make them lose a lot of money. If building FR results in decreasing private stocks, it is not a very effective way to increase the total amount of stocks. Moreover, it is said that the costs of FR agencies are higher than the costs of private storers. The rationale for subsidising private storage is therefore partly based on criticisms addressed to FR (that are supposed to crowd out private storage and have a higher cost). However, as we will see now, these criticisms are not well established from an empirical point of view, and the efficiency of subsidising private storage for stabilising prices is rather uncertain.

Do FR crowd out private storage? Private storage drivers are not well-known (lack of reliable theory, lack of survey data on storage behaviours) and the lack of reliable data on private stocks results in the impossibility to estimate empirically the crowding out effect of FR on private stocks (if any), except in the very rare occasions where such data are available. In the case of the Philippines (the only developing country where such reliable data on private stocks do exist, see Abbott, 2013), the dynamics of private stocks and FR for rice and maize do not exhibit a clear crowding out effect (see Figures 30 and 31 below).

It is rather probable that a crowding out effect exists in many countries but its magnitude can strongly be reduced if the interventions of the FR are predictable, i.e. triggered by a ceiling price which is well-defined, not too low and publicly known in advance (Jayne, 2012; Poulton *et al*., 2006 and Chapter 5).

Is public storage costlier than private storage? The idea that the cost of public storage is much higher than the cost of private storage is mainly based on the (often cited) Indian case where the annual cost of public storage has been estimated around US$ 87 per ton whereas the cost of private storage is between US$ 16 and 20 per ton (Gouel *et al.* 2014). However, the case of India appears to be rather exceptional. Many FR are well-managed and are likely to have storage costs in line with the costs of private stocks (see AFD 2014, Rashid and Lemma 2011, World Bank and FAO 2012 and Figure 3 in Chapter 1).

Is it possible to subsidise private storage without generating huge distortions? Policies based on subsidising private storage are facing huge implementation issues. The main difficulty is in determining what exactly should be subsidised. *Interest rate?* But if a government implements credit programmes targeted to grain marketing, it would be difficult to control that the credit is actually used to store grains (we had a lot of bad experiences in this area, for instance in Sahel countries). Moreover, simulations made with competitive storage models suggest that subsidising the interest rate would be ineffective in stabilising prices (it may even increase price instability, see Box 15 below). *Storage facilities?* It is surely possible when the State owns (unused) storage

facilities. But it is not always possible and is likely to generate unfair competition. *Hedging tools?* They are almost not used for grain in developing countries. *Phytosanitary products?* But they always account for a very small share of the storage cost. *Warehouse receipt systems (WRS)?* But, for now, WRS have not succeeded in attracting a significant share of the grain traded, in spite of the external support they received in many developing countries (for instance in Eastern and southern African countries). Therefore, it seems extremely difficult to transfer subsidies to grain storers, and even more to guarantee that the money received will result in increasing the quantities stored. In addition to this, these kind of subsidies are likely to reach only some market players (big traders, big farmer organisations), thereby generating distortions within the domestic market.

The uncertain effect on staple price stability of subsidising private storage. Even if it was possible to overcome the implementation issues, the effect of subsidising private storage on mitigating staple price increases is uncertain. We have little empirical evidence and what exists is not entirely relevant. The main attempts in that direction have been through interest rate subsidies (for instance in the USA and Brazil, more recently in Vietnam) and public support to warehouse receipt systems (WRS). In all cases, the policy was more focused on farmers, the objective being the reduction of the seasonal collapse in prices that usually occurs in the post-harvest period. In all cases, the results of these policies were not clear. In fact, the main arguments in favour of subsidising private storage stem from the results of competitive storage models. However, as these models rest on several heroic assumptions on private storers' behaviours, their results are likely to be misleading (see Box 15).

In addition, the situations where private storage dysfunctions (stock hoarding, bubbles and panics) should be taken into account: in these situations, private storage contributes to exacerbating price increases. An implicit assumption behind the rationale for subsidising private storage is that the total level of stocks (private stocks plus FR) is what matters. Therefore, private stocks and FR are assumed to be equivalent. This idea is misleading: although in normal times both types of stocks follow a similar dynamic (purchases are made when prices are low and releases are triggered when prices increase, thereby contributing to stabilising prices), specific situations occur where private stocks follow a different dynamic. These situations are generally provoked by the shared belief that prices will continue increasing. In this case, farmers and traders are likely to hoard their stocks (in spite of the fact that immediate sales would be highly profitable) and their hoarding behaviours exacerbate the price increase (which seems to confirm the initial belief that prices will continue to increase). Similarly, consumers are likely to panic and therefore increase their staple purchases, thereby contributing to exacerbating the price increase. Even if the initial belief that prices should continue increasing was ill-founded (not grounded in the reality of supply and demand dynamics), it is sufficient to trigger a self-sustained dynamic of price increases. In these situations, private stocks and FR are not equivalent at all: while private storers exacerbate the increase in food prices, the FR agency can contribute to push them down by selling part of its stocks. If the quantity released from the FR is sufficient, this may exert a leverage effect on the availability of private stocks by ending stock hoarding (see Box 4 in Chapter 3 for the Bangladeshi experience in 2008).

To conclude, subsidising private storage seems to be an attractive alternative to FR because it seems it would allow avoiding some of their drawbacks (crowding out effects on private storage, higher storage cost). However, this option would have to face huge implementation issues and is likely to generate unfair competition between market players. Moreover, its effects on price stability are highly uncertain (in some occasions—such as, speculative bubble, panics—more private storage may even result in exacerbating price increases).

Box 15 Which lessons can be drawn from competitive storage models?

Proponents of competitive storage models are enthusiastic about the idea of subsidising private storage and in fact, these models are the only tangible element in favour of this kind of policies. These models have been created by Bruce Gardner (1979) and then developed by Williams and Wrights (1991). They aim to simulate the dynamics of the price of a storable commodity. They succeeded in mimicking some of the characteristics of real price series (Cafiero et al., 2011). The standard version of the model shows that markets spontaneously generate the optimum level of price instability. More elaborated versions relaxed some of their (very unrealistic) assumptions and found that the instability of prices is excessive, thereby showing that stabilisation policies may contribute to improve the collective welfare. Competitive storage models have been used to simulate and compare the cost-effectiveness of different stabilisation tools: trade policies, FR and subsidising private storage. The new version of the model developed by Christophe Gouel (2011) is able to calculate the optimum design for each stabilisation tools (the amount of import subsidy that should be provided, the level of the FR floor price and ceiling price and the amount of the subsidy that should be provided to private storage). Then the optimum versions of each stabilisation tools can be compared (or even optimum mixes of these tools).

However, in spite of their fascinating attributes, competitive storage models suffer from certain limitations, mainly because they rest on very unrealistic assumptions. As these assumptions lead to eliminate the major part of the problems generated by food price instability, these models strongly underestimate the costs of price instability, and therefore the benefits of stabilising prices (Galtier, 2013b). More problematic for our current discussion is the fact that these unrealistic assumptions affect the results on the comparative cost-effectiveness of the tools.

For instance, competitive storage models usually find that the optimum price band for a FR is a price peg where the floor price is equal to the ceiling price. This result is contrary to a common sense idea that allowing the price to move within a band is much better than a total stabilisation because it let the market functions (and produce signals on scarcity) since the price remains within the floor and the ceiling. But competitive storage models find that a total stabilisation is better. The reason for that is rather technical: the method used to estimate the effect of price instability on consumers' welfare (Turnovsky's measure) is based on the idea that what is problematic is price instability, not extreme price values. Therefore, reducing small oscillations around the mean price value is perceived as welfare improving. And when the (latest version of) the model compares FR with other stabilisation tools (such as subsidising private storage), what it analyses in fact is a FR trying to provide a total stabilisation of prices.

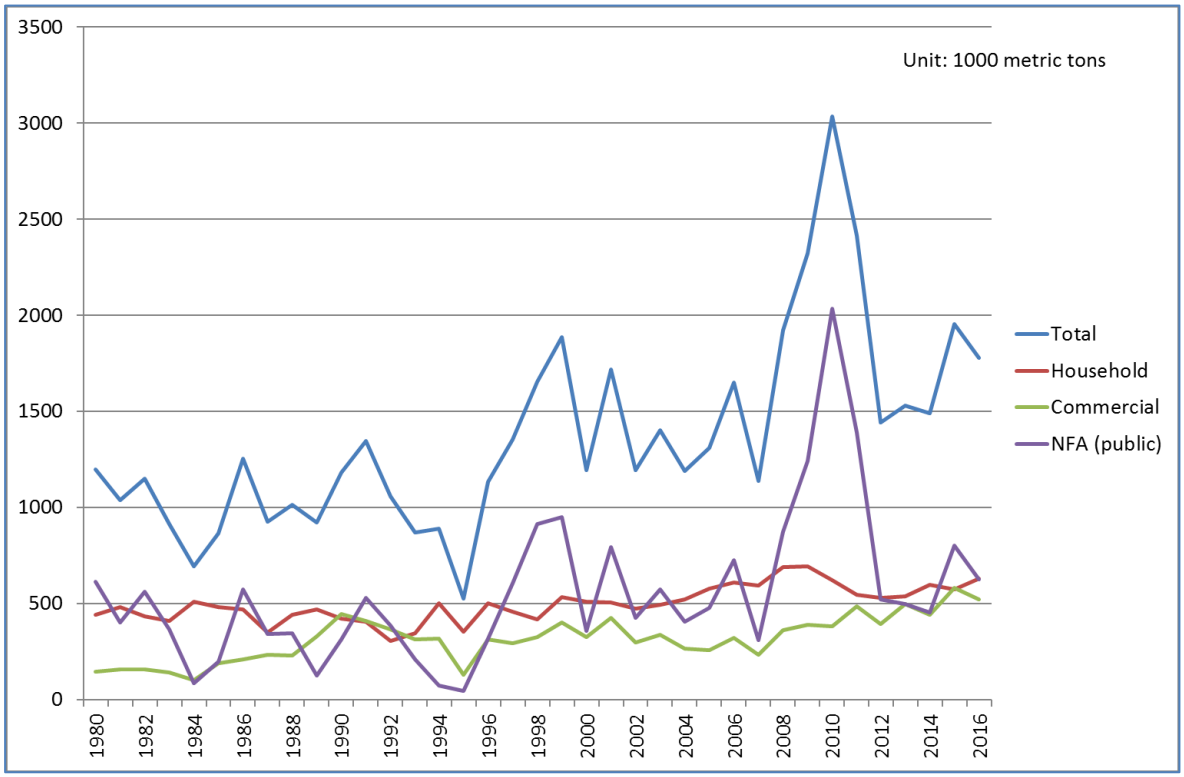
The problem becomes tricky when one considers the cost-effectiveness of subsidising private storage. As a matter of fact, the core of competitive storage models is the standard assumptions regarding private storers. They are assumed i) to be risk-neutral ii) to have a perfect knowledge of the level of all private stocks (heroic assumption, even the States don't know – see Abbott, 2013) and iii) to be able to compute all these data in order to calculate the long run market equilibrium (which requires a top level in computer programming: less than 10 persons in the world are able to solve competitive storage models). Last but not least, by construction, competitive storage models exclude the possibility of panics and bubbles (stock hoarding). Therefore, what can be expected from private storage (and from subsidising private storage) is strongly overestimated by competitive storage models.

What is said by proponents of competitive storage on the 'FR vs. subsidising private stocks debate' should therefore be taken very cautiously. Particularly as interactions between private stocks and FR are not well represented in these models: usually any intervention by the FR is found to crowd out *all* private storage (it is therefore not surprising if FR are found to be highly ineffective).

Another point that should be emphasised is that competitive storage models usually analyse private storage subsidies in the abstract form of a unitary subsidy per bag stored during a given period of time (a decrease in the variable 'storage cost' of the model). The only time competitive storage models tried to estimate the cost-effectiveness of more realistic modalities of subsidising private storage, they found that it is an inefficient way to stabilise prices:

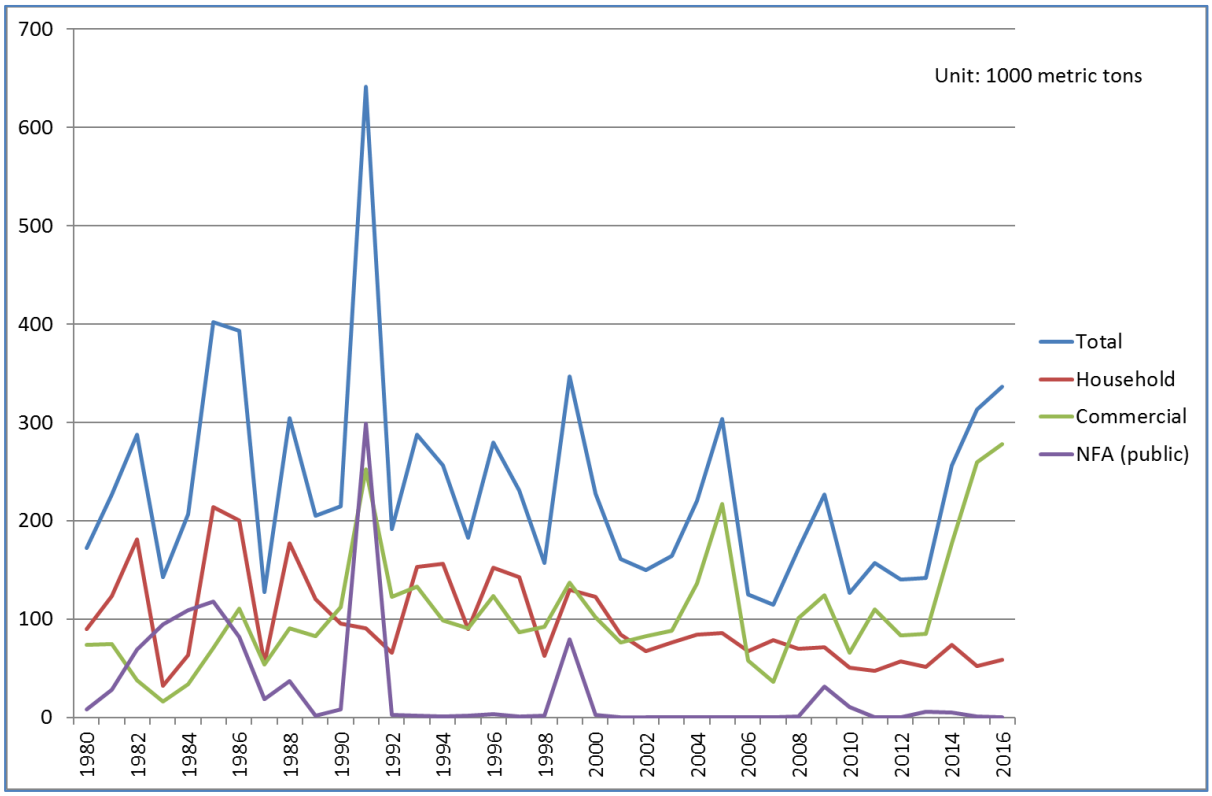
> The literature on competitive storage and on optimal public policy for price stabilisation has found that public buffer-stock and related inventory management programmes tend to be inefficient, and that subsidising private storage is a more promising approach. We find, however, that it makes a difference whether such a subsidy is directly paid on storage costs or takes the form of subsidised interest rates for inventory holders (as it has in the United States and other countries). We find that, for purposes of stabilising market prices, not only is an interest-rate subsidy less efficient, but it can even destabilise prices. (Gardner and Lopez, 1996, pp. 515-516)

Figure 30 September rice stocks in the Philippines (food reserves and private stocks)



Source: FAO Countrystat database.

Figure 31 August maize stocks in the Philippines (food reserves and private stocks)



Source: FAO Countrystat database.

Annex 2 On the social costs of targeting – Resisting to targeting in Niger: de-targeting, 'babies of luck' and other stories

"Transfers solve problems at the household level and create problems at the village level!"
A Niger village mayor cited in Olivier de Sardan et al. (2014).

According to Jean-Pierre Olivier de Sardan, in Niger, the targeting rules used by NGOs and other organisations that implement cash transfers are "incomprehensible" for local populations. They often "contradict local norms, keep their distance with municipal authorities, raise suspicions and exacerbate conflicts" (Olivier de Sardan et al., 2014, p. 107).

For instance, during the 2005 crisis, "the 'humanitarian rent' linked to the famine has been 'treated' by farmers as a form of the usual 'development rent' [provided by the numerous development projects that intervene in Niger], and with the same criteria: everyone should try to 'get his share'. The charitable criteria or values, which are so important for NGOs and other actors of external aid, are not relevant for local populations. […] The targeting criteria used by donors (such as acute child malnutrition) were therefore most of the time perceived as unfair, just as imposed conditionalities that should be circumnavigated" (Olivier de Sardan et al., 2007, p. 21).

A striking example of the gap between targeting rules and local norms is provided by the way households reacted to the food transfers implemented by the WFP and the CCA [Niger public body in charge of managing food crises] during the 2005 crisis. As social targeting was too complicated to implement in this situation of emergency, the choice was made to rely only on a geographical targeting and to distribute food to all households of the selected villages. The amount distributed was supposed to be based on the size of the family: the presentation of the family record book was therefore required to receive the transfers. However, the need to present the family record book generated several problems. In Niger, some taxes depend on the size of the family leading many family heads to declare only part of their family members. Therefore, some of them received food corresponding to six persons whereas they have 20 persons in their family. Moreover, the need for the family record book gave rise to the idea that food transfers were a consequence of having paid the taxes (and therefore a right for all tax-payers). Therefore, many people living in villages not covered did not understand why they did not receive the transfers in spite of having paid their taxes (Olivier de Sardan, 2007, pp. 29-30).

In some localities such Tirmini, an additional condition was added to presenting the family record book: the presence of women was supposed to guarantee that the food would benefit to the family consumption. Therefore, many men were in trouble because they did not have a wife (they were dead or divorced) or because their wife was not available (ill or travelling), or simply because they were not aware of this condition and living far from the delivery place of food transfers. Therefore, women from Tirmini offered them the possibility of a marriage of convenience, with the agreement of their husband (Olivier de Sardan, 2007, p. 30).

Another striking example is provided by the episode of the "babies of luck" that also occurred during the 2005 crisis. Due to the high level of child malnutrition (malnutrition rates have been the triggered of the mobilisation of the international community by *Médecins Sans Frontières* or MSF), many nutrition recovery centres have been set up. Following MSF, almost all NGOs that provided this kind of aid provided food transfers to the families of undernourished children. Having children considered as undernourished therefore became an entry ticket to get grains and other food products (beans, oil, sugar). As the amount of the food transfer was quite high (with MSF, 50 kg of millet, 25 kg of beans and 10 litres of oil when the child leaves the nutritional recovery centre), it was attractive for rural households. Women who came back in their village with the food from the nutritional recovery centre were congratulated and having a child classified as undernourished was perceived as a chance and the considered children were called the "babies of luck". The criterion of selection (a strap to measure the mid-arm circumference) was completely incomprehensible for the local populations, all the more that for them being thin is not perceived to be a disease. As a result, the women who went far to reach a nutritional recovery centre and came back with nothing did not understand why they "make selections whereas everybody is hungry". Of course, many strategies were developed including going to the recovery centre with a child from another family or provoking diarrhoea in children to make them lose weight (Olivier de Sardan, 2007, pp. 31-33).

In order to avoid destabilising effects on social structures and institutions, the transfers received are often reallocated, which sometimes results in nullifying the targeting. Transfers are often reallocated within the household: the most frequent situation is that wives have to give the money received to their husbands and they did it most of the time. But transfers are also sometimes reallocated within the community: the cash received is

bulked and distributed equally to all the households of the village either directly or in the form of food purchased with the cash gathered. In some occasion, part of the money is used to pay the taxes of the village (Olivier de Sardan *et al*., 2014, pp. 120-121).

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