



Abstract

While literature on achieving Inclusive Agricultural Transformation (IAT) through input market policies is relatively robust, literature on the effect of output market policies on IAT is rarer. We conduct a selective literature review of output market policies in low- and middle-income countries to assess their influence on IAT and find that outcomes are mixed across all policy areas. We also review indicators used to measure successful IAT, typologies of market institutions involved in IAT, and agricultural policies and maize yield trends in East Africa. This report details our findings on these connected, yet somewhat disparate elements of IAT to shed more light on a topic that has not been the primary focus of the literature thus far.

Introduction

The goal of this review is to assess, in a limited period of time and across the many different approaches to inclusive agricultural transformation (IAT), what evidence exists on the effectiveness of output market policies and strategies. At the most macro level in sub-Saharan Africa, this is a question of the relative efficacy of more direct government control allocating agricultural goods (through the 1970s), to more market based allocations based on prices and quantities determined by private actor supply and demand (beginning with structural adjustment in the 1980s). Even with less direct government ownership or setting of prices and quantities, however, governments influence markets via policies that either alter market prices (e.g. subsidies, exchange rates), or that indirectly affect market incentives and the cost of doing business (e.g. infrastructure, regulations, standards, bureaucratic costs, etc.).

Understanding the outcomes of any particular product market policy on IAT will not be independent of a country's initial conditions and institutions that affect the rules of exchange. Competition policy and public finance systems, for example, are central to the "inclusive" component and leveraging poverty-growth agricultural elasticities. Agriculture's historically dominant role in reducing poverty, and reducing poverty for the poorest, remains (see most recently Ligon

TAKEAWAYS

The evidence on output markets is thin relative to input markets, mixed, and mostly focused on import and export strategies with results that also depend on trading partner policy.

Market liberalization strategies have been differentially applied to specific cash or export crops, while maintaining domestic price and quantity measures for cereals.

Domestic output market measures can involve direct rural producer v. urban consumer trade-offs and may be seen as less of a systems investment than upstream actions.

When ICT and price information fail it often rests not on the intervention itself, but on uneven access to mobile phones and the internet.

Rankings of "inclusive transformation" depend on the choice of indicator and are inconsistent across countries.

Leveraging the gains from liberalization relies on ensuring competitive markets.

There is no evidence that access or the distribution of the gains will be "inclusive" without an intentional focus on excluded groups and/or a public finance system that works to equalize meaningful access. Further, the source of public financing, as well as the target, affects who benefits.

and Sadoulet, 2018). But the maximum benefits of market liberalization, such as increasing trade (static efficiency) and production incentives (dynamic efficiency), are only realized when policy promotes a competitive market with low costs to entry and exit and good information. The benefits of economic growth, for example, are only broadly realized when public finance systems appropriately tax and spend (including investing in education and health) to support inclusive transformation. Markets alone favor those who begin with human, financial, and physical assets. We do not systematically review the institutional environments in which agricultural strategies are implemented, but Scoones and Thompson (2011) similarly discuss the importance of institutions and argue for changes in the political and societal institutions within some sub-Saharan African nations. Corruption within agriculture and land tenure systems was repeatedly cited as a constraint on agricultural development, especially with regards to inclusive growth strategies (Mgbenka, Mbah, & Ezeano, 2015).

The seeming infrequency of pure product market interventions raises at least two hypotheses stemming from output (food) market interventions occurring at a more downstream point in the food chain. The first is that political-economy trade-offs within agricultural policy are more visible, both in national goals and in terms of sub-populations of winners and losers:

i. within agricultural policy

- In domestic markets, policies that affect food prices will have differential welfare effects on rural producers and urban (rich and poor) consumers;
- In export/import markets, policies often differentiate across commodities, and support higher-valued products, products according to comparative advantage (agro-ecologically and whether a country is relatively more land or labor abundant), or simply cash versus staple products. In addition to a producer's ability to respond to policies protecting some products relative to others, at the country level there can be income and growth versus food security trade-offs (sometimes mitigated with domestic strategic grain reserves).

ii. across agricultural and non-agricultural sectors

- For development policy generally, there are trade-offs between focusing on public goods investment (education, transportation and communication infrastructure, national security, etc.) versus investing in sector product markets, as well as trade-offs across agricultural and non-agricultural sectors.

The second hypothesis is that resources spent on downstream markets are often seen as more of a consumption expenditure, than an investment expenditure, and that system change is less likely to occur at the end of a value-chain than the beginning of it.

As a start to understanding the evidence on output market policies we have assembled a few somewhat disparate pieces:

Section 1 provides general findings on output markets followed by a table and graphic of more specific empirical findings from over 75 reviewed papers. The scope was restricted to output markets, including domestic and foreign price and quantity policies (e.g. direct price or quantity restrictions, subsidies, and export tariffs) and access to market information. We built our search around the typology presented in *Transforming Agriculture in Africa & Asia: What are the Policy Priorities* by Laborde, Lallemand, McDougal, Smaller & Traore (2018).

Section 2 includes some relevant material from a 2015 EPAR review on Maize Yield Trends and Agricultural Policy in East Africa. Although the review is focused on maize yield rather than some

broader measure of IAT, it has the advantage of covering some specific country policies and grey literature.

Section 3 considers indicators and how conclusions depend on how IAT “effectiveness” is measured. To address different starting conditions and the challenge of counterfactuals in assessing macro-level policies, we use Laborde et. al.’s land use and birth rate criteria to cluster countries by similar levels of endowment, and their two indicators for assessing transformation from those starting positions: agricultural employment share of total employment and food security, as measured by the prevalence of undernourishment (estimates of people consuming insufficient calories). We depart, however, from Laborde et al. by emphasizing a few focus geographies and by considering a broader set of indicators that produce slightly different country groupings for comparing policy approaches to IAT.

Section 4 offers six examples of institutional typologies.

SECTION 1: Empirical Evidence on the Effectiveness of Output Market Policies & Strategies

An overview of our findings appears in Table 1. Considerably more empirical literature exists on input market than output market interventions, and of the more than 75 articles reviewed, the outcomes in all policy areas were mixed, with some policy areas notably less effective than others - importantly noting that current assessments may differ from those at the time of the publication. Table 1 is followed by our research methods, some broad take-aways from Laborde et. al. and elsewhere (researcher historical commentary without specific empirical evidence and three specific cases), and more detailed findings from the evidence review in Table 2. Table 2’s results are then presented graphically as simple pathways between the articles reviewed on output market policies or interventions and the author’s measured outcomes. Appendix A contains our search strings.

Table 1: Overview of Evidence Findings

Policy Area	Indicators Used	Results	Stated Rationale
Access to price information/communication technology	Farmer income, output price, qualitative assessment of program participation	Largely beneficial	Grower information access improves market knowledge and sales price because a grower is less likely to be misled by intermediate buyers. In situations where the policy failed, it was usually due to inadequate access to information or widespread knowledge of the program.
Trade liberalization and import-export policy	Export Price Parity, domestic prices	Largely harmful	Export bans instituted as a means of controlling domestic prices were largely ineffective. Trade liberalization was often undertaken with continued interventions by state-controlled marketing boards and price stability did not improve. Strategic liberalization of certain export crops has had some success.
Domestic price controls, subsidies, strategic reserves (domestic taxes still under review)	Domestic prices, price volatility	Better in principle than practice	While some strategic reserves did positively influence grain prices, most were too small to have a significant impact on the economy. Mismanagement and poor strategy also hurt their functionality. Direct domestic price subsidies & taxes, depending on implementation, can involve welfare trade-offs between rural producers and urban consumers.

Research Methods

We created standardized search strings (see Appendix A) for the specific output market policies outlined in IFPRI’s *A Policy Taxonomy for Agricultural Transformation* (Baliño et al., 2019). These strings were entered into Scopus, Google Scholar, and/or JSTOR, and the results were further filtered by a four-tiered process. First, if possible, the results were sorted by number of citations, and the first 50-100 were chosen. This step was skipped if there were fewer than 100 articles. Second, article titles were checked for relevance, omitting gray literature (unless published by IFPRI, FAO, OECD or World Bank), papers focused on high-income countries, and

papers that did not address an output policy, as determined by reading the abstract. Articles passing the first three filters were reviewed in full. If the complete review found the article relevant, the policies and their outcomes were added to the coding spreadsheet and included in the *Evidence on Output Policies* section. To be included, the article had to mention a policy intervention directed at output markets, and the result of that policy by a measurable indicator. Common measures included price volatility, average prices, domestic/export price differences, and measures of wellbeing such as income, profitability, and purchasing power.

Not all the articles which used these methods used empirical data; instead, they had the results of simulations from a base year had the policy been applied. These data were considered relevant because some strategies listed by Baliño et al. (2019) have yet to be implemented by the target countries. These simulation-based papers are labeled “theoretical” in our summaries.

The resulting sample was further divided into three categories: information communications technology (ICT) access and price information publication, import/export policies, and domestic technical regulations, price or quantity interventions (such as strategic grain reserves). Table 2 details the evidence, where authors, the year of policy implementation, the year of publication, and an assessment of the outcome per the authors’ indicators are recorded. Policies were classified as failures if all indicators either did not change or worsened, mixed if one or some but not all indicators improved, and success if the target indicator(s) improved. Consequently, scope of research, choice of indicators, and whether the policy was fully and effectively implemented all influence the results of the studies and our assessment of how the author is interpreting the evidence. Diagrams of the intervention and measured outcomes appear in a set of figures following Table 1.

General Evidence on Output Policies & Enabling Institutions

The relative contribution to the literature on influencing agricultural development through policy has been heavily weighted toward inputs, as the dominant thinking through the late 1900’s assumed that supply-side transformations like those that had previously occurred in “transformed” economies would achieve similar results in Africa. This paradigm held that, given sufficient access to fertilizers and agricultural technologies, growers would naturally produce a surplus that they would then be motivated to find a market for, and excess labor would be released into urban manufacturing or service jobs as the target areas attained food self-sufficiency with drastically reduced labor inputs. In an introduction to the 2014 special issue of the journal *World Development* on economic transformation in Africa, McMillan and Headey define development as increased agricultural productivity that allows labor to move to the nonfarm sector. Collier and Dercon (2014) conclude, in the words of McMillan and Headey (2014) that:

[f]or economic development to succeed in Africa in the next 50 years, not only will agricultural output have to increase massively, but labor productivity will need to increase as well, requiring a vast reduction in the proportion of the population engaged in agriculture and a pronounced population shift out of rural areas.

They cite a positive finding in a study of a Chinese-supported potato farming program that included support for market access and price information along with seedlings and inputs. The study “demonstrate[d] [that] economic development is a continuous process with constantly evolving binding constraints on both the supply side and the demand side.” As they argue, “[o]ften, after a local policy helps remove one binding constraint, a new one emerges that, in turn, may require a new set of local policies.” They conclude that improving food processing capacity is the next logical step.

In 2018, Christiaensen and Martin edited a new *World Development* special issue that identifies differences in African agriculture that constrain a supply-focused growth pattern. Their analysis indicates that agricultural labor productivity is more elastic in the tropics than it is in higher latitudes, indicating that larger productivity gains will be necessary to release similar amounts of labor from agricultural work and that continued growth in

agricultural employment in the interim is not necessarily a sign of failure: “[For poor countries,] [g]rowth in agriculture is in general (two to three times) more effective at reducing poverty than an equivalent amount of growth generated outside agriculture.” They also argue that, prior to growth in urban labor, it might first be necessary to draw people into agriculture from other rural occupations, including “less productive home production.” In the same issue, Adam, Bevan, and Gollin (2018) found that in Tanzania, reductions in transaction costs from transport substantially improved rural incomes, highlighting the need for adequate market development to achieve the population shifts that were called for in the 2014 edition. But the authors also importantly note that the source and nature of public financing matters in terms of who (rural farmers or higher income urban food consumers) bears the burden of the tax (i.e. how an instrument is financed matters, not just the choice of instrument). The evidence on appropriate financing mechanisms is scarce, though Adam, Bevan and Gollin (2018) find that public expenditures targeting agriculture can “...negatively affect real consumption wages of the rural unskilled if financed from a tariff, but have a positive effect if financed through a consumption tax, which affects mainly the urban skilled (Christiaensen, L. & W. Martin, 2018, p. 413). Relative tax and welfare burdens are not just an issue with domestic policy choices, though they are perhaps more politically visible, as Diao and McMillan (2018) further note that aid financed investment that causes real exchange appreciation will favor domestic oriented nonagricultural sectors over more open sectors.

More broadly, we found additional evidence suggesting that when considering output market policies:

- No single policy on its own leads to an agricultural transformation (Henley, 2012);
- In most countries a combination of investment in infrastructure, research and development, and agricultural extension services are needed to spur an agricultural transformation (Henley, 2012);
- Some level of protectionist trade policies (tariffs, import restrictions, quotas, etc.) have been used in many successful agricultural transformations, though there is disagreement about their specific effectiveness (Anderson & Valdez, 2009; Warr & Kohpaiboon, 2009)
- Agricultural transformation is hampered by focusing on industrial development - also referred to as the Relative Rate of Assistance (Warr & Kohpaiboon, 2009; Nwankpa, 2017)

There were several discussions of the Nominal Rate of Assistance (NRA), which measures the difference between the expected price of a given commodity to the producer in the absence of any government market interference and the observed price of said commodity. Calculating the NRA in both the agricultural and non-agricultural sectors allows one to calculate the Relative Rate of Assistance (RRA) with a negative relative rate of assistance suggesting agricultural products have a greater negative distortion to their market price than non-agricultural products (Anderson et al., 2009). When Anderson and Masters (2009) looked into both the NRA and RRA for sub-Saharan African countries almost all of them had negative NRAs, that is, farmers received less money for their goods than they would have in the absence of government interference. These lower commodity prices for farmers were created by policies designed to lower the cost of food for the urban poor such as price controls, export bans/taxes, import subsidies, etc. This was further compounded by an opposite effect on manufactured goods leading mobile capital to be invested in industry and manufacturing rather than agriculture (Anderson & Masters, 2009).

Using Anderson & Valenzuela (2008) data, an OECD report finds that of 13 countries for whom growth in agricultural incomes were estimated to be the major contributors to poverty reduction, mostly negative NRAs in the 1980's (e.g. from export taxes and overvalued exchange rates) slowly declined into the 21st century as did trading partner import protections.

“The turnarounds were especially dramatic in Brazil, China, and Vietnam, three countries also posting exceptionally rapid declines in poverty...we see that the high, positive rates of trade protection and price subsidy afforded rich country farmers were generally declining. That is to say, the protection

confronting developing countries in rich country markets since the 1980s has progressively and significantly declined...Taken together then, the trading environment confronting farmers in the selected countries was one of declining disprotection in the home country and declining positive protection in the rich country trading partners.” (Cervantes-Godoy, D. and J. Dewbre. 2010), p. 17.

We note again, however, that no single policy is behind any country’s success, and the enabling institutions matter, to which we describe the three success stories identified by the OECD: Brazil, Vietnam and China. Broadly speaking, all three strategies were all government-initiated, mostly involved public sector investment in infrastructure and focused on technology and inputs, with product market interventions often more selective and involving strategic choices by commodity. Markets were liberalized slowly and intentionally to further transformation once initial conditions (assets, technologies, extension systems, and in some cases marketing networks), were in place. Then, in China for example, “... except for a short period in the late 1990s, government officials stepped back and allowed the entry of private traders and private transport, doing little to interfere with markets. Licensing fees and taxes are low or non-existent. Markets for both agricultural outputs and inputs were encouraged.” (Huang and Rozelle, 2010)

Brazil: Brazil’s success was mostly supply-side focused, with the publicly well-financed research organization Embrapa (Empresa Brasileira de Pesquisa Agropecuária) developing technologies to improve land quality, grass varieties to feed livestock, and seed for home consumption and export crops (e.g. soybeans and cotton), though it was the “open innovation system and IPR policy adopted by Embrapa, coupled with a network of extension services, [that] enabled an effective diffusion of research results” (Correa and Schmidt, 2014). A mission-focused, farmer-centric, locally informed public sector, in contrast to a profit-maximizing company, supported the widespread adoption of technology.

Vietnam: Vietnam provided the same government catalytic and supporting role, with the almost 100 fold increase in coffee production between 1986 and 2016 attributed to a combination of input and output market measures: sufficient labor supply and stable production (state-owned farms and government encouraged migration to the central highlands), producer incentives via land reforms and government controlled food commodity prices relative to liberalized coffee prices, and the focus on the Robusta coffee variety that is easier to grow, and more pest and disease resistant (International Coffee Organization, Country Coffee Profile: Vietnam, March 2019). The differential treatment of grain and coffee markets took place within an environment of strong institutions, coordinated interventions, and a gradual liberalization:

“Along with the decisive role the government played in coffee development through policy and planning, public institutions have been essential to almost every part of the coffee industry growth. Initially public institutions formed SOEs that undertook all industry roles such as coffee production, the supply of agricultural inputs, rural credit, production, processing, marketing and export. This process has allowed the coffee industry to develop and stabilize under government guidance and subsidy. Over time these institutions have gradually been liberalized and many have been moved over to the private sector”. (Marsh, 2007)

China: China’s growth is generally attributed to land reform (from collectives to individual) and incentives created by the household responsibility system (HSR), infrastructure investment in roads, telephones and digital technology) with a particular a push on irrigation (from 18% in 1952 to the majority of cultivated land), agricultural R&D, labor mobility, and as with Brazil and Vietnam, differentially strategizing among crops for export, domestic food security (largely rice, wheat and maize), and of higher value for both export and domestic consumption (livestock, fish, fruits and vegetables). (Park et. al., 2002; Huang and Rozelle, 2010)

Examples of some policies more directly focused on product markets, include:

“By 1991, all export subsidies were phased out, though China occasionally applied them to specific products (e.g., maize and cotton) to avoid a large fall in domestic prices before China’s WTO accession (Huang et al. 2004). [Following comparative advantage], net exports of land-intensive bulk commodities, such as grains, fiber crop, oilseeds, and sugar crops, have fallen. At the same time, exports of higher value, more labor-intensive products, such as horticultural and animal (including aquaculture) products, have risen... The government began to plan for such a contingency by announcing a “minimum agricultural pricing policy.” The policy is supposed to work by authorizing managers of grain reserves to buy grain (rice, wheat, maize) aggressively when the market price reaches a preset minimum. Although the policy does not authorize the grain managers to give farmers a certain price for any grain sold to them (as the pricing policy in the US did historically), it does authorize grain managers to procure grain and store it. With less grain on the market, prices should be stabilized. (Huang and Rozelle, 2010)

Whether or not institutions and natural endowments within sub-Saharan African nations are conducive to government-led plans involving coordinated input and output strategies and public sector investment, prior to leveraging liberalized markets, depends on the nation and current leadership and governance. Some researchers argue these institutional changes are pre-requisite to policy effectiveness towards IAT (Scoones and Thompson, 2011; Mgbenka, Mbah, & Ezeano, 2015).

Table 2: Paper specific evidence on output policies

Per our methods, these articles are sorted into three categories: information access/information communications technology (ICT), import-export policies and trade liberalization, and domestic price controls and strategic reserves. These categories proved the most useful for grouping the evidence found to date, though we are still looking for more evidence on domestic subsidies and taxes. Across these categories, import-export policies and trade related policies were most abundant, followed by strategic reserves and price controls, and finally ICT and price information. Thus far, little evidence has been found on output subsidies in LMICs, especially within Africa. In general, analysis of specific output market policies is more piecemeal compared to the research on input-side policies (with the exception of export bans and restrictions), and the small sample size (often 1 article per outcome) limits conclusions, as do national level policies without counterfactuals. Just over 75 articles are reviewed in Table 2, with the coding spreadsheet available.

Among the articles reviewed, trade certification, advocacy and marketing for export markets, export auctions, strategic grain reserves, access to ICT and price information, and one case of a price regulation had positive results. The reasons for mixed or negative results vary, but some policy areas are notably less effective than others. In the case of trade liberalization, for example, some failures were blamed on continuing domestic controls through state-owned marketing boards, or continued tariffs despite claims of liberalization. In other cases, trade liberalization has been assessed to have negative effects when cheaper imports displace domestic production and increase food insecurity during periods of high and volatile world prices. Unlike Brazil, Vietnam and China reviewed earlier, the typical pattern for many of these studies involved increasing trade openness, either resulting in a privatized market (e.g., Ghana), or a backlash and reassertion of old buying programs and price controls (e.g., Tanzania). Countries that successfully liberalized appeared to have greater benefits to farm income and prices received by sellers than those that did not. Meanwhile, other forms of state intervention in trade, such as import and export bans, did not tend to benefit the market, usually because they were poorly implemented and/or easily evaded. When ICT and price information fail it appears to rest not on the outcomes of the intervention itself, but on uneven access to mobile phones and the internet.

Price Information/ICT						
	Article	Country	Specific Policy	Policy Level And Year	Degree of Success	Indicator of Success
Empirical	Ali, J. & Kumar, S. (2011)	India	ICT	National (2000)	Mixed (Higher-class farmers saw positive improved decision making in post-production planning and marketing as a result of access to ICT, but lower-class farmers did not see significant positive effects).	Supply Chain Decision Making
	Ayoola & Ayoola (2015)	Nigeria	ICT	Local (2012)	Success (Access to mobile phones significantly improved maize sales)	Output Price
	Chong et al. (2005)	Peru	ICT	National (Mid 1990s)	Success (Government mandated privatization of telecoms company and further integration of payphones in villages led to an increase in both farm and non-farm income)	Farm and Non-farm Income
	Furuholt & Matotay (2011)	Tanzania	Price Information Access	National (2009 - 2011)	Failure (The Ministry of Industry, Trade and Marketing's attempts to send up-to-date agricultural price information to farmers failed because of lack of awareness of the service and lack of farmer access to mobile phones and internet. Attempts to reach them through newspaper also failed.)	Output Price
	Kimura, K. Omole, D.W., & Williams, M. (2011)	Ghana	ICT	National (2007-2011)	Success (Ghana saw more uniform prices and lower transaction costs for farmers by privatizing/liberalizing mobile communications sector, allowing for private companies to provide information to farmers reducing the need for middlemen)	Price Dispersion, Transaction Costs
	Mendoza, R. and Thelen, N. (2008)	Various - Kenya	ICT	National (circa 2004)	Success* (The private-sector Kenya Agricultural Commodity Exchange Limited (KACE) market information system (MIS) provided smallholder farmers with price information via ICT and allowed them to participate more effectively in market for their output products.) *This data comes from KACE, however, and may be suspect.	Qualitative Assessment of Participation

Empirical	Ouma et al. (2010)	Burundi & Rwanda	Price Information Access (lack of)	N/A (2006)	Failure (absence of publicly available banana output price information in newspapers, radio, or through electronic posting means that many producers and sellers are operating without full information, making it harder to participate in viable market transactions.)	Output Price
	Fafchamps, M., & Minten, B. (2012)	India	ICT	Subnational (2007 - 2010)	Failure (There was no statistically significant effect on the price farmers received for their products as a result of access to ICT. While farmers used the ICT technology and information, it did not significantly change their outcomes.)	Output Price
Both Empirical + Theory	Mukhebi et al. (2007)	Kenya	Price Information Access	Subnational (1997)	Success* (See article above: The private-sector Kenya Agricultural Commodity Exchange Limited (KACE) market information system (MIS) provided smallholder farmers with price information via ICT and allowed them to participate more effectively in market for their output products.) *This data comes from KACE, however, and may be suspect.	Output Price
	Muto & Yamano (2009)	Uganda	ICT	National (2003 - 2005)	Mixed (Increased access to ICT and market information led to increased market participation for farmers who live further away from district centers and produce perishable crops but did not have as much of an impact on other farmers).	Ratio of sellers to producers and distance traveled for a sale

Import-Export, Trade Liberalization

	Article	Country	Specific Policy	Policy Level and Year	Degree of Success	Indicator of Success
Empirical	Abdullateef, U. & Ijaia A.T. (2010)	Nigeria	Trade Liberalization	National (1986 - 2005)	Failure (Trade liberalization in Nigeria opened the doors to cheap imported food, which reduced agricultural self-sufficiency. Nigeria has since been increasingly food insecure with a rapidly rising CPI)	CPI
	Abbott, P., & Morse, B. A. (2000)	South Korea & Philippines	Tariff Rate Quotas	National (1990s)	Failure (Underfilling of the quotas in both countries is common due to weak demand and problems with administration of the quotas by producer groups.)	Fill Level Quota
	An, H., et al. (2016)	Ukraine	Export Bans & Restrictions	National (2007 - 2011)	Failure (Authors find prices did not rise as much as international prices and that all actors along the food value had reduced profits in order to insulate urban poor from 25% of the change in global prices.)	Grain Price
	Anderson, K. & Nelgen, S. (2011)	Multiple	Export bans & Restrictions	National (1965 - 2008)	Failure (Trade intervention is more costly and less effective than direct interventions in the market and helps urban poor at the expense of rural poor.)	Grain Price, Nominal Rate of Assistance
	Aragie, E., et al. (2018)	Malawi	Export Bans & Restrictions	National (2011 - 2017)	Failure (An export ban on maize decreased the GDP growth for the agricultural sector, and the decrease in prices provided more benefits for urban rich than compared to all other groups.)	Ag GDP
	Asfaw, S., et al. (2009)	Kenya	Private Trade Standards	International (2003)	Mixed (Private European supermarket standards benefited households with relatively high wealth and access to information while not helping lower-income growers)	Income, household wealth, access to information, access to services
	Bargawi, H.K. & Newman, S.A. (2017)	Tanzania	Export Auction System	Local (1995-2010)	Mixed (Participants in the auction system experienced less price volatility than sellers to private buyers; however, producers have been disproportionately affected by lower international prices than by higher ones)	Price volatility, futures price, international price

Empirical	Barrett, C.B. (1997)	Madagascar	Trade Liberalization	National (1980 - 1990)	Mixed (Liberalizing trade increased price variability of staple crops and did not appear to benefit/incentivize new production)	Price volatility, price dispersion, and national mean price
	Diao, X. & Kennedy, A. (2016)	Tanzania	Export Bans & Restrictions	National (2012)	Failure (An export ban had little effect on the price of food but increased poverty by hurting rural wages and farmer incomes while negatively affecting GDP growth overall. The greatest benefits went to the urban rich)	Poverty Level, Ag GDP
	Dolan, C. & Humphrey, J. (2000)	Kenya, Zimbabwe	Private trade standards	International (1990's)	Failure (Private trade standards tended to consolidate food exports under a small number of buyers and large-scale commercial farms, mostly as a result of supermarkets fearing the potential risks of sourcing from smallholders)	Smallholder share of production and sales
	Dou, L., et al. (2015)	China	Import standards	International (1996-2012)	Success (As China tightened its limits on pesticide revenues in food to bring their regulations more in line with US and EU policy, the perceived quality of Chinese vegetables rose, causing exports to rise)	Export levels
	Durevall, D. & Van Der Weide, R. (2016)	Laos	Export Controls	Multiple (2001 - 2012)	Failure (Trade restrictions caused price spikes while keeping the long-term average price low.)	Prices
	Francesconi, G.N. & Ruben, R. (2014)	Tanzania	Private trade standards	International (2000)	Failure (Analysis of FairTrade cooperatives suggested that the attractiveness of the program causes "crowding in" and oversupply. In the case the authors examined, there were also accusations that development funds were being mishandled, motivating sales to outside buyers at lower prices)	Density of coffee trees, number of participants, sales to FT association, outside sales
	Heinisch, E.L. (2006)	West Africa	International advocacy by government	International (2002)	Success (In 2005, the WTO ordered the US to reduce its cotton subsidies after sustained pressure for Mali, Benin, and Burkina Faso. The author argues that this might be a viable strategy going forward if LMIC's form networks of mutual support)	Export Prices

Empirical	Housa, R. & Verpoorten, M. (2015)	Benin	Export Bans & Restrictions	National (2003 - 2005)	Failure (EU import ban on shrimp (de facto export ban) caused low-income fishermen to leave the trade for lower-wage jobs; industry did not recover after ban was lifted.)	Income
	Jayne, T.S., et al. (2002)	Kenya	Trade Liberalization	National (1986 - 2000)	Failure (Kenya liberalized trade but retained the state-owned maize marketing board that selectively supports maize prices. The government also continued import tariffs.)	Grain prices
	Jayne, T.S., et al. (2002)	Zimbabwe	Trade Liberalization	National (1991 - 2000)	Failure (In 1998, Zimbabwe reversed trend toward liberalization started in 1993, and banned private maize trade in 2001. The national Grain Marketing Board never stopped operating.)	Private investment
	Laiprakobsup, T. (2014)	Thailand	Domestic price floor	National	Failure (A price floor policy supported by government purchases did nothing to incentivize increased production and reduced exports because Thai rice was less competitive)	Yield, export price parity, export volume
	Laconto, A.M. & Simbua, E.F. (2012)	Tanzania	Private trade standards	Local (2008-2010)	Mixed (Whether a fair-trade-certified cooperative benefited smallholders depended on the degree of control and the structure of the value chain)	Price received by grower
	Kleemann, L. et al. (2014)	Ghana	Certification for Export Markets (OPT IN NOT REQUIRED)	Subnational (2010)	Success (Organic certification increases ROI over conventional export certification)	ROI for farmers for one production cycle
	Maertens, M., et al. (2012)	Madagascar Ghana, Senegal	Private Trade Standards	International (1998-2005)	Mixed (Results differed by crop: Ghana vegetable production was highly smallholder involved while papaya production was mostly estate controlled. Smallholder contracting through export companies led to increases in yield and reduction in health hazards to growers due to contracting standards. Women were mostly excluded from buying and contracting)	Smallholder share of production

Empirical	Mendoza, R. and Thelen, N. (2008)	Various - Kenya	Trade and Marketing Development	National (2003)	Failure (A system connecting buyers to growers was initially successful at improving income, but it collapsed when the exporters stopped buying due to noncompliance with EU regulations.)	Household income
	Mitiku, F., et al. (2017)	Ethiopia	Private Trade Standards	International (2014)	Mixed (Of four standards in use in Ethiopia, two substantially increased income and welfare, one increased yields and crop income only, and the last had a negative impact on yields and income.)	Yield, grower income
	Morrison, J., & Sarris, A. (2007)	Multiple	Import Protection	National (1990s to early 2000s)	Failure (Trade liberalization has not resulted in positive gains to the agricultural sector in Africa; some import protection during the early stages of development may be necessary.)	Values of imports and exports
	Moseley, W.G., et al. (2010)	The Gambia	Trade Liberalization	National (2007 - 2008)	Failure (Trade liberalization caused imported rice to displace domestic consumption; when a global price spike came in 2007-2008, local markets were not prepared to handle the shock.)	Imports, grain prices
	Moseley, W.G., et al. (2010)	Cote d'Ivoire	Trade Liberalization	National (2007 - 2008)	Failure (Trade liberalization caused imported rice to displace domestic consumption; when a global price spike came in 2007-2008, local markets were not prepared to handle the shock)	Imports, grain prices
	Moseley, W.G., et al. (2010)	Mali	Trade Liberalization	National (2007 - 2008)	Mixed (Mali was not as hard hit in 2007-2008, but the reasons why are debatable, and may be cultural. Malians did not embrace imported rice and substituted domestic sorghum when rice prices rose)	Imports, grain prices
	OECD	Colombia	Trade Liberalization (Tariff Reduction)	National (1990)	Failure (Reduction in tariffs led to reduction in producer profits and the collapse of the agricultural sector, leading to widespread protests from farmer interest groups and the reinstatement of policy interventions [see price band system below].)	Farmer Income
	OECD	Colombia	Price Band System	National (1991)	Mixed (Survived several waves of further liberalization and has protected prices for 13 agricultural products and has widespread farmer support, but the government is starting to provide exceptions to this system with certain free-trade partners.)	Agricultural Output Prices

Empirical	Porteous, O. (2017)	Ethiopia	Export Bans & Restrictions	National (2006 - 2010)	Failure (Despite the intended effect of insulating domestic markets from global grain price shocks, export bans did little to change the grain prices compared to neighboring countries due to grain hoarding and export ban evasion/smuggling.)	Grain Prices
	Porteous, O. (2017)	Kenya	Export Bans & Restrictions	National (2011)	Failure (see above)	Grain Prices
	Porteous, O. (2017)	Malawi	Export Bans & Restrictions	National (2005 - 2011)	Failure (see above)	Grain Prices
	Porteous, O. (2017)	Tanzania	Export Bans & Restrictions	National (2003 - 2011)	Failure (see above)	Grain Prices
	Porteous, O. (2017)	Zambia	Export Bans & Restrictions	National (2002 - 2009)	Failure (see above)	Grain Prices
	Sangho, Y., et al. (2011)	Mali	Trade and Marketing Development	Subnational (1993-2008)	Success (A series of investments in extension services, financial sector stabilization, pre-cooling packhouses, and multi-modal refrigerated container shipping led to increases in mango exports and higher prices for farmers)	Farm gate Price, Exports
Both Empirical + Theory	Barry, B., et al (2007)	Guinea-Bissau	Export Tax	National (1989 - 2005)	Failure (Authors predict an increase in farmer consumption if the export tax were to be removed.)	farmer consumption, farmer income, poverty rate
	Choeun, H., et al. (2006)	Thailand	Export Tax	National (1950 - 1985)	Mixed (Taxes were higher than optimum due to rent-seeking and policy protections for favored groups.)	National social welfare

Both Empirical + Theory	Dorosh, P. & Ahmed H. (2009)	Ethiopia	Foreign Exchange Rationing	National (2008 - 2009)	Debatable/Low (Foreign exchange rationing and government imports led to higher supply and lower wheat price. Authors argue that the private sector could deliver wheat at similar prices while generating more tax revenue. Government imports in response to the '08 price spike did not bring prices back to import parity levels.)	Grain price
	Hamad, M.M., et al. (2014)	Tanzania	Import Tariff Reduction	National (1986 - 2010)	Mixed (Trade liberalization improved GDP growth when shifting from a "closed" economy to an "open" one, but it led to a trade imbalance that means further increases in openness did not have the same benefit.)	GDP
	Maertens, M., & Swinnen, J. F. (2009)	Senegal	Trade Standards: certification and labeling scheme	National (2002)	Mixed (positive results for poor farmers, but more on labor side than product side)	Export growth, household income, incidences of poverty
	Minot, N. & Rashid, S (2013)	Mozambique	Comprehensive liberalization	National (1997 - 2008)	Mixed (Privatizing the economy led to region's lowest price instability, but the government was not able to respond in time to price spikes in 2007-08. At time of publication, government was implementing a strategic reserve.)	Grain Prices
	Minten, B. et al (2009)	Madagascar	Trade Standards: micro-contracts, farm assistance and supervision	National (Early 2000s)	Success (Contract farming caused a 50% increase in yield and accounts for about half the income of contract farmers. Farm assistance also improves yields for non-contract crops.)	Income and crop yields
	Minten, B., et al (2018)	Ethiopia	Trade Certification Standards	Subnational (2006)	Failure (Producers received less than 1/3rd of the quality premium for certified coffee despite high compliance cost.)	Producer prices
	Sahn, D., et al. (1996)	Various - Madagascar, Tanzania, Malawi, Ghana, Cameroon, The Gambia	Export Tax	National (Various)	Failure (Simulated data indicate that reducing or eliminating export taxes would substantially increase grower income, indicating that these taxes were regressive and reduced export price parity.)	income of rural poor

Both Empirical + Theory	Sharma, R. (2011)	Various	Export Restrictions	National (2007 - 2010)	Failure (Authors conclude that for small countries where changes in export do not affect the global economy, export taxes artificially increase domestic supply, resulting in a benefit to consumers, loss to producers, and a net economic loss.)	National welfare, prices
	Warr, P. (2005)	Indonesia	Import Ban	National (2004)	Failure (A rice import ban caused a 125 percent price increase, leading to increased poverty and benefits going mainly to wealthy landowners.)	Poverty Head Count, Gini Coefficient
	Oramah, B.O., et al. (1995)	Nigeria	Export-Import Bank	National (1991 - 1993)	Success (The evaluation which covers the period between 1991 - 1993 indicates that the Bank had been effective in providing credit support for non-oil exports of Nigeria. Its activities were found to have generated over 70% of the country's export earnings and a diversification of Nigeria's export products and markets in line with Nigeria's export sector objectives.)	Financial records
	Olujide, J.O., & Gbadeyan, R. A. (2010)	Nigeria	Pre-shipment inspections	National (2010)	Mixed/moderately successful (A pre-shipment company under government contract produced good results, but at a high price resulting from corruption.)	Market utilization
Case Study	Dana, J., et al. (2006)	Malawi and Zambia	SAFEX Hedging	National (1997 - 2002)	Mixed (Authors demonstrate using simulations that hedging can reduce imports and price variability, but there is no evidence because these policies were never implemented.)	Imports, food security
Theory	Adam, C. et al. (2018)	Tanzania	Import Tariffs	National (Future Projections)	Failure (Authors found that taxes on consumption were preferable to import tariffs and deficit spending as a method for financing rural development.)	GDP, exchange rates, output, employment, social welfare

Theory	Dorosh, P. et al. (2009)	Zambia	Import & Export Trade Restrictions	International (2005-2007)	Failure (Restricting either imports or exports (depending on maize harvest levels) led to increased maize price volatility in their model,)	Output Price Volatility
	Gebrehiwet, Y., et al. (2007)	South Africa	Import standards	International (1995-1999)	Failure (The authors argue that aflatoxin restrictions on food imports in the OECD cost South Africa \$69 million/year in foregone trade revenue. They suggest that countries implementing the standards lessen the economic impact by providing expert guidance on complying with the requirements.)	Trade effect (\$)
	Hranaiova, J., & Gorter, H. D. (2006)	South Korea	Tariff Rate Quotas	National (N/A, theoretical)	Mixed (For State Trading Enterprises, the right level of TRQ liberalization leads to an improvement in consumer and social welfare, but too much leads STE's to turn to autarky and an import/ destroy tactic that lowers social welfare.)	Social Welfare
	Ilorah, R. (2006)	Nigeria	Export Tax, Price Stabilization	National (1942 - 1985)	Failure (Nigerian farmers paid for price stabilization scheme with export taxes, causing a net loss of income.)	Income Loss
	Oyewumi, O. A., et al. (2007)	South Africa	Tariff Rate Quotas	National (2003)	Mixed ("TRQ liberalization led to societal welfare gains overall. While consumers gained additional income, while producers lost farm income.)	Farm Income
	Reinert, K. (1993)	Costa Rica	Discriminatory Export Taxation Across Agricultural Products	National (1970)	Failure (Export taxation was unevenly applied and mainly resulted in protecting the incomes of landowners at the expense of growers and export rates.)	Welfare, Production

Domestic Price Controls/Strategic Reserves/Subsidies/Taxes

	Article	Country	Specific Policy	Policy Level And Year	Degree of Success	Indicator of Success
Empirical	Kannapiran, C.A. (2001)	Papua New Guinea	Price Subsidy	National (1975 - 1995)	Mixed (price subsidy had positive impact on export income, aggregate demand, private consumption, and employment. However, it increased budget deficits and adversely affected interest and inflation rates).	Export income, tree-crop income, employment rate, private consumption, money demand, others
	OECD (2015)	Colombia	Price Support	National (2001)	Success (A minimum guaranteed price policy for cotton producers allowed the government to make up the difference to producers when the market price dropped.)	Farm income
	OECD (2015)	Colombia	Price Support	National (2013)	Success (Price support program for coffee implemented in response to the fall of coffee prices in 2013, allowing farmers to maintain their typical level of income.)	Farm income
	Abokyi, E., et al. (2018)	Ghana	Strategic Grain Reserve	National (2006 - 2015)	Success (Buffer stocks reduced price volatility)	Grain prices
	Abebe, G. et al. (2013)	Ethiopia	Food Subsidies and Value Added Tax (VAT)	National (2012)	Mixed (Policies to control and subsidize prices led to regular lack of supplies and queuing. Outlets that paid the Value Added Tax (VAT) charged significantly higher prices, controlling for quality. Authors suggest more targeted subsidies or safety nets for the poor.)	Food prices, lack of supplies/stock shortages, length of queues
	Alderman, H. & del Ninno, C. (1999)	South Africa	Value Added Tax (VAT) and Tax Exemptions	National (1993)	Success (Evaluates tax exemptions for various food sources discussing pros and cons of tax exemptions. Confirms the logic of VAT exemption for maize.)	Tax equity (household tax burden/ income), efficiency, energy intake
	Alderman, H. & Lindert, K. (1998)	South Africa	Food Subsidies	National (1991-1998)	Mixed (South Africa was able to slightly decrease the cost of living for poor by excluding certain products from the VAT, but political pressures limited their effectiveness as more products were included)	Incidence of Benefits, Reduction in Household Costs

Empirical	Alderman, H. & Lindert, K. (1998)	Tunisia	Food Subsidies	National (1990-1993)	Mixed (Tunisia was able to decrease the costs of food subsidies and improve their targeting by limiting them to foods disproportionately eaten by poor households, but the incidence was worse than means-tested food programs.)	Incidence of Benefits, Reduction in Household Costs for Poor Households
	Barrett, C.B. (1997)	Madagascar	Strategic Grain Reserve	National (1980 - 1990)	Mixed (rice buffer stock stabilized prices in response to increased volatility, but program shut down due to costs constraints).	Price volatility, price dispersion, and national mean price
	Borish, D., et al. (2017)	Kenya	School Feeding Program	Local (2009)	Success (One Kenyan HGSF led to new tree crop plantings and tomato production).	Perceived benefits of schooling, income, trees and tomatoes planted
	Conway, F.J. (2012)	Chile	Value Added Tax (VAT)	National (1975)	Failure (The informality of the firewood market means producers are unable to get market information or direct access to buyers, and middle-men are able to informally sell the product without paying VAT to the state.)	Participation in formal market
	Delpeuch, C. & Vandeplas, A. (2013)	Tanzania, Uganda, Zambia, Zimbabwe	Taxes	Taxes (1970-2005)	Failure (Liberalization of trade including reduction of taxes on output caused NRA to become less negative during study period, but exogenous factors including exchange rates, decline in world cotton prices, and policy reversals prevented significant improvement.)	Nominal rate of assistance
	Ellis, F. & Bahiigwa, G. (2003)	Uganda	Local Taxes	Local (2001)	Failure (The local tax system penalizes engagement in monetized economic activity (whether in crop sales, trade or nonfarm business) through taxes, fees, and corruption that bear little relation to market prices.)	Participation in Formal Markets
	Kolavalli, S. & Vigneri, M. (2011)	Ghana	Marketing Board	1960s-1990s	Failure (Ghana saw improvements in farm gate prices, yields, and exports after decreasing the size and control of the Cocobod, the cocoa marketing board, even without full liberalization.)	Farm gate Price, Exports

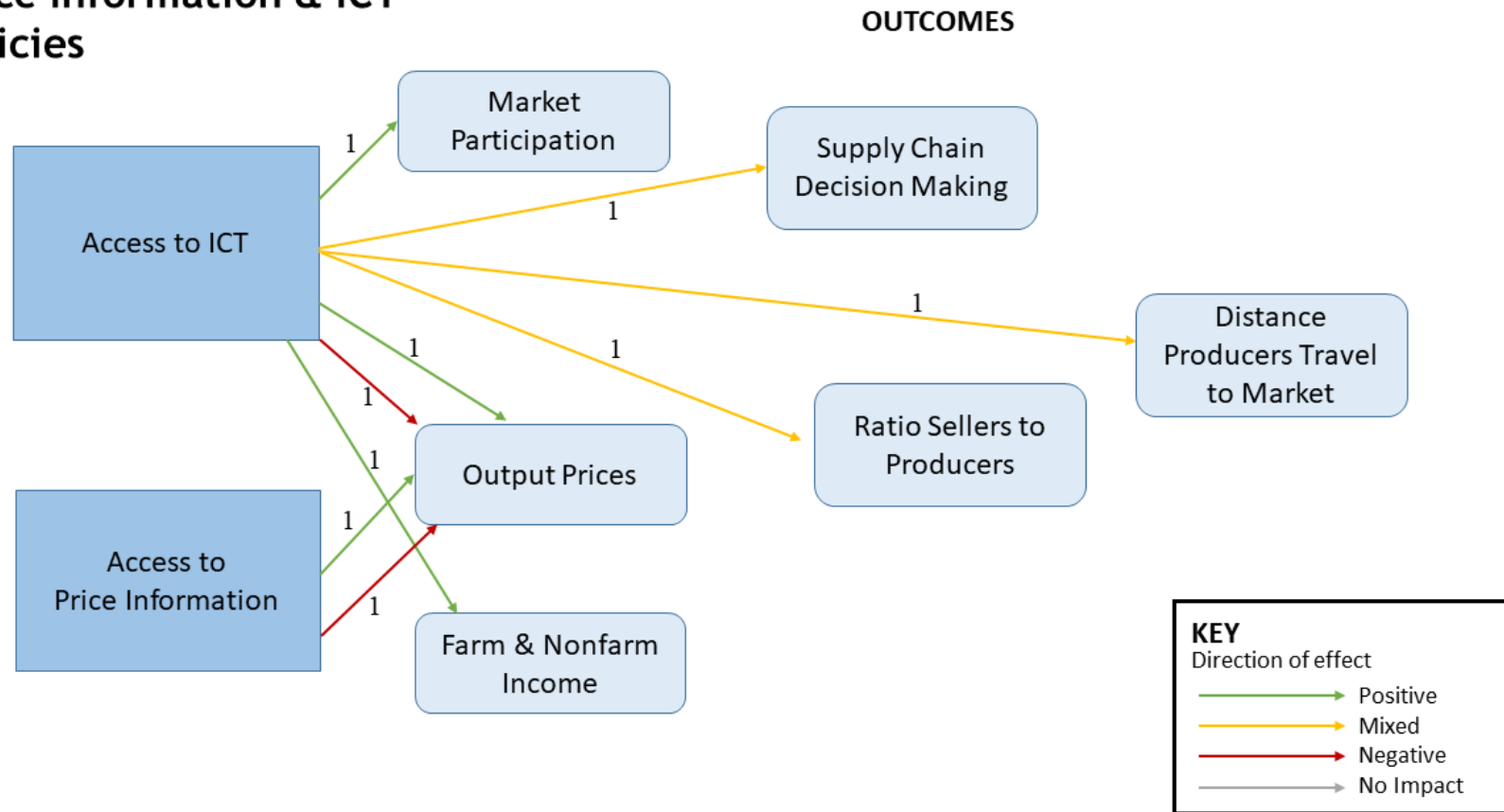
Empirical	Ohimain, E.I. (2015)	Nigeria	Domestic Trade Regulations	National (2002)	Mixed (government cassava requirement in products increased yield and technology investment; however, production costs are still high requiring taxes on other grains to keep cassava competitive.)	Yield, production cost, sale price
	Selim, S. (2011)	China	Price Regulations	National (1990s)	Mixed (policy reduced productivity but increased farmers' welfare)	Growers' welfare and productivity
	Heerink, N., et al. (2006)	China	Farm Income Payment	National (2004 - 2005)	Mixed (improved rural farm incomes, but the effectiveness varied based on geography and infrastructure)	Rural Income
	Alemu, Z. G. et al. (2003)	Ethiopia	Agricultural Taxes	National (1966-1994)	Projected Failure (Planned supply of teff, wheat, maize and sorghum is positively affected by real producer prices and negatively affected by real producer prices of substitute goods in the short and long run, indicating that farmers are responsive to incentive changes. This implies that direct and indirect taxes on agriculture harm growth.)	Area Planted
Both Empirical + Theory	Minot, N. & Rashid, S (2013)	Ethiopia	Minimum Support Pricing	National (2008)	Failure (grain exchange and importation did not have much influence on prices)	Grain Prices
	Minot, N. & Rashid, S (2013)	Kenya	Minimum Support Pricing	National (2008)	Mixed (buying scheme reduced price variability, but benefits were not evenly distributed)	Grain Prices
	Minot, N. & Rashid, S (2013)	Malawi	Strategic Grain Reserve	National (2001 - 2007)	Failure (Malawi has region's lowest maize price stability).	Grain prices
	Minot, N. & Rashid, S (2013)	Zambia	Strategic Grain Reserve/Export Ban	National (1995 - 2008)	Failure (suppliers acted unpredictably, creating conflict between public and private traders)	Grain prices
	Minot, N. & Rashid, S (2013)	Tanzania	Strategic Grain Reserve	National (1991)	Failure (small and largely ineffective at influencing prices).	Grain Prices
	Nakhumwa, T. O. et al. (1999)	Malawi	Implicit Taxes	National (Late 1990s)	Failure (Net policy effects are generally negative for crops studied, meaning that policies are reducing net private profitability below net social profitability. This suggests that government policies are taxing agriculture.)	Difference between the price at market and social prices.
	Pieters, H. & Swinnen, J. (2016)	Multiple	Domestic Price Controls	National (2006 - 2013)	Mixed (some countries successfully reduced short-run price volatility, while allowing structural price changes to pass through to producers and consumers. Most countries were unable to).	Grain price volatility and international vs domestic price

Theory	Omeje, E.E., et al. (2018)	Nigeria	Price Protections	National (1980 - 2016)	Failure (price protections did not improve farm income or farmer economic welfare)	Import price parity, domestic food supply,
	Langinger, N. (2011)	Kenya	School Feeding Program	Subnational (2009)	Mixed (Kenya lacks the backup yield and production to source its food locally).	Within-district crop purchases
	Younger, S. et al. (1999)	Madagascar	Value Added Tax (VAT)	National	Failure (Under a VAT, all of the benefits go to the government, unlike import duties in which local producers benefit because the import protection allows them to charge higher prices.)	Output Prices

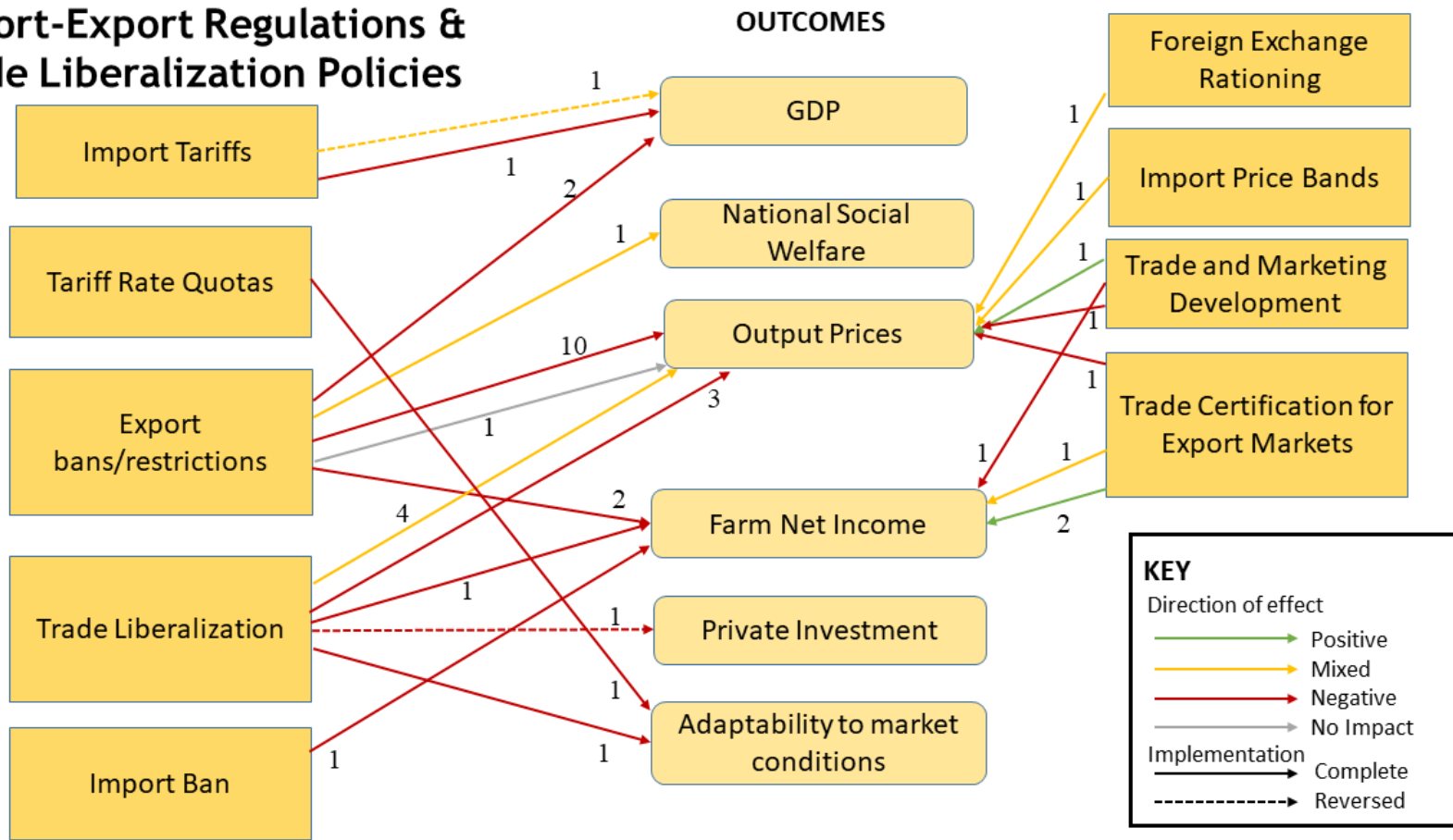
Figure 1: Policy Effectiveness and Outcome Pathways

The following pathways illustrate the effectiveness of the policies presented in Table 2 and the associated outcomes of each policy. Each policy is linked to an outcome by an arrow color-coded by the type of effect it had on the associated outcome. Next to each arrow is the number of articles that provided evidence on that particular policy to outcome pathway.

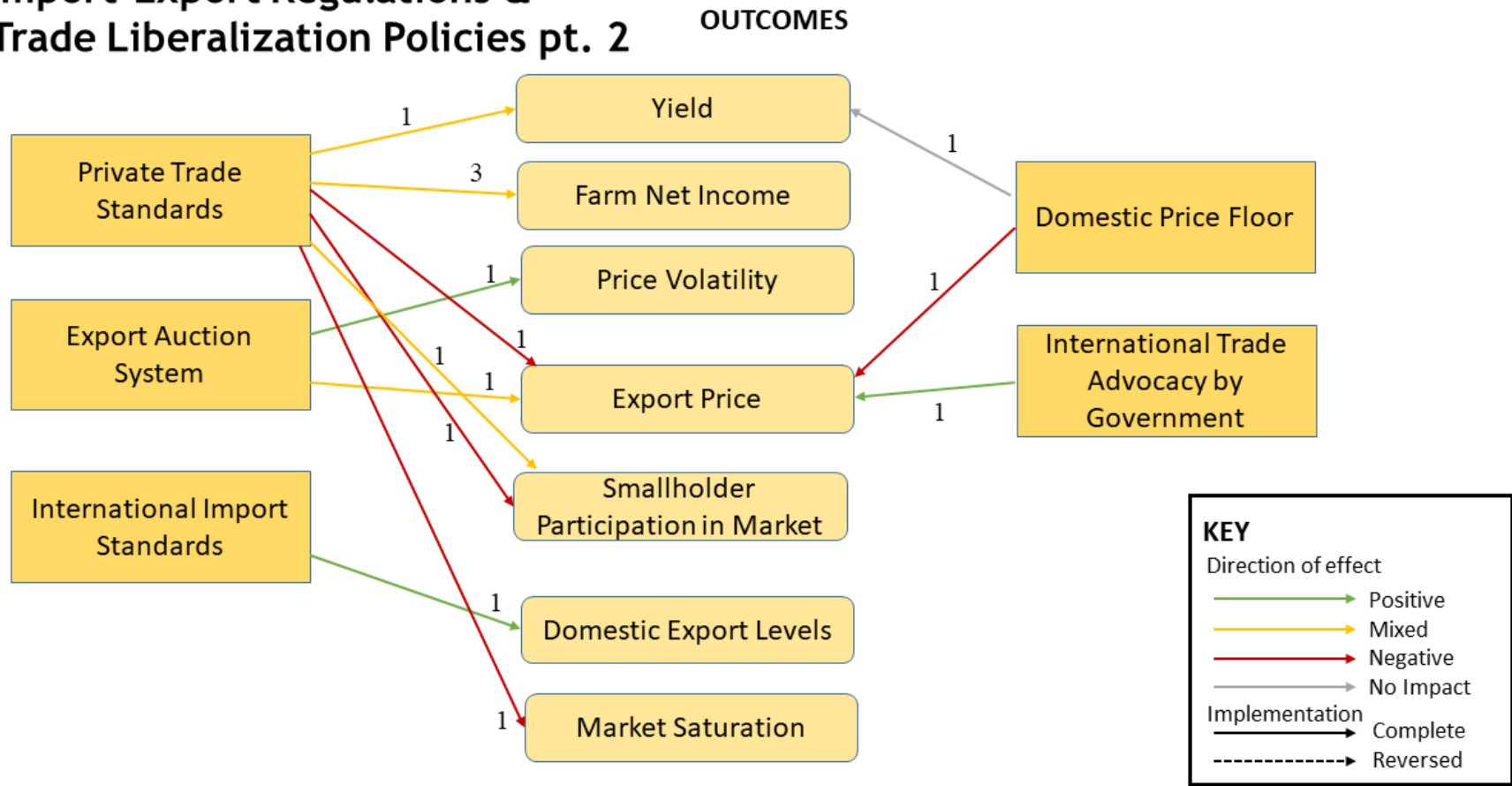
Price Information & ICT Policies



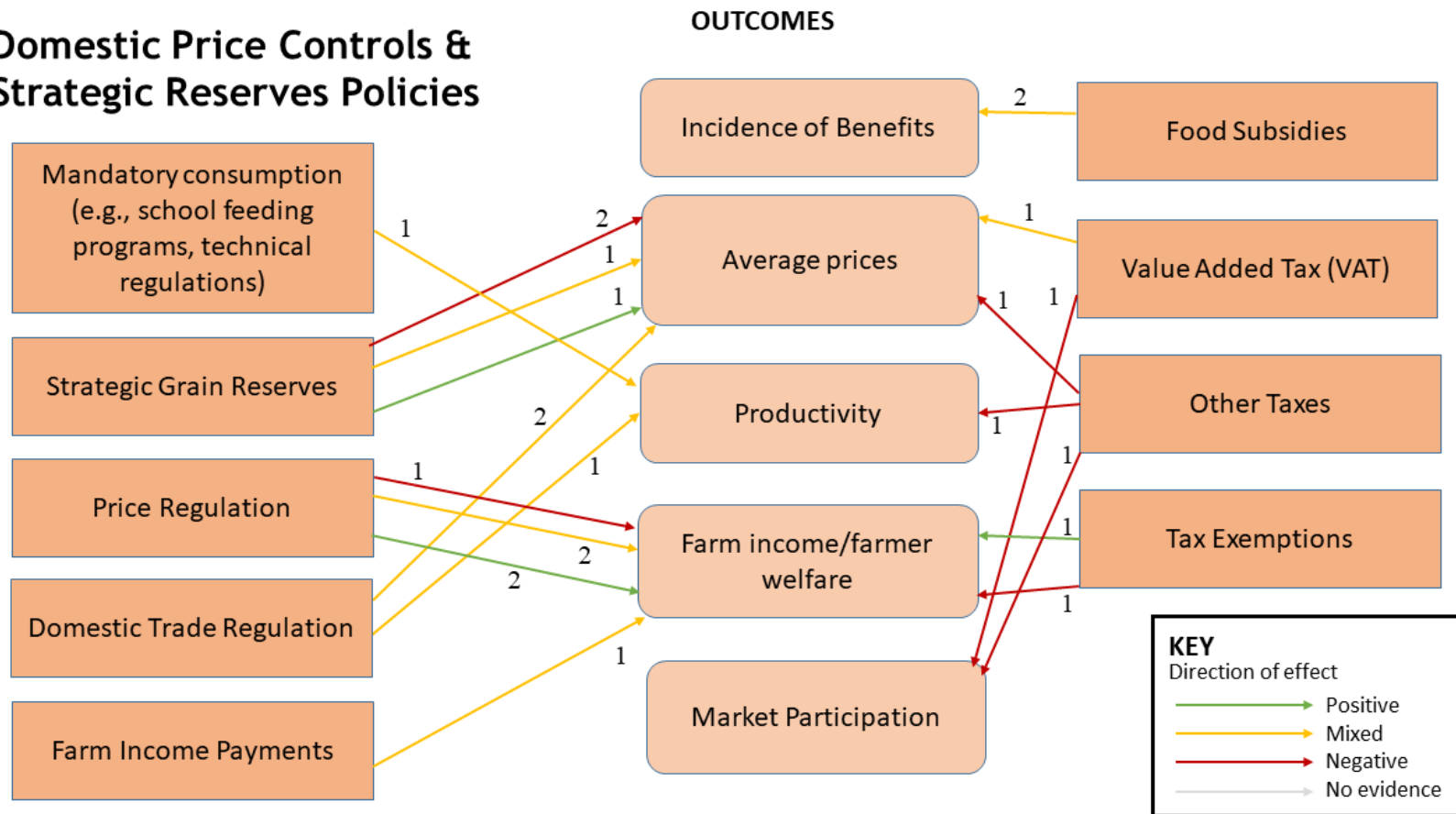
Import-Export Regulations & Trade Liberalization Policies



Import-Export Regulations & Trade Liberalization Policies pt. 2



Domestic Price Controls & Strategic Reserves Policies



SECTION 2: Additional Evidence from MAFAP and Country Policy Documents

What follows is a shortened version of the 2015 EPAR Technical Report #310 *Maize Yield Trends and Agricultural Policy in East Africa, Macro-Level Literature Review for Six Countries* (EPAR, 2015), that looked at maize yield trends and agricultural policy across six countries in East Africa. Because of an output market focus, policies relating to the following have been excluded, but are available in the [full report](#).

- Fertilizer prices, access, subsidies
- Improved seed prices, access, subsidies
- Other input prices, access, subsidies
- Transportation
- Public agricultural research
- Extension

Sources

FAOSTAT Analysis & National Reports

FAOSTAT data are collected and compiled with the assistance of national governments. For this analysis we include data from a 20 year period, 1993-2013, to illustrate national level changes in reported yield (reported in kilograms per hectare (kg/ha)). To account for the variation in proportion and type of cereal crops grown in Tanzania, Ethiopia, Malawi, Rwanda, Kenya, and Uganda we also report the yield for the top four cereal crops in each country.

MAFAP Public Expenditure Data

Public expenditure amounts are self-reported by countries and are available from 2006 to 2013 for Ethiopia, Kenya, Malawi, Tanzania, and Uganda. Expenditure data were not available for Rwanda. In this report, we include total agriculture-specific expenditures, which is comprised of amounts paid to agents in the food and agriculture sector (producers, consumers, input suppliers, processors, traders, and transporters) and general support to the food and agriculture sector (including research, technical assistance, training, agricultural infrastructure, etc.).

To compute public agriculture spending per capita rural population, for each year, we converted the MAFAP public expenditure amount into US dollars using that year's exchange rate and then divided by the total rural population for the year in question. We considered using number of rural households or total agricultural GDP as alternate denominators, but found that the trends in spending were robust to these different denominators, and the rural population estimates were more consistent across countries. We retrieved historical exchange rates from Oanda and rural population data from the World Development Indicators database from the World DataBank.

Figure 1: Ethiopia Yield and Public Agriculture Spending Trends and Relevant Policies

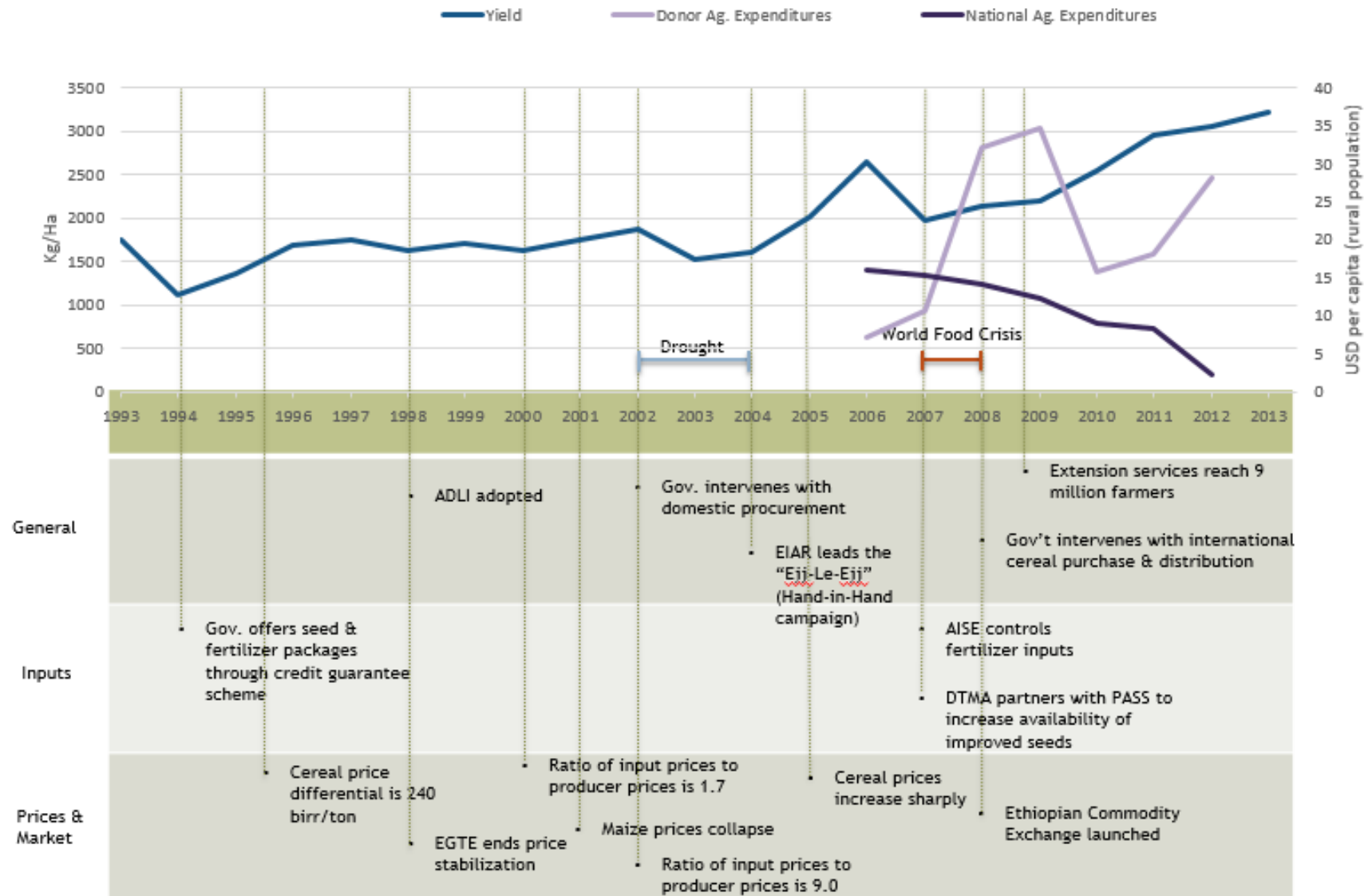


Table 1: Agricultural Policies in Ethiopia

<p>General policy</p>	<ul style="list-style-type: none"> • As maize yields increased overall in Ethiopia, national spending on agriculture decreased between 2006 and 2012. Meanwhile, donor spending increased until peaking in 2009, right after the world food crisis. It dropped in 2010 then steadily climbed until 2012 (MAFAP, 2015). • Policies in Ethiopia have followed the ‘Washington Consensus’ and include features of structural adjustment such as devaluing the exchange rate, liberalizing product markets, deregulating prices, reducing subsidies, and lowering duties and taxes (Chang, 2009). • In the 1990s and 2000s, the government of Ethiopia emphasized cereal productivity in all of its policy strategies (Rashid et al., 2010). • In 2005, the budget allocation to agriculture increased to 17 percent, up from eight percent of the total budget in 1951 (Chang, 2009). • From 2005 to 2010, the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) prioritized labor, proper land use, and innovation specific to agroecological zones (Davis et al., 2009).
<p>Market access</p>	<ul style="list-style-type: none"> • Output markets in Ethiopia are dominated by small grain traders with limited access to resources, warehouses, and market information. Traders operate within a small radius, and grain may change hands many times along the value chain. Long distance trade is limited (Chang, 2009; Rashid et al., 2010). • Farmers sell up to 60 percent of their crop during the first three months after harvest, and 25 percent in the next three. When prices peak, an average farmer has 16 percent of the market volume remaining, and may not see the full benefit of higher prices as only a few large traders supply grain during the lean period (Rashid et al., 2010). • In 1992, the Agricultural Marketing Corporation was renamed the Ethiopian Grain Trade Enterprise (EGTE), and it began to compete in the open market as a public enterprise. It was intended to stabilize prices, stimulate foreign exchange, and maintain a food reserve. Between 1999 and 2000, the EGTE’s mandates were revised. It was required to end price stabilization and focus on export promotion and disaster preparedness. Its market share diminished from 40 percent in the 1980s to around 3 percent in the early 2000s. • From 1996 to 2008, transaction cost per ton of grain declined 83 percent in real terms (Rashid et al., 2013). • In the 2000s Ethiopia had about 300,000 small traders, about 14 times more than the number of small traders in the 1980s, indicating increased competition and the importance of cereal trading for rural livelihoods (Rashid et al., 2013). • In 2008, the Ethiopian Commodity Exchange (ECX) was launched (Abate et al., 2015), but traders were not required to trade through ECX, and it traded around 1000 tons of maize in its first year. All coffee and pulse exports go through the ECX. • By 2008, membership in agricultural cooperatives had risen to 36 percent of smallholders, up from 9 percent in 2005. Growth in membership was higher in cereal-growing regions (Amhara, Oromiya, and SNNP) (Rashid et al., 2013).
<p>Trade policy</p>	<ul style="list-style-type: none"> • In Ethiopia, most cereals are non-tradable, as domestic wholesale prices are typically above export parity but below import parity, and transportation costs to port in Djibouti are high (Rashid et al., 2010).

	<ul style="list-style-type: none"> • Food aid constitutes a significant share of the Ethiopian grain market, as the government relies on it to manage risk. Donors have begun procuring food locally in food surplus regions, but the purchases have been poorly timed so as to increase risk and price variability (Spielman et al., 2010; Rashid et al. 2013).
Output prices, subsidies	<ul style="list-style-type: none"> • Subsidies are inconsistently applied across major crops in Ethiopia: "While commodities such as flour, cotton and sugarcane are given generous incentives, food grains have not received this type of support" (Chang, 2009). • Grain markets in Ethiopia exhibit significant short- and long-term asymmetric price transmission, as well as significant market inefficiency, causing food prices to adjust to shocks slowly (Wondemu, 2015). • In the 1990s, cereal prices were relatively stable, but have been more volatile since the Ethiopian Grain Trade Enterprise (EGTE) stopped intervening regularly to stabilize prices. The price of maize is more volatile than that of wheat (Rashid et al., 2013; Chang, 2009). • The EGTE and the Central Statistical Agency (CSA) collect information on cereal prices for agency use only. From 1996 through 1998, price information was disseminated via radio under the Grain Market Research Project, but when the project ended, wholesale traders returned to getting price information from brokers in central markets (Rashid et al., 2013). • In 2001-02, maize prices collapsed following a bumper harvest the previous year, and the EGTE intervened with domestic procurement and a price floor for maize (Abate et al., 2015). However, many farmers had already sold their crops prior to the intervention because no price floor was in place and it was unclear whether the EGTE would step in. Others found it unprofitable to harvest their maize (Rashid et al., 2010; Rashid et al., 2013). • "The ratio of input prices to producers' prices increased from 1.7 in 2000 to about 9.0 in 2002." Between this price increase and a drought in 2003, fertilizer application declined by 22 percent in the next cropping year (Rashid et al., 2013). • In 2003, Ethiopia experienced a severe drought. In 2005, cereal prices began to rise sharply in spite of good harvests. In 2008 when prices shot above import parity, the EGTE intervened, again on an ad-hoc basis, procuring grain internationally and distributing it (Rashid et al., 2013). • In 2008, the cereal price differential declined from USD 25 per ton in 1996 to USD 8.85 per ton in nominal terms (Rashid et al., 2013).
Regulatory Environment	<ul style="list-style-type: none"> • The agricultural marketing system in Ethiopia lacks regulatory frameworks to protect producers, especially smallholders (EEA, 2005). • In 2009, the Ethiopian Biosafety Proclamation was enacted. Due to the stringent requirements of the proclamation, research on genetic engineering (GE) technologies has not been initiated. Though the government's stance on GE technologies has softened over the past few years and it attempted to introduce insect-resistant cotton seed, foreign technology providers will not work in Ethiopia because of the unfavorable regulatory conditions (Abraham, 2014).

Figure 2: Kenya Yield and Public Agriculture Spending Trends and Relevant Policies

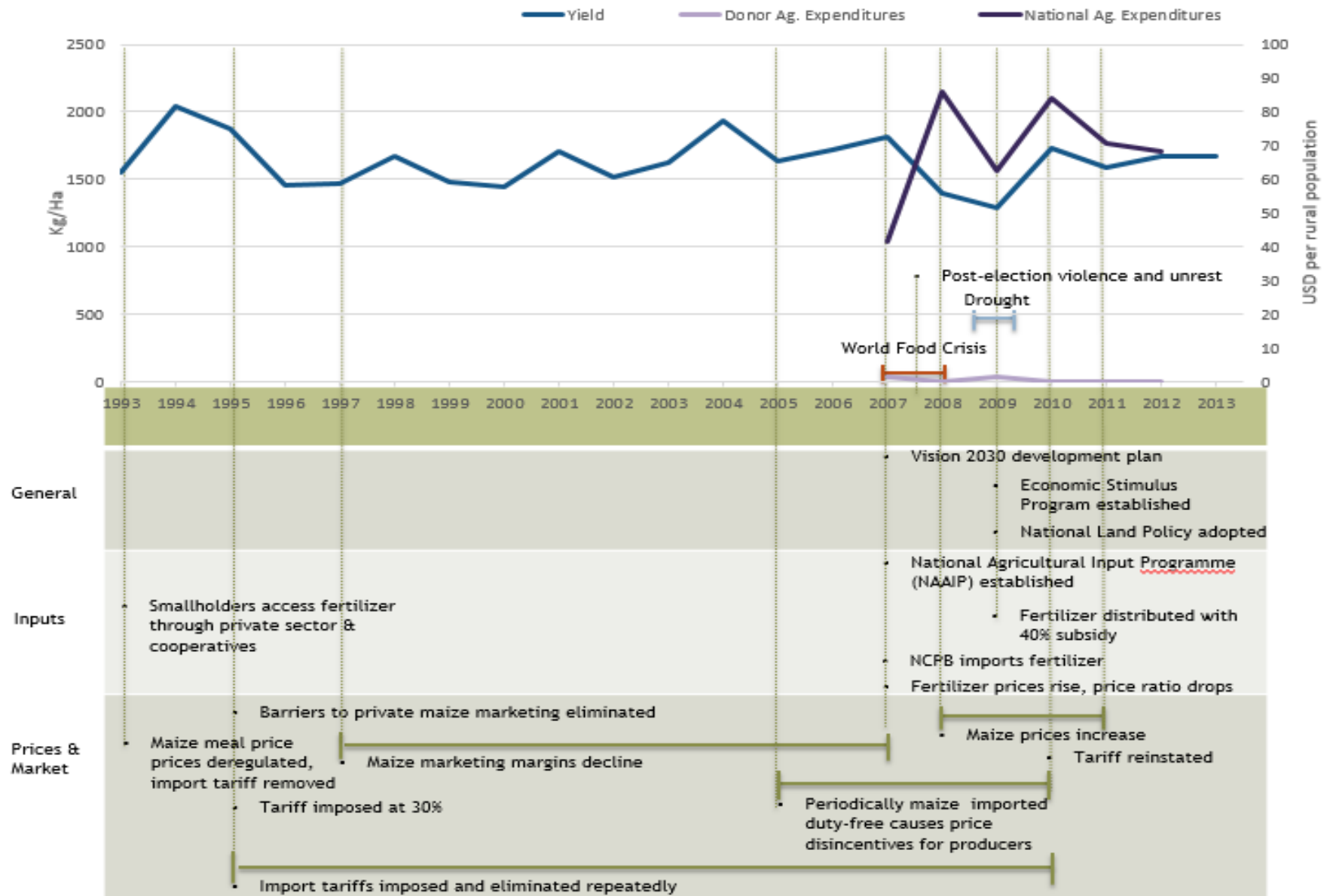


Table 2: Agricultural Policies in Kenya

<p>General policy</p>	<ul style="list-style-type: none"> • In the early 1990s, Kenya began to liberalize its markets after changes to world economic ideology, perceived corruption and paternalism, fiscal deficits, and pressure to reform from international financial institutions (Ariga & Jayne, 2009). • Donor spending on agriculture in Kenya remained low from 2007 to 2012. National spending has been volatile, doubling between 2007 and 2008, dropping by 50% in 2009, and increasing by nearly 50% in 2010 before steadily declining until 2012. Yields, meanwhile, have remained relatively stagnant despite high national spending (MAFAP, 2015). • Created in 2007, Kenya’s Vision 2030 Development Plan delegated the responsibility of developing rural infrastructure, providing agricultural inputs, researching, and providing extension services to private and de-concentrated regulatory boards (MAFAP, 2013a).
<p>Market access</p>	<ul style="list-style-type: none"> • High market access costs in Kenya are driven by fuel, poor infrastructure, delays and corruption at Non-tariff Trade Barriers (NTBs), high processing costs, and a lack of enforceable quality and safety standards. The government spends 5 percent of its budget on marketing. Kenya also spends on infrastructure to reduce market access costs, but has invested more in increasing production and productivity than on increasing market access and reducing marketing costs (MAFAP, 2013a; Ogada et al., 2011). • Despite a reduction in wholesale prices, 88 percent of households in all regions found it more convenient to sell grain after liberalization than before, though many of them did not sell. Now, farmers can sell at the farm gate and receive cash on the spot, whereas under the NCPB, farmers had to move produce to depots and payments were often delayed for months (Ariga & Jayne, 2009). • In 1993, maize meal price controls were eliminated, and barriers to private maize marketing were eliminated by 1995 (Ariga & Jayne, 2009). • Over the period of 1997 to 2007, maize marketing margins declined, while maize yields increased by 18 percent (Ariga & Jayne, 2009).
<p>Trade policy</p>	<ul style="list-style-type: none"> • Kenya has the highest number of road blocks at Non-tariff Trade Barriers (NTBs) among EAC countries (Ogada et al., 2011). • Negotiated bilateral and multilateral trade agreements, lengthy documentation, high fuel costs, and underdeveloped communication technologies impeded business development (Ogada et al., 2011). • In 1993, maize meal prices were deregulated and the import tariff was removed, but it was re-imposed at 30 percent in 1995. An export ban was imposed in 1996 following a dip in production, and another import tariff was imposed in 1997 after a poor harvest (Ariga & Jayne, 2009). • Starting in 2005, tariff barriers to trade with neighboring East African Community (EAC) countries (Uganda and Tanzania) were removed (Ariga & Jayne, 2009). • From 2006 to 2007, exports increased, then dropped drastically through 2009. Generally, Kenya exports limited quantities of maize. (Ogada et al., 2011). • Kenya imports maize from Uganda and Tanzania below world market prices. In 2008 and 2009, EAC countries could not meet Kenya’s production shortfall, and Kenya imported maize from South Africa. In 2009, Kenya waived its maize tariff and imports increased, but domestic wholesale prices remained high despite approximating import parity. The tariff was reinstated in 2010 (Ogada et al., 2011; MAFAP, 2013a).

Output prices, subsidies	<ul style="list-style-type: none"> • In the 15 years following liberalization, the partial withdrawal of government marketing board interventions caused a decline in the real price of maize (Ariga & Jayne, 2009). • Until the mid-1990s, the NCPB supported maize price levels in maize-surplus areas, but its operations have since scaled down. It now buys maize in a few major surplus zones in order to stabilize prices (Ariga & Jayne, 2009). • Producers faced price disincentives in 2005, 2006, 2007, and 2010 as Kenya imported duty-free maize from its neighbors, yet maintained normal levels of production (MAFAP, 2013a). • In 2011, the purchase price of maize rose to double the market price (MAFAP, 2013a).
Political unrest	<ul style="list-style-type: none"> • In 2008, post-election violence in the Rift Valley Province contributed to a sharp drop in maize productivity. Physical infrastructure such as petrol stations and grain storage facilities in western Kenya were destroyed, as was 0.3 billion kgs of maize and many input supply stores closed. In the next planting season, maize area planted fell by 20 percent (Ariga & Jayne, 2009; Ogada et al., 2011; MAFAP, 2013a).

Figure 3: Malawi Yield and Public Agriculture Spending Trends and Relevant Policies

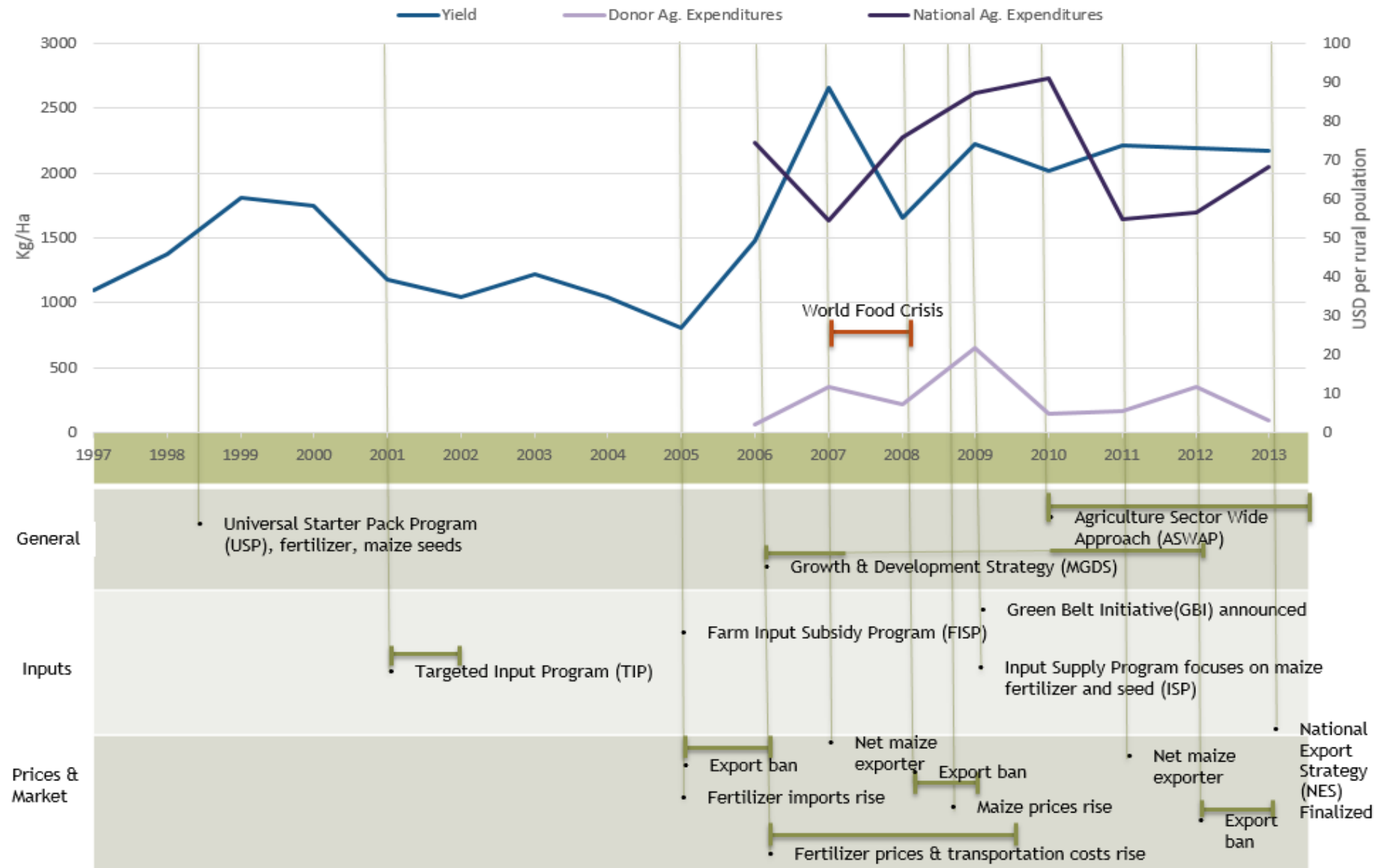


Table 3: Agricultural Policies in Malawi

<p>General policy</p>	<ul style="list-style-type: none"> • In 1993, Malawi became a multi-party democracy (Matchaya et al., 2014). • Malawi’s overarching development strategy is outlined in the Malawi Growth and Development Strategy (MGDS), the theme of which is to promote sustainable economic growth, particularly in agriculture (Matchaya et al., 2014). • Donor spending remained low from 2006 to 2012, spiking briefly in 2009 following the food crisis. National spending rose from 2007 until 2010, then dropped. Yields have been volatile during this period (MAFAP, 2015). • In 2006-07 and 2010-11, the first MGDS was implemented (Matchaya et al., 2014; MAFAP, 2014). • In 2009, the Green Belt initiative was launched to improve access to credit and irrigation (MAFAP, 2014). • In 2010, Malawi enacted the National Irrigation Policy and Development Strategy. • From 2010-2016, Malawi has implemented the National Agricultural Policy Framework to achieve national food security by promoting agricultural productivity and sustainable land management (MAFAP, 2014). • In 2011-12 and in 2015-16, Malawi carried out the second MGDS (Matchaya et al., 2014; MAFAP, 2014). • In 2012, Malawi launched the Economic Recovery Plan (ERP), an implementation plan to reduce poverty through commercializing agriculture and agro-processing (MAFAP, 2014). • In 2010 through 2014, Malawi implemented the Agriculture Sector Wide Approach (ASWAp) to prioritize investment strategies for the agricultural sector (Matchaya et al., 2014). Malawi implemented the ASWAp in order to accomplish the Millennium Development Goals (MDGs), which sought to halve poverty and hunger by 2015 (Matchaya et al., 2014; MAFAP, 2014).
<p>Market access</p>	<ul style="list-style-type: none"> • Key strategies of the Malawi Growth and Development Strategy (MGDS) (implemented on and off from 2005 to 2016) include strengthening linkages between farmers to markets by connecting rural communities, focusing on domestic markets and exports. The strategy also includes increasing commercialization and international competitiveness, particularly for SHF (Matchaya, 2014).
<p>Trade policy</p>	<ul style="list-style-type: none"> • Export bans on maize were in place in 2005-2006, 2008-2009, and 2012-2013 (MAFAP, 2014). • Since the 2005 implementation of the Farm Input Subsidy Program (FISP), the magnitude of fertilizer imports rose. 2008 had the highest fertilizer imports (Matchaya et al., 2014). • Since 2006, Malawi has been largely self-sufficient in maize, trading relatively low volumes of maize compared to total production. Malawi was only a net exporter of maize in 2007 and 2011. Maize import restrictions have been in place for over a decade (MAFAP, 2014). • A poor harvest in 2008 was caused in part by global and local food price speculation and falling prices for high-value export crops (Mazunda, 2013). • For the years 2013-2018, Malawi has finalized plans for the National Export Strategy (NES). The NES provides a plan to increase export competitiveness and economic empower for vulnerable populations (MAFAP, 2014).

<p>Output prices, subsidies</p>	<ul style="list-style-type: none"> • During the 1980s, the Malawian government set prices of outputs at the beginning of each growing season so farmers could plan which crops to grow. The Agricultural Development and marketing Corporation (ADMARC) was the primary buyer and seller of outputs. While these policies may have resulted in the maize surplus, they proved unsustainable due to large budget deficits (Matchaya, 2014). • For the years 2005-06 and 2008-09, during the Farm Input Subsidy Program (FISP), maize output prices did not increase at the same rate as fertilizer prices (Lunduka, 2013). • In 2008, 2012, and 2013, sharp price increases in the maize market and government trade policies exacerbated seasonal price variations and reduced incentives for farmers to grow maize. In 2007, 2010, and 2013, farmers were incentivized to grow maize due to high domestic maize prices relative to the region, particularly in years of few trade restrictions. (MAFAP, 2014). • Between 2005 and 2010, maize prices in Malawi increased from USD 100/1000 kgs to USD400/1,000 kgs despite the maize production increases from the Farm Input Subsidy Program (FISP), possibly in part due to the Malawi government’s purchasing of maize for its Strategic Grain Reserves (SGR), which reduced the supply and increased the demand and price for maize domestically (Lunduka, 2013).
<p>Economic Factors</p>	<ul style="list-style-type: none"> • In 2012-2013, maize production declined due to poor rains after the 2011 bumper crop (MAFAP, 2014).

Figure 4: Rwanda Yield Trends and Relevant Policies (MAFAP agriculture public expenditure data was not available for Rwanda)

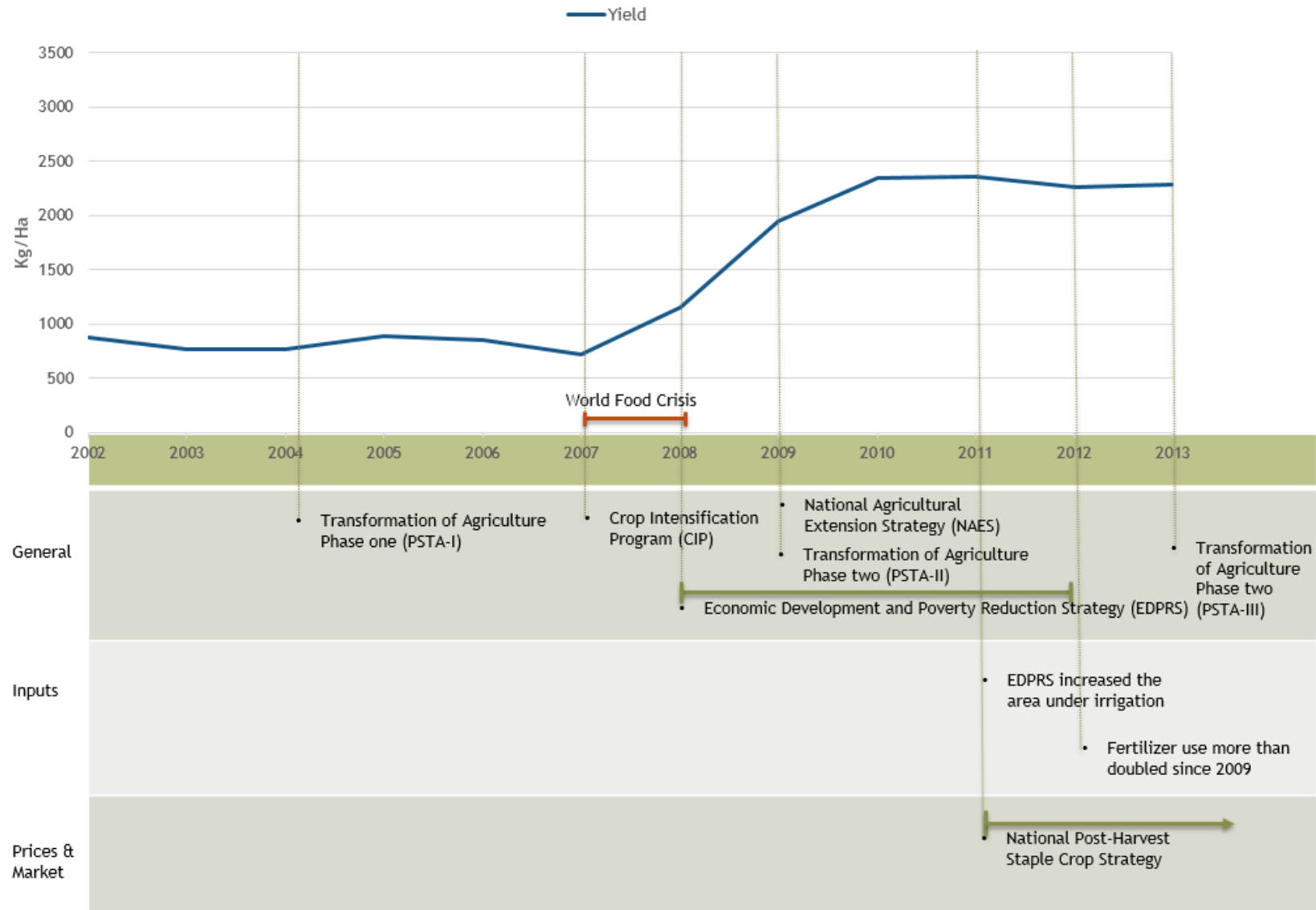


Table 4: Agricultural Policies in Rwanda

General policy	<ul style="list-style-type: none"> • In 2004, the Rwandan Ministry of Agriculture and Animal Resources (MINAGRI) implemented The Strategic Plan for the Transformation of Agriculture Phase One (PSTA-I). The PSTA-I provided the basis for implementing the National Agriculture Policy, which outlined the main areas of agriculture that needed to be improved and how the government needed to intervene (MINAGRI, 2009). • In 2007, MINAGRI launched the ongoing Crop Intensification Program (CIP), which is a pilot program with the goal of increasing agricultural productivity of six priority crops including maize. The program focuses on land use consolidation, improved seed and fertilizer use, extension services, and agricultural marketing. As a result of the program, crop productivity increased, including maize production, which increased six fold from 2007 to 2011 (MINAGRI, 2015). • From 2008 to 2012, The Economic Development and Poverty Reduction Strategy (EDPRS) was in effect. The strategy sought to increase economic growth by increasing the contribution of strategic exports, enhancing business climates, and increasing agricultural productivity (IPAR, 2012). • From 2009-2012, Rwanda implemented PSTA-II in conjunction with the EDPRS. The plan articulates the strategy for achieving agricultural growth and productivity through commercialization, particularly for rice crops. The plan seeks to increase agricultural output and incomes through agricultural intensification, sustainable production systems, producer training, and support for commodity chains and agribusiness development (IPAR, 2012). • In 2013 PSTA-III began, with the aims of building upon the prior two phases of PSTA, primarily the intensification and commercialization of Rwandan agriculture (World Bank, 2014).
Market access	<ul style="list-style-type: none"> • The PSTA-II (2009-2012) supported the development of an efficient private sector and a greater role in policy implementation to markets in order to support rice cultivation (IPAR, 2012). • With a timeline of 2011-2016, the National Post-Harvest Staple Crop Strategy was a policy framework that was created to assist with strengthening harvesting, post-harvest handling, trade, storage and marketing within staple crop value chains. The National Post-Harvest Strategy was created in response to the harvest losses that resulted from of a lack of capacity in post-harvest handling of increased crop yields from the Crop Intensification Program (CIP), which was enacted in 2007 (IPAR, 2012).
Trade policy	<ul style="list-style-type: none"> • The United Nations-led 2010 Development Driven Trade Policy Framework states that trade policy should be development-driven rather than demand-led. The framework directs investment to diversification of exports, local processing industries, and for employment in rural areas. It also promotes tariff policies that promote imports of industrial inputs, as well as strategically located export processing zones (IPAR, 2012).
Output prices, subsidies	N/A

Figure 5: Tanzania Yield and Public Agriculture Spending Trends and Relevant Policies

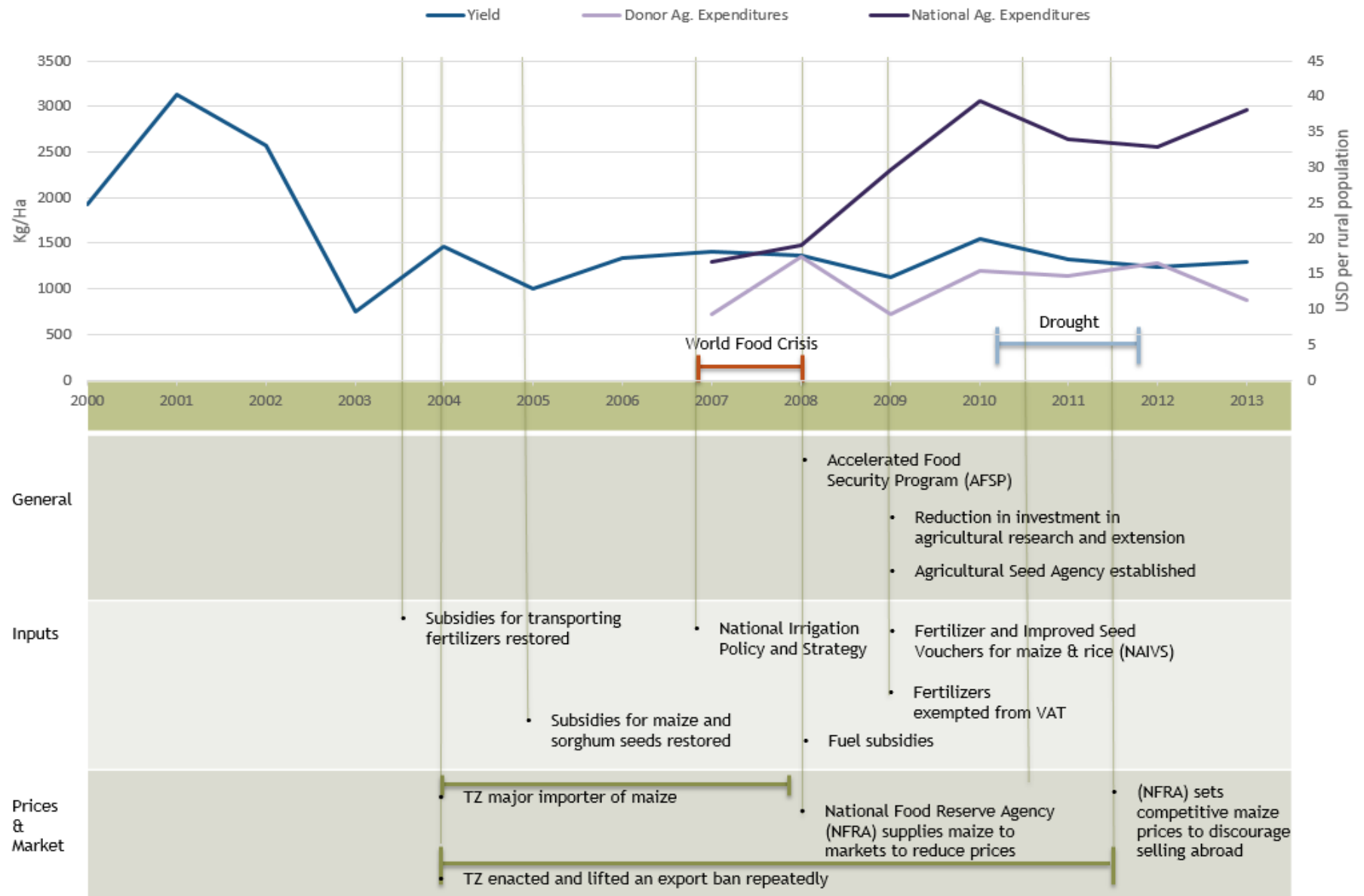


Table 5: Agricultural Policies in Tanzania

General policy	<ul style="list-style-type: none"> • In 2008, the Tanzanian government launched the Accelerated Food Security Program (AFSP) to boost food production and productivity in response to the food and fertilizer price increases (MAFAP, 2013b). • Yield trends and donor spending remained relatively stable from 2007 to 2013. National spending increased steadily until 2010, and has remained relatively high while yields have declined slightly (MAFAP, 2015). • Prior to 2009, Tanzania spent over 60 percent of expenditures on general support, including agricultural research, extension, and training. Since 2009, Tanzania decreased its spending on general sector support to less than 50 percent, and has increased spending for direct input subsidies and payments for farmers and other agents in the agricultural sector. The decrease in general sector spending led to less support for storage facilities, marketing, and infrastructure, though spending on input subsidies for farmers increased (MAFAP, 2013b).
Market access	<ul style="list-style-type: none"> • Since market liberalization, the lack of functioning markets, poor market performance, and inefficient processing plants in Tanzania has reduced farm gate prices for crops and created disincentives for farmers. FAO recommends that Tanzania spend more on marketing, storage and processing to minimize disincentives for farmers and to maximize production (MAFAP, 2013b).
Trade policy	<ul style="list-style-type: none"> • Overall, maize is a thinly traded commodity in Tanzania (MAFAP, 2013b). • Tanzania is the only country in East Africa that formally restricts trade, which in turn creates economic incentives that keep maize outputs below potential levels (MAFAP, 2013b). • From 2004-2008, Tanzania was a major importer of maize (MAFAP, 2013b). • From 2004 to 2012, Tanzania enacted and lifted an export ban at least ten times, creating uncertainty among agents throughout the maize value chain (MAFAP, 2013b).
Output prices, subsidies	<ul style="list-style-type: none"> • The National Food Reserve Agency (NFRA), formerly known as the strategic grain reserve, ensures national food security and will intervene in the market to purchase or sell crops, including maize, in order to stabilize prices (MAFAP, 2013b). • In response to rising food prices in 2008, the NFRA supplied the market with some of its maize stock so as to reduce food prices in areas where prices were rising sharply (MAFAP, 2013b). • In response to the 2011 drought, the NFRA intervened in the maize market and set competitive prices so as to discourage farmers from selling abroad. This policy was marginally effective as the set price was lower than wholesale prices in some cases (MAFAP, 2013b).

Figure 6: Uganda Yield and Public Agriculture Spending Trends and Relevant Policies

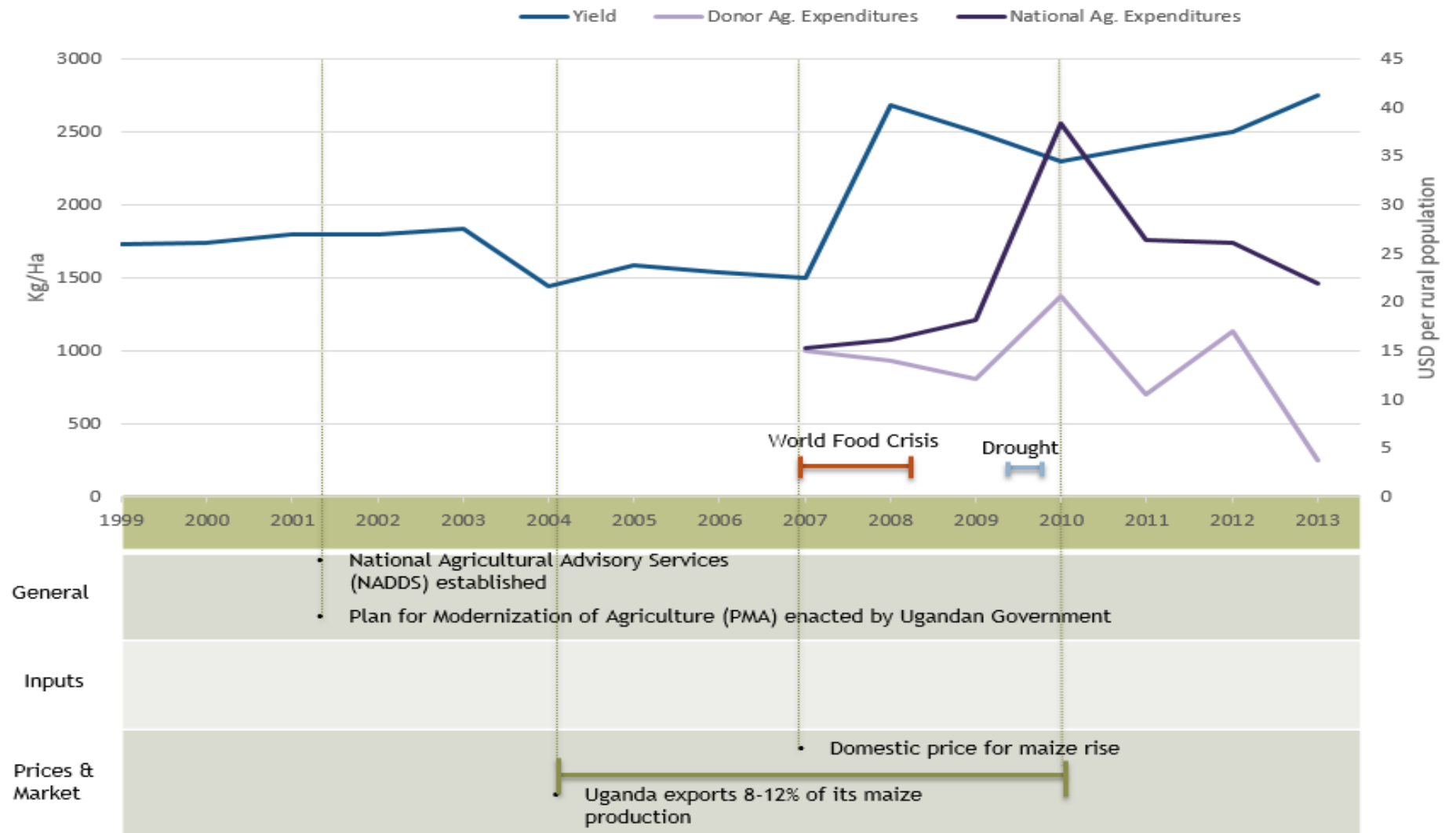


Table 6: Agricultural Policies in Uganda

General policy	<ul style="list-style-type: none"> • Since 1991, the Ugandan Maize market has been highly liberalized (MAFAP, 2013c). • While donor and national spending on agriculture were roughly equal in 2007, national spending increased until peaking in 2010, while donor spending has been more volatile, with an overall decrease between 2007 and 2013 (MAFAP, 2015). • In 2001, the Ugandan government enacted its Plan for Modernization of Agriculture (PMA). The mission of the plan is to eradicate poverty by re-orienting agricultural production towards commercial agriculture. In addition, the PMA resolved to support the creation, distribution, and adoption of productivity-enhancing technologies (Sserunkuuma, 2005). • Uganda’s specific policy on agriculture and maize remains unclear. There are no known incentives for farmers to increase production and no attempts to ensure that farmers receive an economic return for their efforts. Farmers’ decision to plant a surplus of maize beyond subsistence needs is highly influenced by price levels (MAFAP, 2013c).
Market access	<ul style="list-style-type: none"> • The maize marketing chain in Uganda is complex, requiring maize crops to pass through several markets before reaching a wholesaler, exporter, or consumer. With each transaction, the margin for marketing maize increases, which negatively impacts producers’ incentive to invest in maize (MAFAP, 2013c). • “With a highly liberalized maize market in Uganda, minimal government intervention in price setting, insignificant direct taxes on maize marketing and liberalized foreign exchange market, the above results suggest the presence of significant market development gap” (MAFAP, 2013c).
Trade policy	<ul style="list-style-type: none"> • Since 1991, the Ugandan maize market has been highly liberalized. The private sector carries out domestic and international trade for all agricultural products (MAFAP, 2013c). • Between 2004 and 2010, Uganda exported eight to 12 percent of its maize production. However, unofficial maize exports may far exceed the official exports (MAFAP, 2013c). • Prior to 2007, maize producers received prices lower than reference prices. With the onset of the world food price crisis in 2007-08 producers began to receive domestic prices that were higher than reference prices, creating greater incentives for maize producers. These incentives appear to be related to the high export prices during the world food price crisis (MAFAP, 2013c).
Output prices, subsidies	<ul style="list-style-type: none"> • Uganda does not operate any trading companies that compete with the private sector or that act as buyers or guarantors of a minimum price (MAFAP, 2013c). • The Ugandan government no longer practices price controls as a development or trade policy measure. Instead, markets determine prices (MAFAP, 2013c).
Economic Climate and Climate Factors	<ul style="list-style-type: none"> • Uganda has yet to live up to its maize production potential due to a number of production constraints including low soil fertility, lack of improved maize seeds, and drought in some seasons. Maize production is generally characterized by low yields (MAFAP, 2013c). • From June through August 2009, Uganda suffered from drought (MAFAP, 2013c).

SECTION 3: Indicators of Agricultural Development

An assessment of policy effectiveness for IAT obviously depends on the metric against which outcomes are measured, and unfortunately there is no perfect measure of IAT. Laborde et al. (2018) use agricultural employment as a percentage of total employment, and food security, assessed as the percent of the population who are undernourished in terms of caloric intake. The proportion of agricultural employment is a common proxy of agricultural transformation, as a falling agricultural employment share assumes that rising agricultural productivity “releases” labor into manufacturing and other high value sectors. A falling agricultural share, however, could also represent more rapidly growing employment in other sectors (the denominator), or that high-value sectors are “pulling” labor out of agriculture with higher wages (McMillan et al. 2014). Labor may also be pushed out of agriculture into other sectors through environmental, conflict, or other shocks, and/or be moving into lower productivity informal sectors. Hence, a declining share of agricultural employment need not be correlated with rising agricultural productivity. Similarly, the food security index, intended as a proxy for inclusivity, collects information on calories, not micronutrients. Neither measure is routinely gender or age disaggregated, so it is unclear, in a presumed process of transformation, who is leaving the farm, who remains, and why.

According to Laborde et al.’s classification, Nigeria is transformed (Stage 2: Agriculture Integrated into the Marco Economy), and Ethiopia and Tanzania are not (Stage 5: Getting Agriculture Moving). Yet almost half the population in Nigeria lives below the international poverty line, similar but even higher than in Tanzania, and almost twice that of Ethiopia. *Nigeria slightly outperforms Tanzania in the proportion of the population vulnerable to multidimensional poverty, and considerably outperforms Ethiopia.* Among the multidimensional poor Ethiopia has the highest percentage in severe poverty (61%), compared to Nigeria (32%) and Tanzania (24%). So, on Laborde’s “transformation” scale, Nigeria performs the best, on poverty dimensions, Ethiopia performs the best, while on distributional measures, Tanzania performs the best. If one is trying to understand the dynamics of change and considers a declining number of smallholders as an indicator of transformation - defined as households with less than or equal to 4 hectares of land and with less 50 cattle, less than 100 small ruminants, and less than 1000 poultry (chickens and other poultry) - then across available waves of the LSMS-ISA survey data, Tanzania’s proportion of small-scale producers has been consistently falling (from 85% to 77% of rural households) while Ethiopia’s and Nigeria’s has been consistently rising (from 77% to 90% and 70% to 78%). The story varies in magnitude more than direction if the small-scale producer definition uses tropical livestock units rather than particular animals.

The literature reviewed had some similarities to Laborde et al.’s approach (2018), but additional indicators are commonly used, for example, to convey information about the profitability or efficiency of agricultural activities. Three authors used ratios of inputs to outputs as an indicator: Nin-Pratt & McBride (2014) use *profit efficiency* as an indicator of agricultural transformation in Ghana, measured as level of input (land, labor, purchased inputs, and assets) compared to output (yield). Bachewe et al. (2018) use a *ratio of input market prices to output market prices* to assess agricultural transformation in Ethiopia, and Song et al. (2016) use the *total factor productivity (TFP) of crop production* to measure agricultural transformation in China. Two authors point to changes in food production and prices as indicators of agricultural transformation: Frankema (2014) uses *per capita production of food and changes rural incomes*, while Dorward (2013) uses a *Food Expenditure Ratio (FER)* equal to essential caloric expenditure divided by total per capita expenditure minus essential caloric expenditure.

Bachewe et al. (2018) also use *agricultural production as a percent of GDP, total crop yields, and area under cultivation*. Dorward (2013) uses three additional indicators relating to cereal prices: *Cereal Equivalent Productivity of Agricultural Labour (CEPAL)* equal to Agricultural value added divided by number of agricultural workers times cereal prices; *Cereal Equivalent Land Yield (CELY)* equal to agricultural value added divided by

amount of agricultural land times cereal prices; and *Cereal Equivalent Productivity of Inorganic Fertiliser (CEPIF)* equal to agricultural value added divided by inorganic fertilizer use times cereal prices.

Initial conditions can also affect interpretations of “success”. In order to assess transformation pathways of structurally similar countries, Laborde et al. (2018) introduce a typology that clusters countries in terms of arable land and birth rates, LMICs were sorted into “abundant arable land,” “abundant non-arable land,” or “scarce but productive land with high birth rates” to differentiate how country labor markets might evolve.

In what follows, we compare three countries; Ethiopia, Tanzania, Nigeria; against other similarly classified countries. We categorized the countries according to Laborde et al.’s (2018) land/birth rate schema, resulting in three categories: abundant and fertile land (e.g., Panama, Gabon, Uruguay, and Tanzania), abundant but infertile land (Peru, Ethiopia, Costa Rica, Tunisia, and South Africa), and high birth rates and scarce but fertile land (Thailand, Ghana, Nigeria, Gambia, Benin, and Suriname).

We then offer some plots over time adding cereal yields as an indicator against the Laborde et. al. indicators of share of agricultural employment and food security. We look at how the groupings might shift if a new indicator (here, cereal yields) is used. The findings show some relationships that do not appear in Laborde et al.’s (2018) original comparisons. First, they suggest that abundant but non-arable land is not necessarily an impediment to reducing hunger; second, they suggest that productivity in terms of yield is not necessarily an indicator of how well a country is addressing hunger.

Land abundance and fertility did not appear to influence movement of countries during the 2000-2017 period. Panama, a category 2 (industrializing) country was a notable outlier in 2000, but rapidly closed the gap to merge with the category 1 (industrialized) cluster by 2017. The remaining category 2 countries clustered around reduced hunger and marginally reduced agricultural unemployment, while category 4 (“getting agriculture moving”) countries Tanzania and Ethiopia both addressed hunger, but to different degrees. Ethiopia, despite its relative land infertility, was more successful at reducing hunger than Tanzania while maintaining a similar share of agricultural employment.

The results of this comparison show that countries may be achieving similar reductions in hunger while employing different strategies - countries with low per-hectare yields of cereals, including Benin, The Gambia, and Tunisia, appear to be effectively reducing hunger without increasing yields. Meanwhile, Ethiopia eclipses these countries over the course of the study and achieves substantial reductions in hunger. Furthermore, land fertility does not appear to be a significant barrier to land productivity, as abundant but infertile land countries achieved the biggest gains in yield and some of the highest overall yields compared to countries with fertile land.

The countries most successful at reducing hunger between 2000 and 2017 were Ethiopia, Peru, and Panama. Meanwhile, high birthrate and scarce but fertile land countries achieved more modest reductions, and Nigeria lost some of its gains, going from around 10 percent hunger in 2010 to almost 20 percent in 2017. Tanzania lagged all other countries, achieving little reduction in high hunger rates.

Country	IISD Classification		
	Category from Annex 3	Transformation Level from Annex 2	Discrepancy in Categorization*(Table 3)
Ethiopia	Abundant but Infertile Land	Getting Agriculture Moving	High Birth Rates and Scarce Land
Tunisia	Abundant but Infertile Land	Industrialized Economies	n/a
Peru	Abundant but Infertile Land	Agriculture Integrated Into the Macro Economy	n/a
Costa Rica	Abundant but Infertile Land	Industrialized Economies	n/a
South Africa	Abundant but Infertile Land	Industrialized Economies	n/a
Tanzania	Abundant and Fertile Land	Getting Agriculture Moving	High Birth Rates and Scarce but Fertile Land
Gabon	Abundant and Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
Panama	Abundant and Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
Uruguay	Abundant and Fertile Land	Industrialized Economies	n/a
Nigeria	High Birth Rates and Scarce but Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
The Gambia	High Birth Rates and Scarce but Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
Benin	High Birth Rates and Scarce but Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
Ghana	High Birth Rates and Scarce but Fertile Land	Agriculture Integrated Into the Macro Economy	n/a
Suriname	High Birth Rates and Scarce but Fertile Land	Industrialized Economies	n/a
Thailand	High Birth Rates and Scarce but Fertile Land	Agriculture Integrated Into the Macro Economy	n/a

Ethiopia and Tanzania were categorized differently in Annex 3 and Table 3 within the Laborde et. al report. Based on information elsewhere in the paper and outside research, we assume that the categorization in Annex 3 is correct and used it for our country group analysis. We have included the discrepancies in categorization in the third column above, for reference.

Country	OIL						POVERTY						
	Oil Production (Y/N)	Total Petroleum and other liquids production (million barrels/ day)					GDP per capita, PPP (constant 2011 international \$)					Poverty headcount ratio at \$1.90 a day (2011 PPP) (% of population)	
		1980	1990	2000	2010	2018	1990	1995	2000	2010	2017	2003 - 2005 (except two)	2014 - 2017 (except one)
Ethiopia	Y	-	-	-	0.10	0.40	\$655	\$577	\$621	\$1,075	\$1,724	37%	31%
Tunisia	Y	110	98	80	79	41	\$5,608	\$6,124	\$7,567	\$1,0441	\$10,950	3%	0%
Peru	Y	200	128	100	160	141	\$5,254	\$6,160	\$6,428	\$10,075	\$12,518	14%	4%
Costa Rica	Y	-	-	-	-	2	\$7,744	\$8,865	\$9,786	\$12,909	\$15,430	4%	2%
South Africa	Y	-	77	202	183	110	\$9,900	\$9,174	\$9,701	\$11,973	\$12,215	26%	19%
Tanzania	N	-	-	-	-	-	\$1,546	\$1,437	\$1,565	\$2,228	\$2,809	60% *(2007 data)	49% *(2011 data)
Gabon	Y	176	270	315	245	195	\$19,557	\$19,917	\$17,822	\$15,508	\$16,145	8%	3%
Panama	Y	1	-	-	-	0.40	\$7,855	\$9,257	\$10,625	\$15,631	\$22,244	10%	3%
Uruguay	Y	-	0.20	0.40	1	2	\$9,842	\$11,513	\$12,881	\$17,159	\$20,658	1% *(2006 data)	0%
Nigeria	Y	2,060	1,817	2,169	2,212	2,057	\$3,361	\$2,992	\$3,069	\$5,085	\$5,351	54%	Not available
The Gambia	N	-	-	-	-	-	\$1,445	\$1,358	\$1,449	\$1,552	\$1,465	45%	10%
Benin	N	-	4	0.70	-	-	\$1,463	\$1,515	\$1,666	\$1,819	\$2,069	49%	50%
Ghana	Y	2	-	7	9	174	\$1,901	\$2,035	\$2,219	\$3,026	\$4,051	25%	13%
Suriname	Y	-	4	10	15	16	\$10,417	\$9,502	\$9,801	\$14,131	\$13,636	n/a	n/a
Thailand	Y	1	58	182	423	517	\$6,653	\$9,385	\$9,190	\$13,489	\$16,285	1%	0%

Source Data

Oil production - US EIA:

https://www.eia.gov/beta/international/data/browser/#/?pa=00000000000000000000000000000000vg&c=000400000000100h200000000002400000000000020002&ct=0&tl_id=5-A&vs=INTL.53-1-BEN-TBPD.A&cy=2018&vo=0&v=H&end=2018

Poverty (GDP per Capita and Poverty Headcount Ratio) - World Bank

<https://databank.worldbank.org/source/world-development-indicators>

Country	HUNGER			AGRICULTURAL PRODUCTIVITY											
	Hunger (prevalence of undernourishment %) 3-year average			Cereal Yields (Kilograms per hectare)				Value Added/Worker (Agriculture, forestry, and fishing, constant 2010 US\$)				Percentage of Employment in Agriculture (modeled ILO estimate)			
	2000	2010	2017	1991	2000	2010	2017	1991	2000	2010	2017	1990	2000	2010	2017
Ethiopia	52%	32%	21%	n/a	1,116	1,833	2,538	\$347	\$317	\$438	\$572	N/A	76%	74%	67%
Tunisia	5%	5%	4%	1,546	985	1,694	1,533	\$5,079	\$5,403	\$5,591	\$7,965	N/A	19%	18%	15%
Peru	22%	11%	10%	2,296	3,084	3,898	4,167	\$1,606	\$1,935	\$2,345	\$2,552	N/A	35%	28%	28%
Costa Rica	5%	5%	5%	3,299	3,626	3,199	4,187	\$6,733	\$8,055	\$10,879	\$10,387	N/A	16%	11%	13%
South Africa	5%	4%	6%	1,986	2,766	4,150	5,648	\$7,258	\$6,343	\$12,992	\$12,419	N/A	10%	5%	5%
Tanzania	37%	35%	31%	1,234	1,441	1,648	1,544	\$408	\$412	\$567	\$670	N/A	83%	71%	67%
Gabon	11%	11%	11%	1,702	1,630	1,595	1,601	\$4,762	\$4,774	\$3,526	\$4,530	N/A	43%	40%	38%
Panama	28%	13%	10%	1,817	2,237	2,246	2,702	\$2,726	\$4,599	\$3,868	\$4,226	N/A	17%	17%	14%
Uruguay	4%	3%	3%	2,419	3,892	4,256	4,252	\$13,792	\$16,654	\$15,786	\$22,597	N/A	11%	12%	9%
Nigeria	9%	6%	13%	1,094	1,172	1,528	1,462	\$1,652	\$1,822	\$4,538	\$5,599	N/A	48%	41%	37%
The Gambia	13%	9%	10%	1,108	1,296	1,129	848	\$1,573	\$1,741	\$1,694	\$904	N/A	30%	31%	30%
Benin	23%	12%	10%	879	1,102	1,201	1,490	\$725	\$911	\$999	\$1,089	N/A	45%	44%	42%
Ghana	16%	5%	6%	1,221	1,309	1,814	1,873	n/a	n/a	\$1,829	\$2,833	N/A	55%	50%	34%
Suriname	13%	8%	9%	3,813	3,896	4,232	4,464	\$67,762	\$31,698	\$30,231	\$38,384	N/A	7%	8%	7%
Thailand	19%	9%	8%	2,295	2,719	3,073	3,240	1,412	\$1,735	\$2,426	\$3,165	N/A	49%	38%	31%

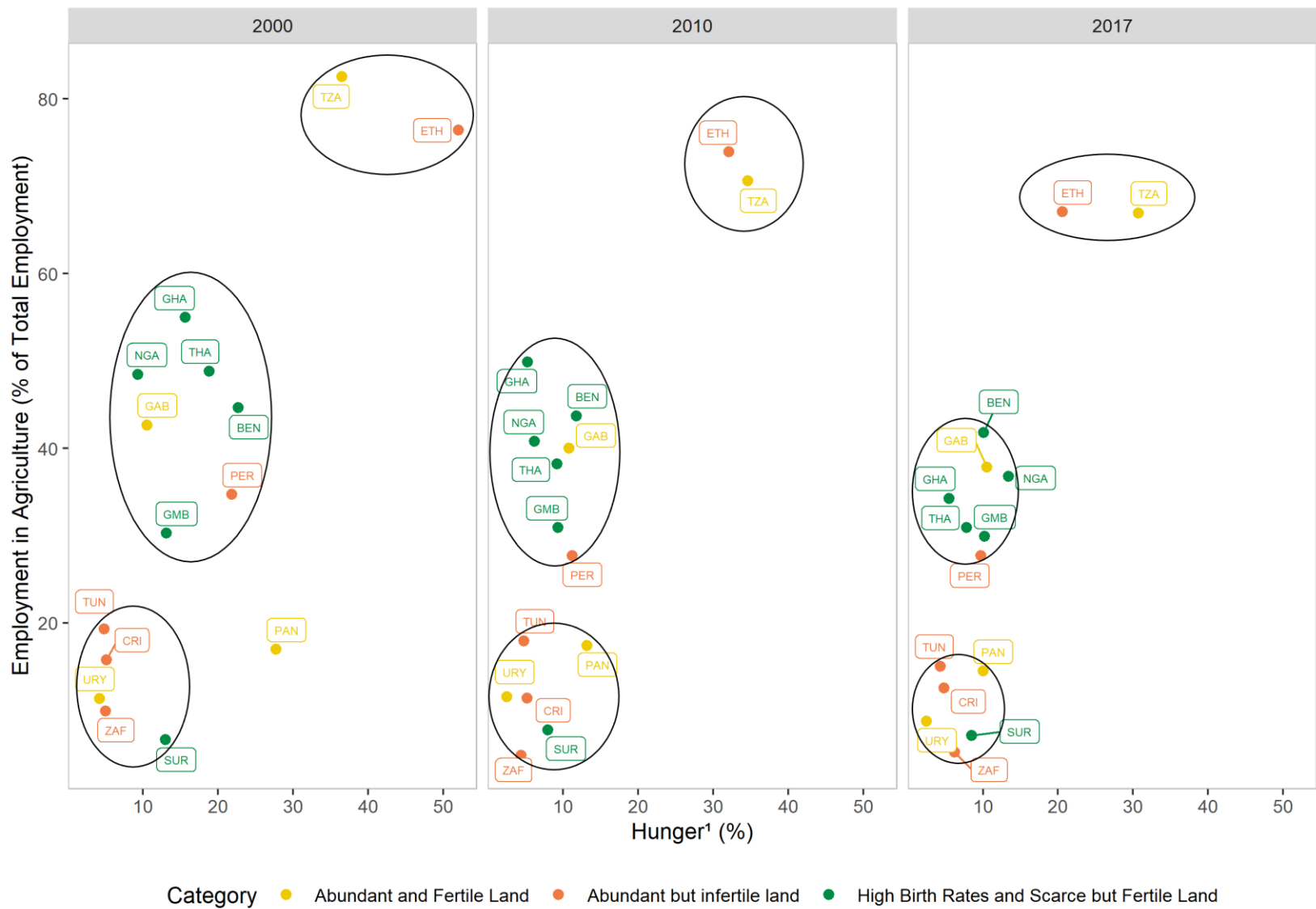
Source Data

Hunger - FAO:

<http://www.fao.org/faostat/en/#data/FS>

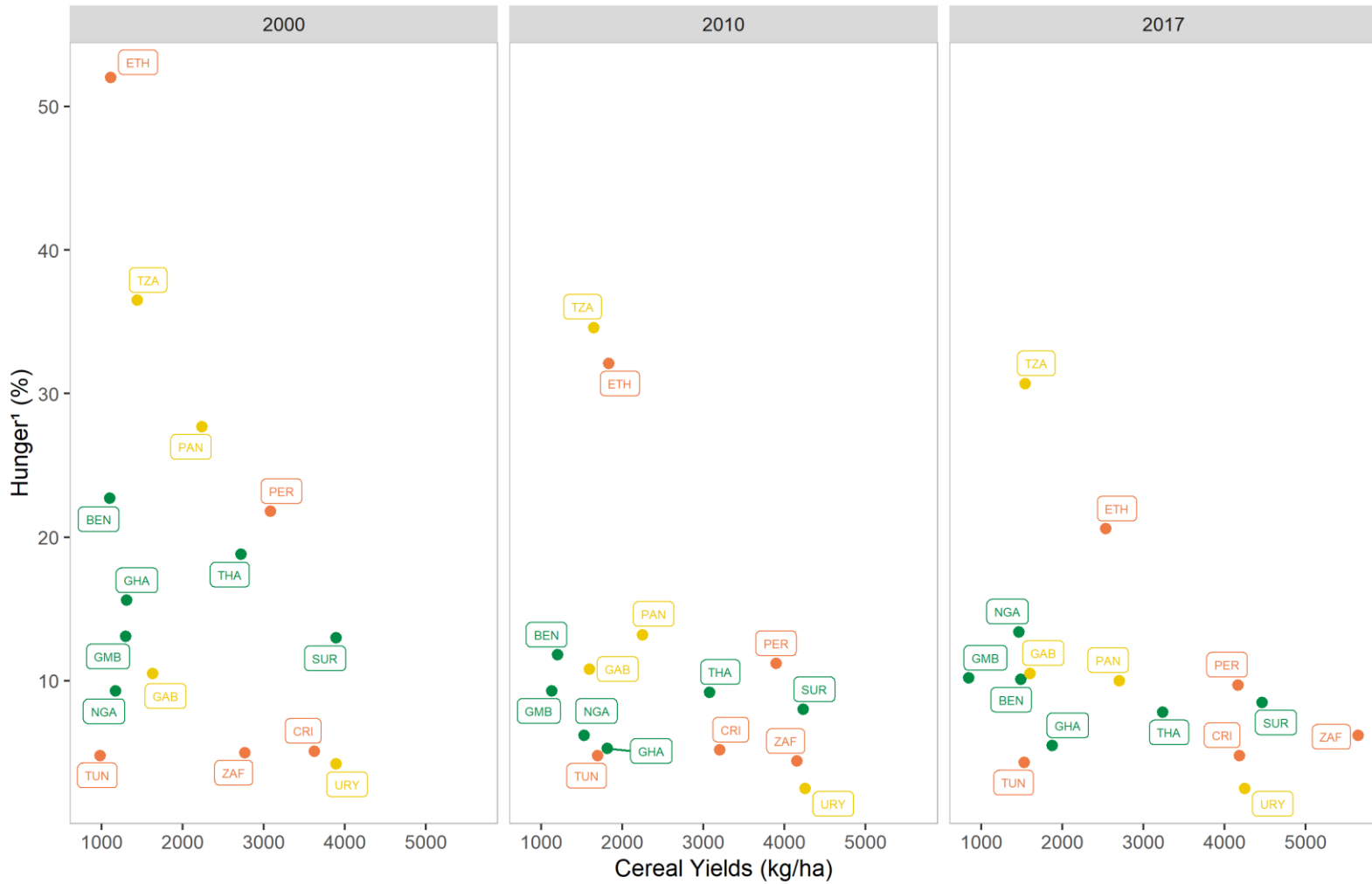
Agricultural Productivity

<https://databank.worldbank.org/source/world-development-indicators>



¹Hunger is determined as a percentage of people in the country receiving insufficient calories. Source: World Bank

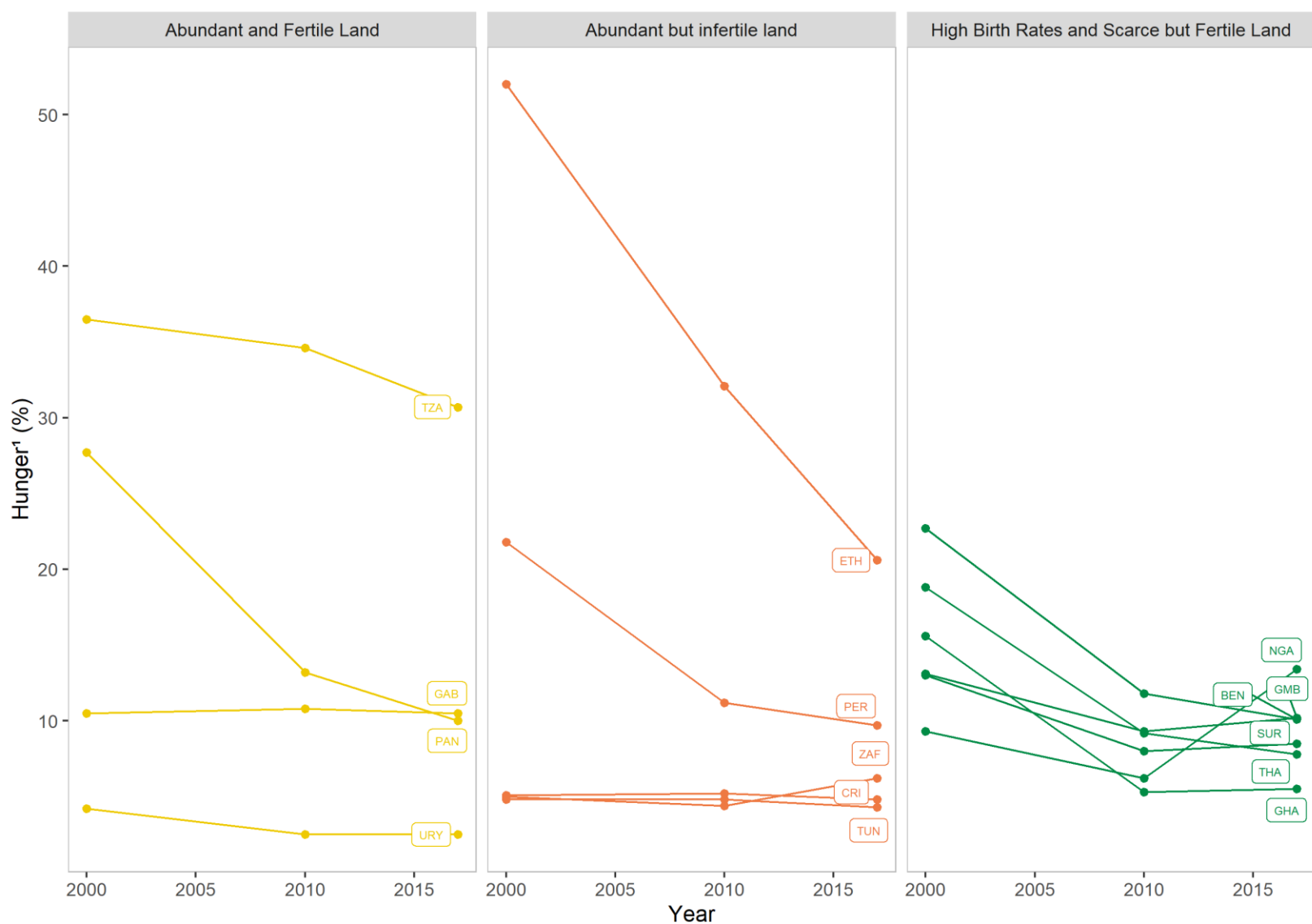
Figure 1: Comparison of hunger levels and agricultural employment between 2000 and 2017. The circles indicate the groupings as defined by Laborde et al. 2018. Overall, there is a consolidation within categories, and initial outlier Panama appears to join Category 1 (industrialized) economies.



Category ● Abundant and Fertile Land ● Abundant but infertile land ● High Birth Rates and Scarce but Fertile Land

¹Hunger is determined as a percentage of people in the country receiving insufficient calories. Source: World Bank

Figure 2: Comparison of cereal yields (kg/ha) and hunger. There is some relationship between increased yields and reduced hunger, but further benefits do not appear below undernourishment levels of 10 percent.



¹Hunger is determined as a percentage of people in the country receiving insufficient calories. Source: World Bank

Figure 3: Hunger levels between 2000 and 2017. Many low-hunger economies stay stable, but Nigeria saw a substantial increase in hunger and Tanzania failed to realize significant increases as occurred in Ethiopia, despite better land fertility.

SECTION 4: Typology of Institutions that Shape Agricultural Market Relationships

Background

Institutions are defined broadly as informal and formal structures that support market functionality through establishing market rules and norms, building relationships, and strengthening coordination. In this brief review, we search for typologies of institutions that shape agricultural market relationships and identify existing typologies for agricultural market institutions.

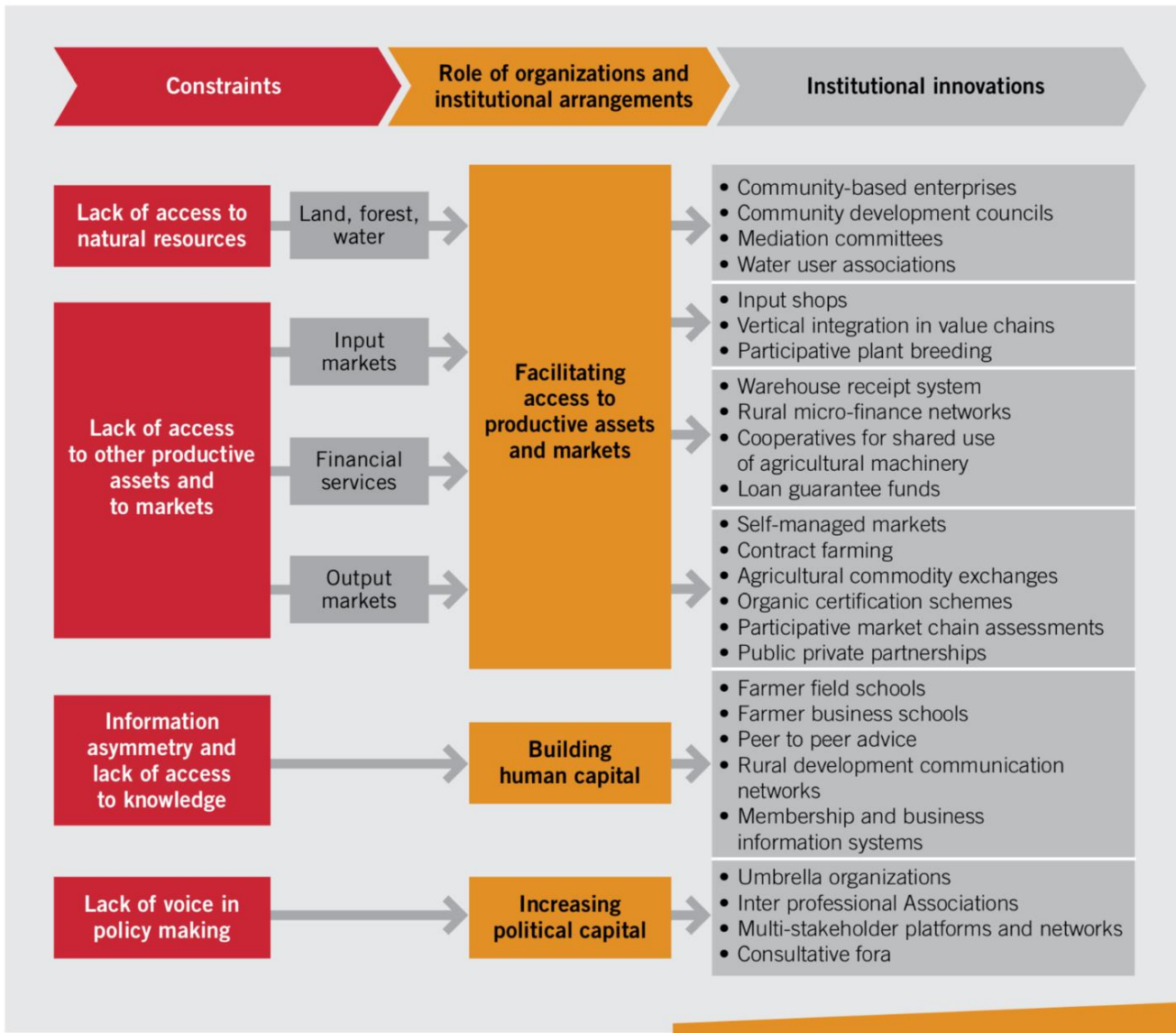
Typologies of Market Institutions

In an informal search of about 30 articles, we identified 6 typologies that describe agricultural market institutions, or aspects of agricultural market institutions. These include typologies regarding intervention strategies, institutional innovations and coordination strategies, financial institutions, and elements of organizational development. While the 6 typologies vary in scope and focus, some commonalities are evident:

- All 6 include farmer co-operatives (either in the typology or in the article generally);
- 4/6 include financial institutions (Appendix C demonstrates a typology specifically focused on financial institutions);
- 3/6 include commodity exchange platforms;
- 3/6 include contract farming;
- 3/6 include market information systems;
- Some sources list many other formal and informal institutions.

Example A

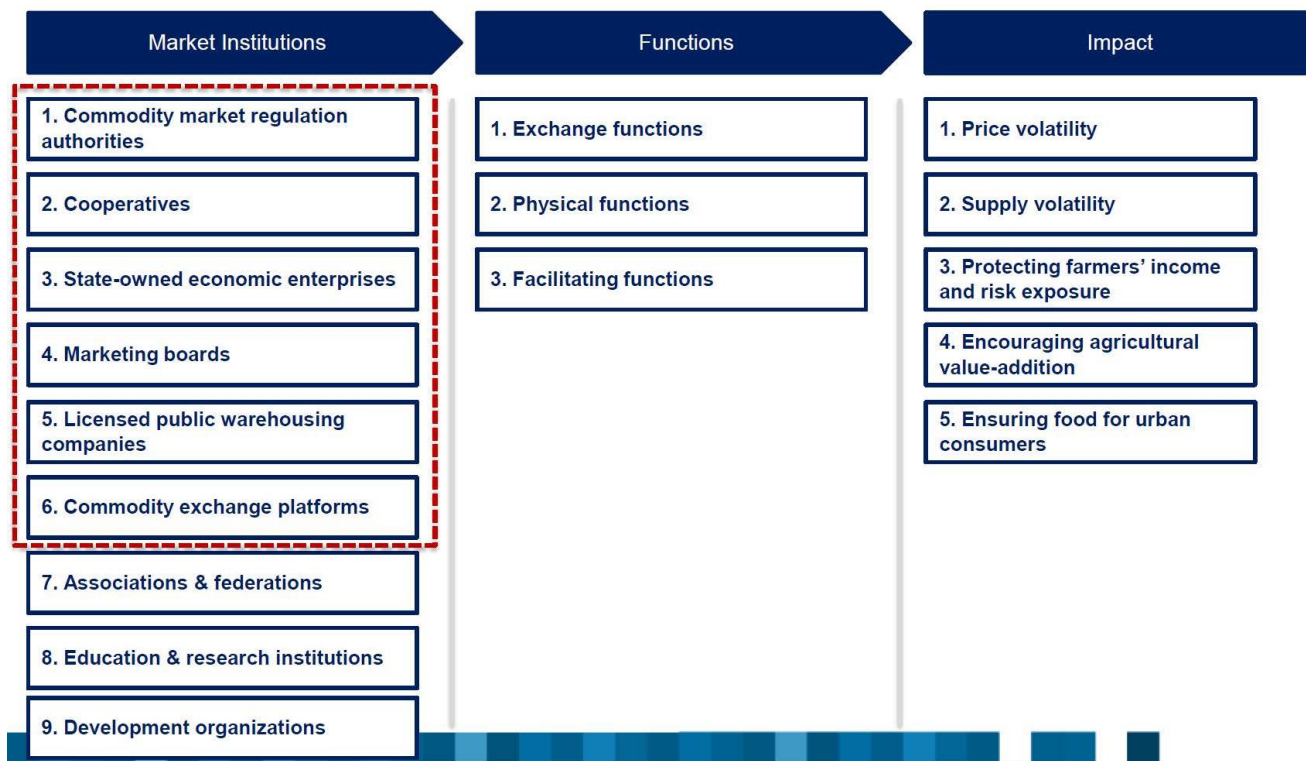
Figure 2.1 Small producers' constraints and institutional innovations



Source: (Herbel, D. et al, pp. 30).

Example B

AGRICULTURAL & FOOD MARKET INSTITUTIONS



Source: (Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation, pp. 8).

Example C

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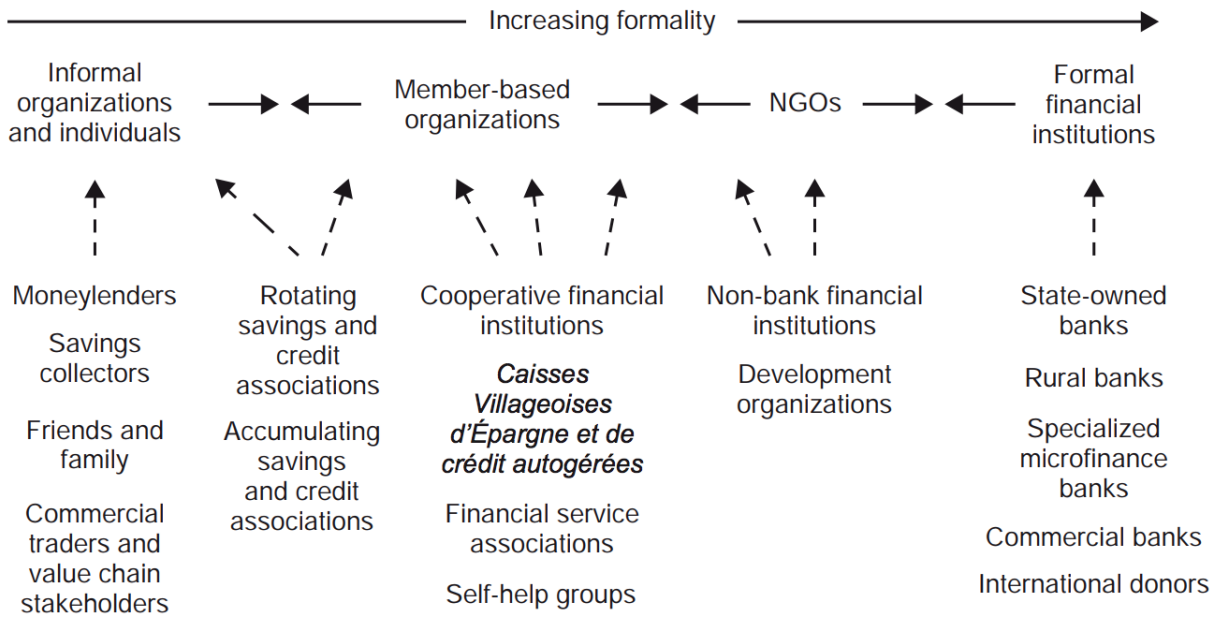


Figure 3.1 Spectrum of financial services providers

Source: adapted from Helms (2006)

Source: (Poole, N., pp 68).

Example D

TABLE 1 Typology of smallholder farms and appropriate strategies and interventions

TYPE OF FARM	CHARACTERISTICS	STRATEGIES		
		Agriculture-based	Transforming	Transformed
Subsistence farms	With profit potential	<ul style="list-style-type: none"> • Productive social safety nets • Investment in infrastructure, agricultural research and extension, and smallholder-friendly and climate-smart technologies • Access to innovative financial services 	<ul style="list-style-type: none"> • Flexible arrangements for land transfer • Risk reduction and management tools • Access to market information (e.g., ICTs) • Pro-smallholder, nutrition-sensitive value chains • Social safety nets and improved access to housing, education, and health services for rural migrants • Vertical and horizontal coordination to meet safety, quality, and quantity standards • Enhanced role of farmers' organizations, particularly for women farmers 	<ul style="list-style-type: none"> • High-value production • Reduced trade restrictions and subsidies • Flexible arrangements for land transfer • Efficiency- and quality-enhanced production systems • Vertical and horizontal coordination to meet safety, quality, and quantity standards
	Without profit potential	<ul style="list-style-type: none"> • Soft constraints <i>plus</i> hard constraints to land size and agricultural production • High population density • Low quality soil • Low rainfall and high temperatures • Remote location 	<ul style="list-style-type: none"> • Social safety nets • Nutrition-focused crop production for own consumption • Education and training for nonfarm employment • Migration to urban centers and other agriculture areas with greater profit potential 	<ul style="list-style-type: none"> • Social safety nets • Improved access to housing, education, and health services for rural migrants • Education and training for nonfarm employment • Flexible arrangements for land transfer
Commercial smallholder farms	<ul style="list-style-type: none"> • Soft-constraints • Limited access to capital, insurance, and other risk reduction tools 	<ul style="list-style-type: none"> • Vertical and horizontal market coordination to meet safety, quality, and quantity standards • Smallholder-focused, climate-smart, and nutrition-enhancing technologies • Investment in infrastructure, agricultural R&D, and extension 	<ul style="list-style-type: none"> • High-value and nutrition sensitive food chains • Flexible arrangements for land transfer • Links to urban and global markets • Vertical and horizontal market coordination • Enhanced role of farmers' organizations, particularly for women farmers 	<ul style="list-style-type: none"> • High-value crops • Flexible arrangements for land transfer • Clear regulatory frameworks and intellectual property rights to link private sector with smallholders

Source: Authors' compilation.

Source: (Fan, S. et al, pp 4).

Example E

Table 3.1 Elements of an integrated organizational development process

Type of relationship	Characteristics	Examples of organizations created	Opportunities for	
			small producers	external actors
Bonding	<i>Relations among small producers</i> Horizontal intragroup ties among individuals	<ul style="list-style-type: none"> Formal and informal grassroots groups, self-help groups, farmer field schools, cooperatives. 	Enable small producers to make collective choices, build confidence, pool skills/knowledge and provide opportunities to exercise/practice leadership	Improves efficiency of extension and other public and private service provisions
Bridging	<i>Relations among small-producer organizations</i> Horizontal intergroup ties between similar types of groups with common interests	<ul style="list-style-type: none"> Apex organizations (unions, federations of producer organizations) Peer-to-peer cooperation 	By reducing fragmentation, enable small-producer groups collectively to access assets, increase market power, and influence decision-making	Small producers are able to serve as reliable partners by achieving delivery targets (quantity, quality and timeliness of produce) of interest to market actors and policy-makers
Linking	<i>Relations with other organizational entities</i> Vertical extra-group ties between small-producer groups and other types of organizations with different interests and levels of power (resources, knowledge, and scales of action)	<ul style="list-style-type: none"> Advocacy coalitions, interprofessional associations Contract farming, commodity exchanges, public-private partnerships Policy forums, multistakeholder platforms 	Enable small-producer organizations collectively to: <ul style="list-style-type: none"> access markets under better conditions influence the “rules of the game” access resources, knowledge, and technologies at a scale or of a type not available locally or nationally 	Small producers are able to coordinate their activities more effectively with other economic actors and policy-makers Design and implementation of national food security, rural development, and agricultural policies is more efficient, effective, inclusive, and responsive to small-producer needs

Source: (Herbel, D. et al, pp. 71).

Example F

Table 5: Typology of agricultural market coordination institutions

Product	Homogeneity	Value to Volume	Market Structure	Coordination
<i>Staples (domestic foodgrains)</i>	High	Low	Many sellers Many buyers	Commodity exchange
<i>Traditional exports (coffee, tea, cotton, etc)</i>	High	Low	Many sellers Few buyers	Auction
<i>Non-traditional exports (flowers, fruits and vegetables, live- stock products)</i>	Low	High	Few sellers Few buyers	Integrated supply chains

Source: (Harsmar, M.et al, pp.70).

Example G

The World Bank World summarizes the following as market institutions:

- a. Contract farming
- b. Farmer cooperatives
- c. Grades and standards evaluation
- d. Market information systems (MIS) (generically describe dissemination networks of public data that provide information on agricultural markets).

Source: (World Bank, pp.33).

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Appendix A: Search Strings

Search Strings			
Policy	Query	Search Engine	# of Articles
Farm Income Payment	("farm" AND "income payment") AND (Africa OR Asia OR "Latin America" OR "South America")	Google Scholar	357
Farm Income Payment	(TITLE-ABS-KEY (("farm*" AND "incom* pay*"))) AND (LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar"))	Scopus	2
Arable Acres Supplementary Payment	("arable" AND "acreage" AND "supplementary" AND "payment") AND (Africa OR Asia OR "Latin America" OR "South America")	Google Scholar	1100
Arable Acres Supplementary Payment	(TITLE-ABS-KEY ("arab*" AND "acre*" AND "pay*")) AND (LIMIT-TO (DOCTYPE , "ar"))	Scopus	11
Import Duties and Subsidies	-input ((food OR crop OR agriculture) AND (policy OR program OR scheme OR intervention)) AND (import AND (duties OR subsidies)) AND (Ethiopia OR Tunisia OR Peru OR "Costa Rica" OR "South Africa" OR Tanzania OR Gabon OR Nigeria OR Gambia)	Google Scholar	10,000+
Import Duties and Subsidies	(((((food OR crop OR agriculture) AND (policy OR program OR scheme OR initiative)) AND (import AND (duties OR subsidies))) AND (Africa OR ethiopia OR tunisia or gabon or nigeria or gambia))	JSTOR	713
Export Taxes and Subsidies	((food OR crop OR agriculture) AND (polic* OR program OR scheme OR intervention)) AND (export AND (tax* OR subsid*)) AND africa	Scopus	49
Export Taxes and Subsidies	((food OR crop OR agriculture) AND (policy OR program OR scheme OR intervention)) AND (export AND (tax OR subsidy)) AND africa	Google Scholar	110,000
Export Taxes and Subsidies	((food OR crop OR agriculture) AND (policy OR program OR scheme OR intervention)) AND (export AND (tax OR subsidy)) AND africa	JSTOR	22,285
Export Restrictions and Bans	(TITLE-ABS-KEY (("agricultur*" OR "food*" OR "crop*" OR "grain*" OR "cereal*") AND ("export* ban*" OR "export* restrict*"))) AND (LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar"))	Scopus	51
Commodity Board	"commodity boards" OR "commodity board" AND "agricultural transformation"	Google Scholar	120
Import Restrictions and Bans	(((food OR crop OR agriculture) AND (polic* OR program OR scheme OR intervention)) AND (import AND (restriction OR ban))) AND africa)	Scopus	11
Import Restrictions and Bans	(((food OR crop OR agriculture) AND (polic* OR program OR scheme OR intervention)) AND (import AND (restriction OR ban)))	Scopus	188

Minimum Import Pricing	TITLE-ABS-KEY ((((food OR crop OR agriculture) AND (polic* OR program OR scheme OR intervention)) AND (import AND pricing) AND africa))	Scopus	9
Minimum Import Pricing	TITLE-ABS-KEY ((food OR crop OR agriculture) AND "minimum import price")	Scopus	3
Minimum Import Pricing	"minimum import price" AND agriculture AND Africa	Google Scholar	474
Pre-Shipment Inspections	TITLE-ABS-KEY ((export OR import OR shipment) AND inspection AND africa)	Scopus	46
Export-Import Bank	"export import bank"	Scopus	146
Intervention Prices	"intervention price" AND Africa	Scopus	2
ICT Adoption Rates and Price Information	"polic* AND (agricultur* OR food OR crop OR grain OR cereal OR farm) AND ((ict OR ""information technolog*" OR ""communication technolog*") AND (price OR pricing)) AND (africa OR tunisia OR peru OR ""Costa Rica"" OR uruguay OR thailand) AND (LIMIT-TO (SUBJAREA , ""SOCIO"")) AND (LIMIT-TO (DOCTYPE , ""ar""))	Scopus	527
Standards and Technical Regulations (Export Strategy)	polic* AND (agricultur* OR food OR crop OR grain OR cereal OR farm) AND ((standard* OR regulat*) AND (export*)) AND (africa OR tunisia OR peru OR "Costa Rica" OR uruguay OR thailand) AND (LIMIT-TO (SUBJAREA , "SOCIO")) AND (LIMIT-TO (DOCTYPE , "ar"))	Scopus	2,888
Plant, Animal and Food Health/Safety (Export Strategy)	polic* AND (agricultur* OR food OR crop OR grain OR cereal OR farm) AND ((plant OR animal OR food OR meat) AND (safety OR health) AND (export*)) AND (africa OR tunisia OR peru OR ""costa AND rica"" OR uruguay OR thailand) AND (LIMIT-TO (SUBJAREA , "SOCIO")) AND (LIMIT-TO (DOCTYPE , "ar"))	Scopus	27