The Malawi Priorities Project

The costs and benefits of commodity exchange (COMEX) reform in Malawi - Technical Report

National Planning Commission Report with technical assistance from the Copenhagen Consensus Center and the African Institute for Development Policy

COPENHAGEN CONSENSUS CENTER

NATIONAL PLANNING COMMISSION

AFIDEP
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This work has been produced as a part of the Malawi Priorities project.

Malawi Priorities: Background

Malawi Priorities is a research-based collaborative project implemented by the National Planning Commission (NPC) with technical assistance from the African Institute for Development Policy (AFIDEP), and the Copenhagen Consensus Center (CCC) to identify and promote the most effective interventions that address Malawi's development challenges and support the attainment of its development aspirations. The project seeks to provide the government with a systematic process to help prioritize the most effective policy solutions so as to maximize social, environmental and economic benefits on every kwacha invested. Cost-benefit analysis is the primary analytical tool adopted by the project. Cost-benefit analysis will be applied to 20-30 research questions of national importance. Research will take place over the course of 2020 and 2021.

Research questions were drawn from the NPC's existing research agenda, developed in September 2019 after extensive consultation with academics, think tanks, the private sector and government. This sub-set was then augmented, based on input from NPC, an Academic Advisory Group (AAG) of leading scholars within Malawi, and existing literature, particularly previous cost-benefit analyses conducted by the Copenhagen Consensus Center. The research agenda was validated and prioritized by a Reference Group of 25 prominent, senior stakeholders. The selection of interventions was informed by numerous consultations across the Malawian policy space, and one academic and two sector experts provide peer review on all analyses.

Cost-benefit analyses in Malawi Priorities consider the social, economic and environmental impacts that accrue to all of Malawian society. This represents a wider scope than financial cost-benefit analysis, which considers only the flow of money, or private cost-benefit analysis, which considers the perspective of only one party. All benefit-cost ratios (BCRs) reported within the Malawi Priorities project are comparable.

The cost-benefit analysis considered in the project is premised on an injection of new money available to decision makers, that can be spent on expanding existing programs (e.g. new beneficiaries, additional program features) or implementing new programs. Results should not be interpreted as reflections on past efforts or the benefits of reallocating existing funds.

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Limestone is a Canada-based consulting firm specializing in the evaluation of international development projects and social programs. The firm is recognized for combining academic rigor, state of the art methods, and international development experience to provide customized evaluation and economic analysis services and to help their clients incorporate evidence to improve the design, financing, and implementation of their projects. Information about our current and past projects can be found at: limestone-analytics.com.

Contents

Acronyms

AAG	Academic Advisors Group
ACE	Agriculture Commodity Exchange
ADMARC	Agricultural Development and Marketing Corporation
AHCX	AHL Commodities Exchange
ASWA	Agriculture Sector Wide Approach
BCR	Benefit-Cost Ratio
CBA	Cost-Benefit Analysis
CCC	Copenhagen Consensus Center
COMEX	Commodity Exchange
ECI	Economic Complexity Index
EPA	Economic Partnership Agreement
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FARMSE	Financial Access for Rural Markets, Smallholders, and Enterprises
FBS	Farmer Business Schools
FISP	Farm Input Subsidy Program
FUM	Farmers Union of Malawi
GDP	Gross Domestic Product
HDI	Human Development Index
IFPRI	International Food Policy Research Institute
MIS	Market Information Systems
MOAFS	Ministry of Agriculture and Food Security
NAS	National Adaptation Strategy
NASFAM	National Smallholder Farmers' Association of Malawi
NES	National Export Strategy
NAIP	National Agriculture Investment Plan
REER	Real Economic Exchange Rate
SIVAP	Smallholder Irrigation Value Addition Project
SSA	Sub-saharan Africa
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development

1. Introduction and context

As part of the Malawi Priorities project, the team was posed the following question:

How does Malawi most effectively create access to formal markets for smallholder farmers?

This paper summarizes the research into the key challenges and opportunities for improving access to formal markets in Malawi. The team conducted research into Malawi's agriculture sector through a review of past and current agricultural projects, consultations with sector experts, and a review of the literature on impacts of various intervention options. We then conducted a cost-benefit analysis to quantify the net impact from a proposed intervention: reform of the country's two commodity exchanges (COMEX).

Agricultural commercialization in Malawi is broadly constrained by poor market systems and unorganized farmers. However, there are a multitude of other challenges constraining the development of formal agricultural markets in Malawi in addition to these overarching concerns. According to the World Bank (2017), some of these challenges include:

- Inadequate infrastructure for efficient agricultural marketing;
- Policy incoherencies that negatively affect marketing;
- Nascent farmers' organizations;
- Inadequate access to credit and poor financial literacy among smallholder farmers;
- Small farm sizes;
- Excessive climate risk, and;
- Reliance on informal rural intermediary vendors, among others.

Many programs have worked to address the problem of improving access to formal markets, using a wide variety of intervention approaches. The roster of approaches ranges from providing technical assistance for farmers to increase productivity, facilitating linkages between value chain actors, providing farmers with access to market information (such as minimum farmgate prices), training farmers cooperatives and groups, as well as building infrastructure. However, one of the overarching issues in market coordination is the poor functioning of key institutions, including the unrealized potential of the commodity exchanges (COMEX).

Malawi currently has two commodity exchanges; ACE and AHCX. The two exchanges duplicate efforts, operate inefficiently, are currently poorly structured, and remain underutilized (FEWSNET, 2018). For example, the two exchanges have differing policies related to quality control standards, warehouse receipts, and storage facilities. The exchanges also have difficulty communicating their function to producers and suffer from very thin trading levels. Farmers prefer to sell to intermediary traders at low prices, resulting in lost income. The proposed intervention for this analysis is the reform of the two commodity exchanges. This was selected because it has the potential to improve policy and market coordination at a national level, as well as provide a practical avenue for farmer training, storage, and credit systems.

The COMEX reform would involve a multifaceted process with defined milestones. The key elements of the reform would include:

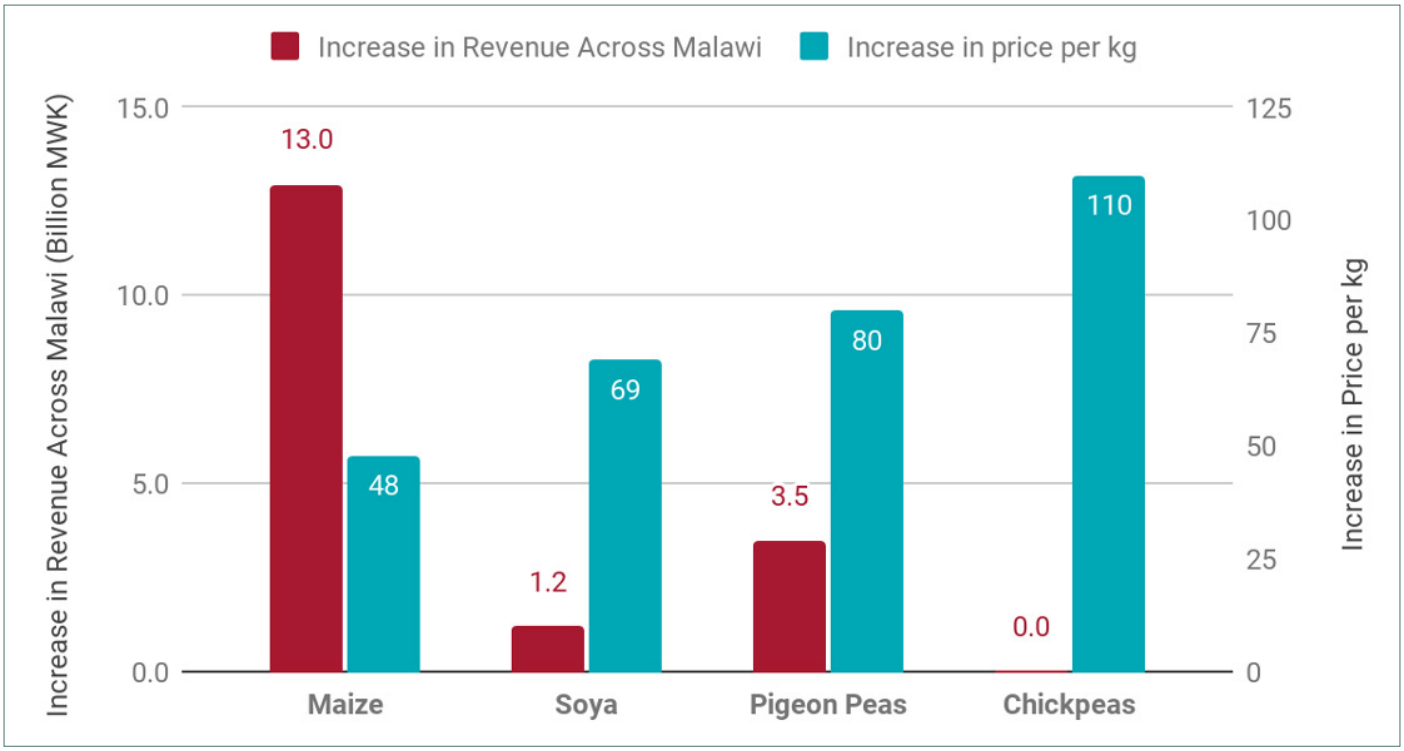
- A merger of the two COMEX into one, including business and policy restructuring. Given the size of the market in Malawi, having two independent commodity exchanges results in inefficient use of resources (such as storage space) and poor coordination.
- Investment in grading technology
- A management contract that specifies a number of performance benchmarks that the COMEX would have to meet for the government to purchase maize through the platform, thereby increasing volume of trade. Benchmarks would include:
    - Financial stability and transparency
    - Established management systems in place
    - Use of standardized grading methods
    - Help farmers to form cooperatives (or other models) to operate at scale

We then conducted cost-benefit analysis (CBA) to quantify the impact of COMEX reform on Malawi. The primary benefit examined in this model is the increased price paid to farmers for their agricultural commodities, a metric that captures improved efficiency in the agricultural value chain. Farmers are typically paid below the minimum farmgate price for their crops when they sell directly to traders at the farmgate (Baulch and Ochieng, 2020). With an efficiently functioning COMEX and coordination among farmers, market access costs, including transport and storage costs, are expected to drop. When successful, farmers would receive the advertised minimum farmgate prices, which are higher than what they receive now.

We conducted the analysis assuming that only 10% of maize, soya, pigeon pea and chickpea production are traded through the exchange. In this case, the annual benefits associated with increased farm revenue are estimated at MWK 17.7 billion (See Figure

1.1). The current gap in between market prices and farmgate prices is so high, that the intervention is even feasible if 1% of farmers sell their output through the reformed COMEX.

Figure 1.1: Annual increase in farm revenue by crop arising from COMEX reform, assuming 10% volume traded through COMEX



The cost parameters are estimated based on conservative estimates of the cost to reform the policies and business practices for the COMEX. There is some uncertainty around cost estimates because there are no commodity exchange reform interventions that provide reasonable comparisons or benchmarks. However, this is explored in the sensitivity analysis. In the central estimate, the intervention requires an upfront investment of MWK 5.8 billion over three years, mostly for grading technology. Ongoing investments are estimated at MWK 91 million, with the primary cost associated with maintaining grading technologies.

The results indicate that this intervention would have a BCR of 16 with an 8% discount rate (central estimate). This is an excellent return-on-investment, and one of the largest in the agricultural sector across all Malawi Priorities research. Part of the reason the BCR is so high is that both exchanges already have sufficient infrastructure, particularly systems and storage, to operate at scale in Malawi. The proposed intervention aims to generate the necessary incentives to improve the efficient use of these assets, such that substantial gains can be made at relatively little cost. The intervention could be considered a key policy lever or 'quick win' under evolving strategic documents that aim to operationalize the new national vision, *Malawi 2063* (NPC, 2020). Additionally, it would support Agricultural Productivity and Commercialization, a key pillar in the Vision to become an inclusively wealthy and self-reliant nation.

Table 1.1: Summary of costs and benefits over a 10-year time horizon

Discount Rate	Expected Benefits (Billion MWK)	Expected Costs (Billion MWK)	Benefit Cost Ratio
5%	103	5.7	18
8%	87	5.4	16
14%	63	4.8	13

Research Context

The National Planning Commission (NPC) with technical assistance from AFIDEP, and the Copenhagen Consensus Center (CCC) are conducting the Malawi Priorities Project across 2020 and 2021. The Project is a research and advocacy exercise which aims to identify the most effective ways to address the nation's challenges using the framework of cost-benefit analysis. The goal is to inform both short and long term development priorities for the country, acknowledging that there are insufficient resources to address all of Malawi's challenges and that maximizing outcomes requires careful, evidence-based consideration of the costs and benefits of all policies.

The starting point of all research questions is the NPC's existing research agenda, structured around the six thematic areas of Sustainable Agriculture, Sustainable Economic Development, Human Capital and Social Development, Sustainable Environment, Demography, Governance, Peace, and Security, and Human Capital and Social Development.

The NPC's research agenda was developed by the Commission in September 2019 after extensive consultation with academics, think tanks, the private sector and government. Consequently, the Commission's research agenda, prima facie, contains questions of national importance. As a first step, Malawi Priorities drew questions from the NPC research agenda that could be answered using a cost-benefit methodology. Then, additional research questions were added based on input from NPC, an Academic Advisory Group (AAG) of leading scholars within Malawi, and existing literature, including previous cost-benefit analyses conducted by the Copenhagen Consensus Center. This process of identifying research questions for investigation generated a total of 38 potential research questions across all 6 thematic areas.

The research agenda was validated and prioritized by a Reference Group of 25 senior stakeholders from government, civil society and the private sector. The outcomes of the Reference Group exercise were used to inform which research questions to prioritize and which interventions to focus on within those 38 potential research questions. The validation process was completed in July 2020.

In August 2020, the research team at Limestone Analytics began investigation into the development question: *How does Malawi most effectively create access to formal markets for smallholder farmers?*

This question was ranked 4.6 out of 5, according to the Reference Group, making it one of the most highly ranked questions of the entire project.

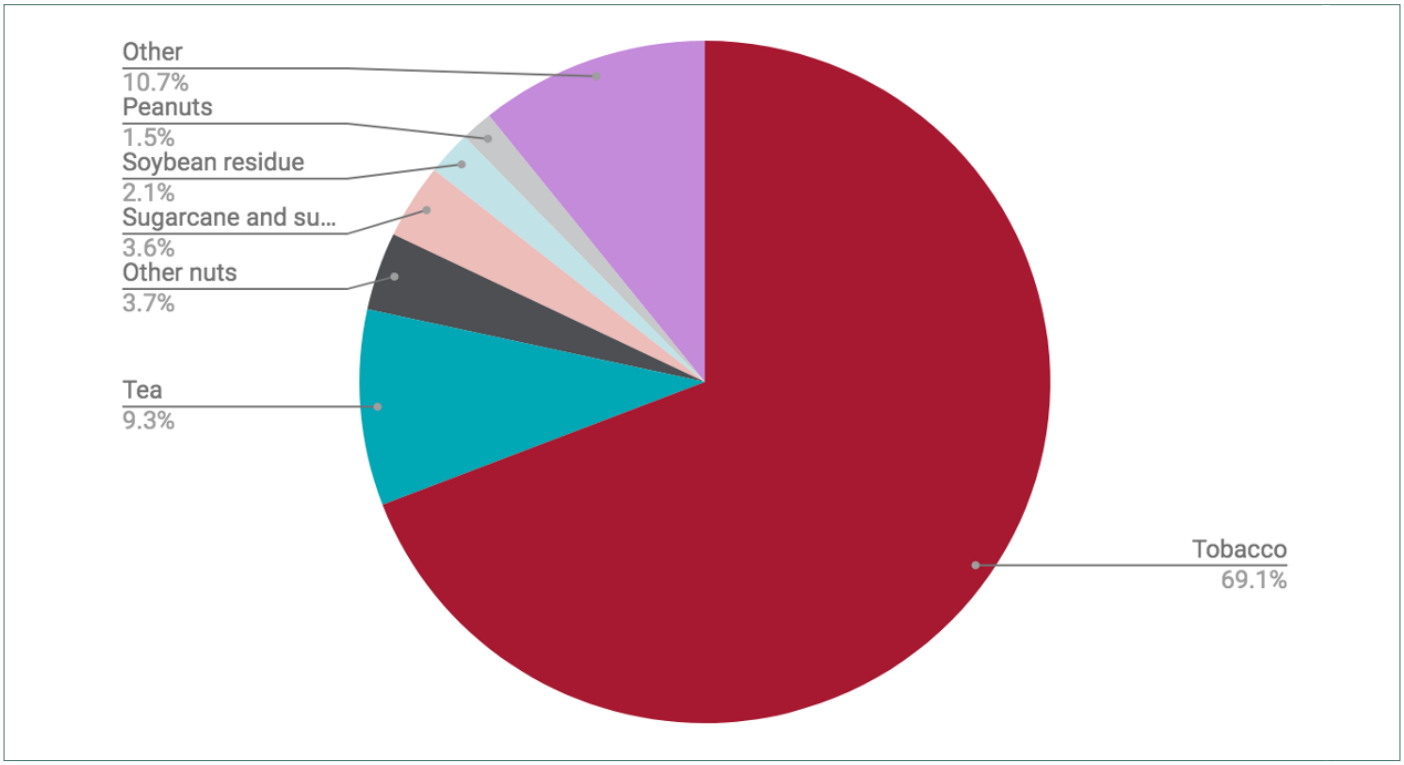
The research team conducted a literature review to understand the sector and identify key barriers and performance gaps that prevent smallholder farmers from accessing formal markets. The team then participated in a series of consultations with an academic advisor in Malawi, Professor Patrick Kambewa, in addition to conducting a more thorough review of secondary data to identify key barriers preventing smallholder farmers from accessing formal markets. Once these gaps were outlined, the research team explored interventions that have been implemented in Malawi that address such issues. The menu of barriers and interventions were reviewed by Professor Kambewa, who provided feedback on additional considerations, as well as additional contacts from the sector who have been involved in market research, feasibility studies, and program design to increase market access for farmers. The sector and academic experts were able to provide valuable insight into what interventions have had the greatest reach, impact, and data availability. The team used these insights to select a subset of interventions to include in the feasibility study.

Agriculture sector background

Agriculture is the backbone of Malawi's economy; it accounts for one third of GDP, almost 80 percent of employment, and 80 percent of the country's total exports (World Bank, 2020). Tobacco alone comprises almost 70 percent of Malawi's total exports (Atlas, 2018). The lack of diversity resulting from dependence on tobacco has made the agricultural sector in Malawi vulnerable to market and climate induced shocks. As a consequence, improved agricultural production is one of the main pillars of Malawi's National Agricultural Investment Plan (NAIP). Additionally, one of the three pillars of the Malawi 2063 Vision is Agricultural Productivity and Commercialization. Access to markets is key for achieving the country's wealth creation and self-reliance aspirations, anchoring on agricultural commercialization.

Malawi ranks 118th out of 133 countries in the Economic Complexity Index (ECI) by the Atlas of Economic Activity (2018). The index ranks countries based on the diversification and complexity of their export basket. Malawi has only diversified into four new products, all in the agricultural sector, since 2003 (Atlas, 2018). In 2018, Malawi exported $998M and imported $1.51B, resulting in a negative trade balance of -$514M (Atlas, 2018).

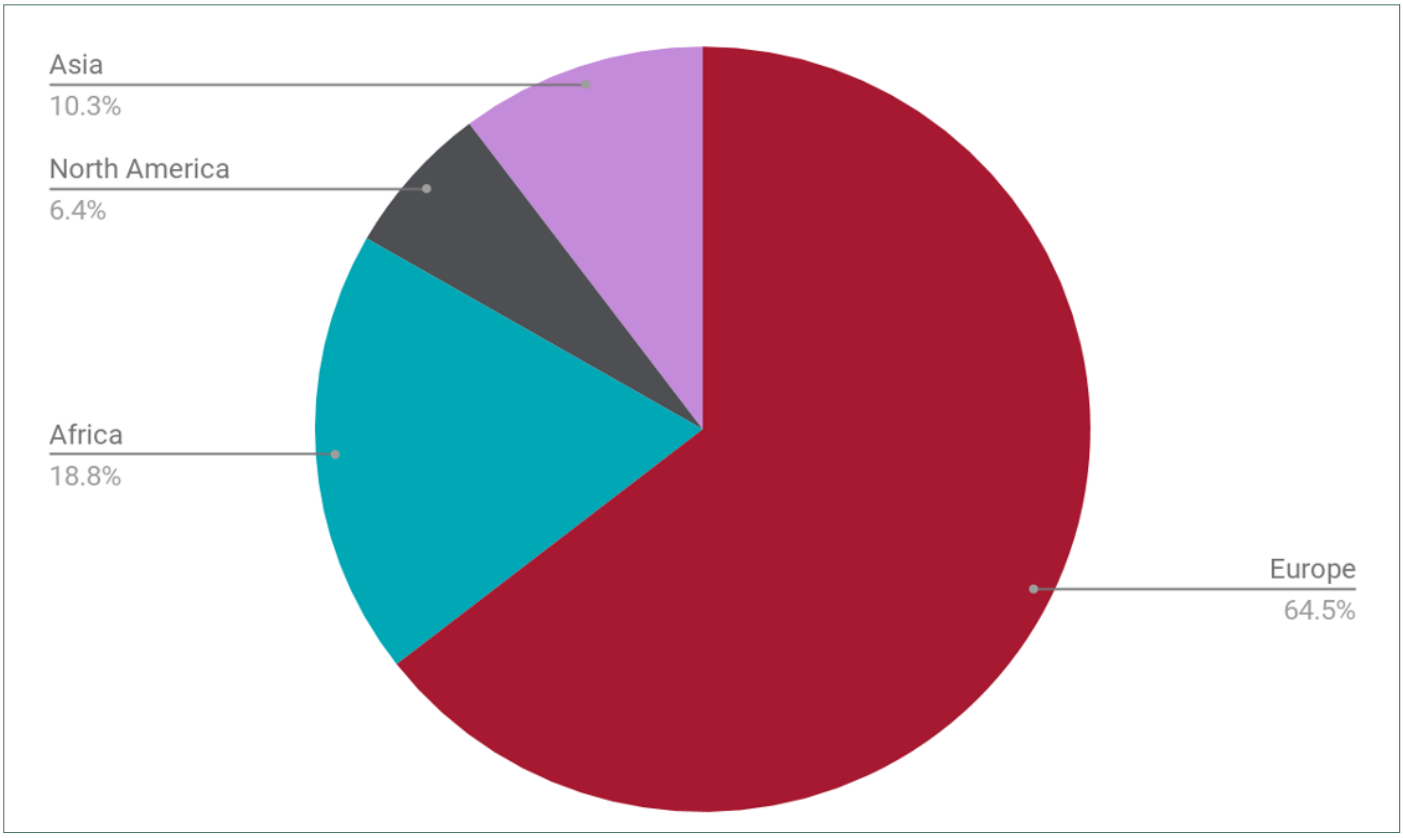
Figure 1.2: Malawi Export Basket, Atlas 2018



Prior to the COVID-19 pandemic, Malawi's economy was on a positive trajectory for the third consecutive year in 2019, primarily driven by improved agricultural production in maize and other crops, despite the adverse effect of Cyclone Idai. Maize production had increased from 3.39 to 3.69 million metric tons from 2018 - 2019 (World Bank, 2020). Tobacco sales, however, were weaker, declining from 202.0 million kilograms in 2018 to 165.6 million kilograms in 2019, with average prices reducing from US$ 1.67/ kilogram in 2018 to US$1.43/kilogram in 2019 (World Bank, 2020).

Malawi's main trading partners for exports are Belgium (20.7%), Germany (13.16%), and Russia (7.25%). Imports primarily come from South Africa (28%), China (14.4%) and India (11.6%).

Figure 1.3: Malawi's Primary Export Regions, Atlas 2018



The government of Malawi recognizes the need to focus efforts on the agricultural sector to improve general economic growth in the country. In 2011, the government developed the Agriculture Sector-Wide Approach, ASWAp (2011-2015). The plan advocated strategic investment in programmes and initiatives that fall under three distinct pillars: food security and risk management; commercial agriculture, agro-processing, and market development; and sustainable agricultural land and water management. This was recently followed by the National Agricultural Investment Plan (NAIP) for the fiscal years 2017/2018 - 2022/2023. NAIP has four programs and sixteen intervention areas, summarized below.

Table 1.2: NAIP program structure

Program	Objective	Funding (USD)
Policies, institutions, coordination	To improve policy and regulatory environment , stakeholder coordination and accountability	372 M
Resilient livelihoods and agricultural systems	To strengthen resilience of livelihoods and natural resource base for agriculture.	925 M
Production and productivity	To increase production and productivity of a more diversified agricultural sector	994 M
Markets, value addition, trade, finance	To enhance market access, value addition, trade, and access to finance	927 M

There are 16 intervention areas that support the four programs.

Table 1.3: NAIP intervention areas

Intervention	Outcomes	Funding (USD M)
Policy, Program and Stakeholder Coordination	Effective mechanisms for multi-sectoral and multi-stakeholder coordination	182
Farmer Organizations	Strengthened performance/outreach of farmer orgs	16
Public agricultural services delivery	Strengthened MoAIWD's capacity to provide relevant, market-oriented agricultural extension services	93
Food and nutrition security	Available diversified and nutritious foods consumed	209
Food safety and quality	Food safety and quality standards established and mainstreamed	11
Empowerment and tenure security	Empowered Women and youth and enhanced land tenure security	33
Disaster risk management	Strengthened Capacity to manage disasters and reduce their impact	413
Pest and disease management	Major pests and diseases controlled and major outbreaks managed effectively	232
Agricultural innovation systems	Demand-driven, pluralistic innovation systems for relevant technologies generated and disseminated	432
Access to inputs	Broader range of quality inputs at reasonable costs timely accessed by farmers	361
Natural resource management and climate	Change Sustainably managed natural resources and enhanced climate resilience of production systems	65
Irrigation development	Sustainably increased use of irrigation (increased use of sustainable irrigation)	396
Mechanization	Improved access to and use of mechanization services	55
Agricultural markets and trade	Enhanced efficiency and inclusiveness of agricultural markets and trade	522
Investments in agribusiness	Increased agro-processing, value addition and investments into the domestic markets	168
Access to financial services	Improve access to agricultural finance	31

Institutional framework

Malawi has a strong institutional framework supporting the agricultural sector, but not all institutions are functioning at full capacity and there are inefficiencies due to overlap of services. Below is a table with some of the primary institutional actors in this space.

Table 1.4: Summary of main institutional actors in agriculture sector

Name	Function
Ministry of Agriculture and Food Security (MOAFS)	Organized in 6 technical Departments: Agriculture Extension Services, Crops Development, Animal Health and Livestock Development, Agriculture Research, Land Resource and Conservation, and Irrigation Development. Develops policies and strategies, such as NAP and Control of Goods Act.
Farmers Union Malawi (FUM)	Umbrella body of farmers and farmer organizations established in 2003 - objective is to ensure that farmers effectively and meaningfully participate in the design, formulation, implementation, monitoring and evaluation of policies, strategies, programs and plans aimed at improving the livelihoods of farmers in Malawi.
National Smallholder Farmers' Association of Malawi (NASFAM)	Formed in 1997, and formally registered in February 1998 as an organization to support market access for participating smallholder farmers, NASFAM has evolved into a sophisticated system of services, programmes, enterprises, and associations designed to meet the varied needs of smallholder farmers in Malawi across several value chains, including groundnuts, rice, tobacco, soya, pigeon peas, beans, and sunflower. NASFAM has a membership of around 100,000 smallholder farmers. The smallest operational unit of NASFAM is the Club, made up of 10-15 individual farmers. Clubs combine to form Action Groups that are the key points in the extension network for dissemination of information to members, and for the bulking of member crops. Action Groups combine to form NASFAM's Associations. Currently, NASFAM has 54 associations.
Agriculture Development and Marketing Corporation (ADMARC)	Formed in 1971 as a Government-owned corporation or parastatal to promote increased volume and quality of agricultural exports, to develop new foreign markets and to support Malawi's smallholder farmers. It is now a limited liability corporation. ADMARC has ten depots, 24 parent markets, 343 unit markets, 411 seasonal markets, 220 warehouses and has an overall capacity of 137,000 metric tons.
AHL Commodities Exchange Limited (AHCX)	AHCX is a marketplace where buyers and sellers can transact trade of commodities with an assurance on quality, delivery and payment. AHCX operates 12 warehouses, mostly rented from third parties. The weigh bridges & laboratory equipment necessary for grading are not available. There is a lack of certification space for quality assurance. The main crops AHCX deals in are cereals and legumes.
Agricultural Commodity Exchange for Africa (ACE)	ACE started operations in 2006. ACE has a diversified shareholding that includes grain trading firms, food processors, and farmers' associations. ACE certifies privately owned warehouses. This includes 54 warehouses with over 186,672 MT of storage space (31 rural and 23 urban), however, it was not being used to full capacity in 2016. ACE handles maize, soya, sunflower, beans, processed soya, groundnuts, rice, and sorghum.

At the policy level, Malawi's new administration proposed an Affordable Inputs Program through their provisional budget (July - Oct, 2020). The program will provide smallholder farmers with access to fertilizer at a reduced cost, as well as maize and legume seeds. The government has also stated they will ensure internal and external trade continues and support small-scale traders by expanding and encouraging the use of simplified declarations and processes and being more responsive to consolidated cargo shipments, particularly as small traders will need to consolidate shipments during this time.

However, utilization of other institutions is limited. According to a Feed the Future (FTF) baseline study in Malawi (2013), less than 15 percent of households in their sample reported participating in either National Association of Smallholder Farmers (NASFAM) or Farmer's Union of Malawi (FUM) farmer's groups in the past year. Among those communities with active farmer's groups, approximately half of the groups have been active for less than one year.

Further, the average distance to the closest daily, weekly, or Agricultural Development and Marketing Corporation (ADMARC) market ranged from 7.4 to 17.0 km.

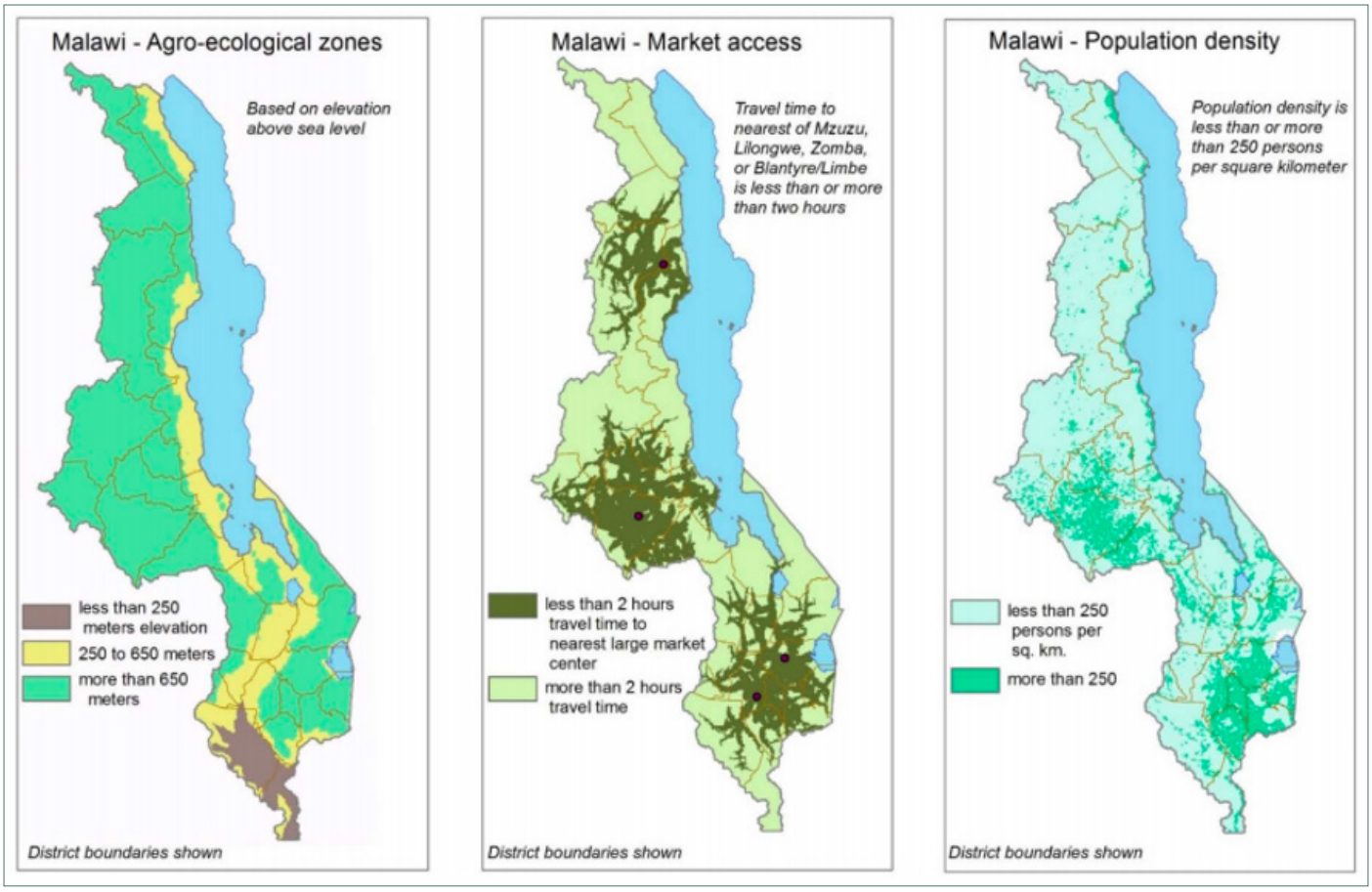
There are also capacity gaps with the two Malawian commodity exchanges. The volumes and turnover of the two Commodity Exchanges are low and volatile and many actors in various agricultural value chains have unrealistic expectations regarding their purpose; they want to use them as an aggregation mechanism and to increase and stabilize the prices received by farmers (GIZ and AGRA Workshop Report, 2018). However, the reality is that both commodity exchanges remain thinly traded and rely on their warehouse receipt system to generate revenue. In addition, many farmers do not fully understand the purpose of the commodity exchange, which has led to disillusionment, or at times outright hostility, towards COMEX (Sector Expert Meeting, 2020).

A recent FEWSNET (2018) report concluded that the formal commodity trading associations do not play an important role in Malawi, although market-level coordination occurs among traders to establish daily market prices. Currently, the two exchanges have differing policies related to quality control standards, warehouse receipts, and storage facilities. They operate inefficiently, and remain underutilized.

Market and storage locations

Feed the Future (2016) conducted a study that looked at the variation in regional access to markets, suitability for key crops, and population density. A summary of geographical features, market access (to urban centres) and population density is noted below. Note, that this does not account for access to regional markets through other major transportation corridors.

Figure 1.4: Geographical breakdown of agro-ecological zones, market access, population density (Food for Peace, 2016)



In Southern Malawi, Lunzu market (Blantyre) is an important market for bulking/aggregation and distribution for the region, especially Neno, Chikwawa, and Nsanje (FEWSNET, 2018). In addition to the urban markets in Blantyre, Lilongwe, Mzuzu, and Zomba, there are well-integrated markets in district administrative centers (bomas) and along major roads. Markets in physically isolated rural areas are less integrated, especially during the rainy season, and have low volumes of traders, goods, and frequency of market days (FEWSNET, 2018).

Storage and distribution is available between central distribution points. Major national roads, like M1 (north-south) and M10 (west-east) connect northern, central, and southern regions through the major cities of Mzuzu, Lilongwe, and Blantyre, which are also the destination of most commodities (FEWSNET, 2018). However, beyond the major roads, towns, and district headquarters, road conditions deteriorate quickly, especially during the rainy season. Similarly, the main town and district headquarter markets are competitive, with a large number of buyers and sellers, but market availability and functioning can deteriorate rapidly beyond district headquarters, especially during lean season (FEWSNET, 2018).

Challenges in agriculture sector

There are a multitude of challenges constraining the development of agricultural markets in Malawi, which include:

- Inadequate infrastructure for efficient agricultural marketing
- Distance to markets, especially during lean or rainy seasons
- Poor functioning of ADMARC, such as delayed purchasing of maize stocks (after harvest season)
- Limited access to and poor quality of marketing service provision
- Reliance of smallholder farmers on selling to intermediary traders below minimum farmgate prices
- Policy incoherencies that negatively affect marketing
- Nascent farmers' organizations - only 18 percent of the 4.2 million smallholder farmers in Malawi belong to some form of functional farmer organizations
- Inadequate access to credit for smallholder farmers
- Small farm sizes

- Excessive climate risk
- Lack of reliable or formal market access - reliance on informal rural intermediary vendors that set prices, where farmers have little bargaining power.
- Low literacy rates, including financial literacy

These challenges have led to poor utilization of marketing opportunities and a reliance on informal markets. During the 2018 conference on Strengthening Structured Markets in Malawi, four main marketing roadblocks were identified (GIZ and AGRA Workshop Report, 2018):

1. Dominant informal marketing system for most crops
2. Poor implementation of market regulatory frameworks
3. Lack of market information/information asymmetry and;
4. Disorganization of farmers

Feed The Future (2013) has also conducted a baseline study in Malawi to better understand the characteristics and barriers faced by farming households in preparation for an activity that targets groundnuts, soybeans and dairy; three primary value chains commonly consumed with promising economic and nutritional return on investment.

The baseline study found that households surveyed almost universally owned or cultivated land in the last rainy season. Almost three-quarters of the households cultivated two or more crops; maize was the most prevalent crop followed by groundnuts and soy. Among the 59.6 percent of households cultivating groundnuts or soy, over half reported selling some of the harvest; half of the groundnut harvest was sold and three-quarters of the soy was sold. This finding is mirrored by a recent study (Msiska and Matumba, 2018), which shows the difference in food volumes sold at market by households according to crop.

Table 1.5: Smallholder farmers share of crops sold at market, 2018

Crop	Maize	Ground nuts	Soy beans	Beans	Sunflower	Pigeon peas
Typical share sold at market	8 - 15%	40-45%	85-91%	35%	100%	35%

Source: Msiska and Matumba, 2018

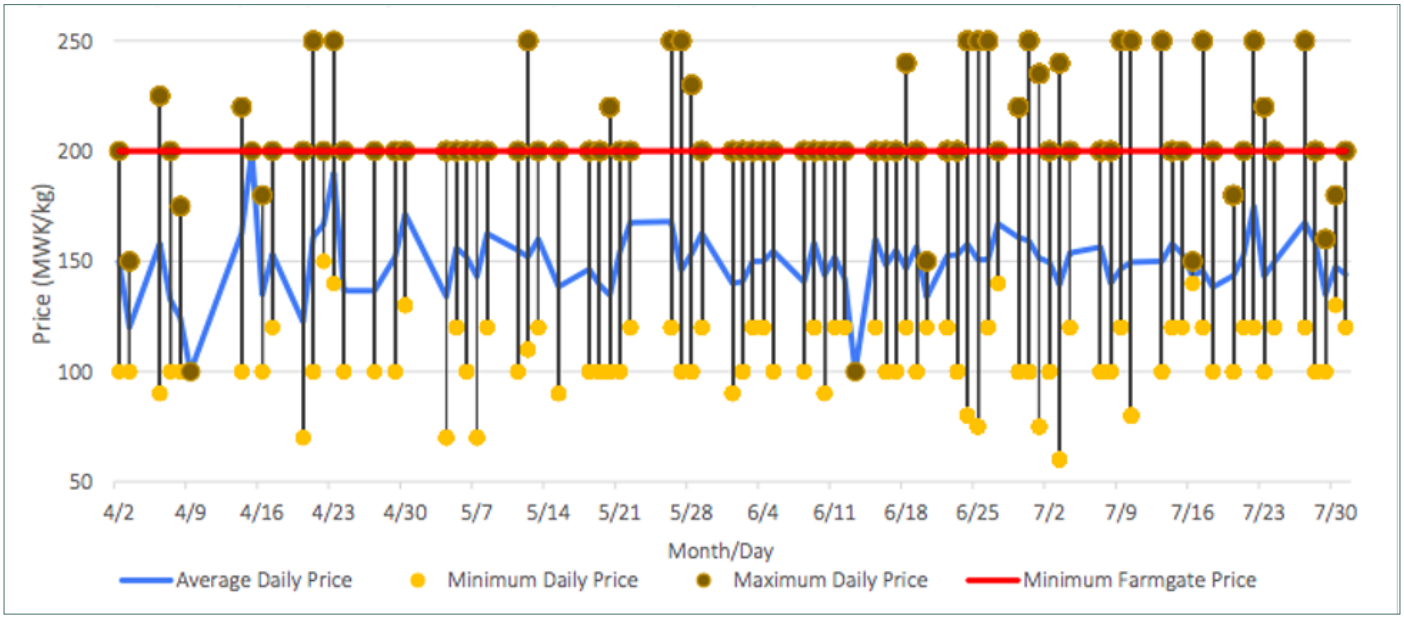
FEWSNET (2018) identified numerous formal and informal barriers to entry to food trade. First, large crop trading firms need licenses from the government, which many do not register for due to cost and insufficient information. Certification on scales offered by the Malawi Bureau of Standards (MBS) costs 3,700 MWK/year. A separate impact evaluation found that 93 percent of firms in Malawi have not registered with the government and operate informally (Campos et al., 2019).

The FEWSNET 2018 report also finds that there is a high degree of entry and exit among traders depending on actual and perceived market trends. Uncertainty created by national maize marketing policies influences entry, exit, and incentives to scale up operations during crisis periods. Poor households predominantly sell on markets or to rural aggregators based on their cash flow needs for both crops and livestock. This issue was also raised by NASFAM, who stated that policy inconsistency affects decision-making for smallholder farmers and private actors by making diversification into legumes and other grains highly risky (GIZ and AGRA Workshop Report, 2018). Farmers do not trust market availability and prices for those crops, so they stay with tobacco, where there is more stability. NASFAM concluded that farmers acting as business players are primarily looking for reduced transaction costs, ease of doing business, and reduced risk.

This finding is confirmed by a study examining the use of price band policies in Malawi. It found that maize price volatility together with operational challenges and budgetary constraints make it very difficult for Malawi to stabilize either retail or farmgate maize prices using a price band combined with a buffer stock (Baulch and Botha, 2020). This in turn reduced incentives for larger farmers to produce and sell maize surpluses through formal markets, both domestically and regionally. Another study found that most large scale farmers will only grow maize for their own use because of its unprofitability and the unpredictability of government policy (Edelman et al, 2016).

Another issue that is well-documented in Malawi is that farmers sell their produce at the farm gate for less than its market value to traders, who act as middlemen between smallholder farmers and formal markets. A 2020 (Baulch and Ochieng) study gathered data directly from farmers on the prices sold for maize and soya beans. It found that 76 percent of maize farmers and 90 percent of soybean farmers sold their crops at below the official minimum prices that season. On average, the prices received were three-quarters of the applicable minimum farmgate prices (75 percent for maize and 76 percent for soybeans).

Figure 1.5: Geographical breakdown of agro-ecological zones, market access, population density (Food for Peace, 2016)



Finally, the COVID-19 pandemic has introduced additional challenges to the agriculture sector in Malawi. There have been temporarily disrupted supply chains for key production inputs from South Africa and China, though exports from both countries have seen recent improvements as lockdown measures have eased. Malawi's imports were 26 percent lower in April and May 2020 compared to the previous year (World Bank, 2020). There are also higher costs and delays in trade logistics, combined with decreased demand from trade partners.

So far, according to the second round of agricultural production estimates, all major crops have shown an increase in production, particularly maize at 3.78 million tons (11.5 percent), rice (6.5 percent), cotton (112.5 percent), pulses (19.5 percent), and soybeans (19.6 percent) (World Bank, 2020). Despite these yields, the 2020 Food Security Vulnerability Assessment and Analysis estimates that a total of 2.6 million people out of the national projected population of 17.5 million would not be able to meet their annual food requirement during the 2020/21 consumption period. The total humanitarian food assistance for the rural affected population is estimated at 56,744 Metric Tonnes of maize with an estimated cash value of MK14.19 billion.[1]

[1] Press Statement carried in the local media from Secretary for Economic Planning and Development and Sector Reforms, translated by Patrick Kambewa, 2020.

2. Literature review and intervention selection

As outlined in the sector background, smallholder farmers in Malawi face a wide variety of barriers to accessing formal markets. The table below presents a summary of the primary barriers that we identified, along with possible interventions that address each barrier.

Table 2.1: Summary of barriers and potential intervention options

Key Barrier	Possible interventions
Reliance on informal trade or intermediary vendors	• Cooperatives • Farmers organizations, • Small-medium enterprises • Contract farming • Knowledge of minimum farm gate prices
Financial literacy/ access to credit	• Pre-harvest financing models • Microfinance + financial literacy training • Training for community-based financing mechanisms
Knowledge of farming methods and market information	• Provide farmers with knowledge of market prices • Technical training on farming methods
Transportation	• Construction of rural roads
Storage facilities	• Additional auction houses • Additional storage facilities • Better access/transportation to storage facilities
Farmers unions	• Form or increase capacity of farmers unions/coops
Multiple commodity exchanges	• Reform the two commodity exchanges
Quality control	• Pre-post harvest farmer trainings • Improved quality control standards/regulations for more value chains
ADMARC capacity	• Use capacity more effectively- improve access to storage facilities, align purchasing with harvest seasons
Climate risk	• Improved farm inputs (transition to better drought-tolerant seed varieties: • Improved farming techniques • Improved irrigation methods
Export bans - reliance on informal markets	• Remove export ban on maize
Farm productivity	• Improvements in farm inputs and farming techniques

Intervention options

A number of different programs have worked to address the problem of accessing formal markets, using a variety of intervention approaches. In this section, we review the evidence and impact of various interventions that have been implemented in Malawi by each barrier identified in the previous section.

Table 2.2: Examples of interventions addressing each barrier

Key Barrier	Interventions or Studies	Evidence of Impact?
Intermediary vendors	• Ferris et al. 2014 - Discussion paper on importance of linking smallholder farmers to markets and the implications for extension and advisory services • Fafchamps M. and Gabre-Madhin E. (2006) found that large transactional costs for traders, who must travel extensively to buy farm products, raises the costs for buyers and reduces prices farmers receive, limiting their growth. • Aku et al. (2018) Effect of market access provided by farmer organizations on smallholder vegetable farmer's income in Tanzania - farmers linked to farmers organizations increased profits and reduced transportation costs.	Yes
Financial literacy/ access to credit	• Chithumba model- alternative finance mechanism implemented by the Agricultural Commodity Exchange for Africa (ACE) and launched in Malawi in 2015 • Financial Access for Rural Markets, Smallholders and Enterprise Programme (FARMSE), Government of Malawi country-wide program, 2017	No
Farmer knowledge of market info	• Farmer business schools (FBS) program (Chilemba and Ragasa 2019) - little to no impact reported. • Mobile phone-based market information services (MIS) Chikuni and Kilima (2019) - subscription did not significantly increase probability of participating in the market. The study found that above average maize yield, literacy, access to credit, and farm size are significantly associated with the probability to participate in maize markets. • Ochieng et al., (2020) IFPRI research experiment in central Malawi found that providing price info to farmers and traders had no impact on quantity or price of maize sold through structured markets. • 92% of pigeon pea and chickpea farmers sell below the minimum farm gate price set by the government because their access to alternative markets is limited and volumes traded are low. They also report that knowing the price is not useful because buyers purchase commodity prior to the price announcement (Ochieng, 2019)	No
Transport	• Reduced translation costs for tobacco farmers closer to auction houses (Wouter Z. 2019) - 10 percent reduction in distance to the auction house increases crop area and production around 4 and 10 per cent, respectively • Omiti J.M. Et al. (2009) - Distance from farm to point of sale is a major constraint to the intensity of market participation. Better output price and market information are key incentives for increased sales. Peri-urban farms consume less and sell more compared to rural. • Regional Network of Agricultural Policy Research Institutes - distance is a misleading indicator - access to productive assets and technologies, and the low efficiency with which limited productive assets are used prevent surpluses. Farmers prefer to sell at the gate for lower prices.	Yes
Storage facilities	• Reduced translation costs for tobacco farmers closer to auction houses (Wouter Z., 2019)	Yes
Farmers unions	• Negri M. and Porto G. 2008 (World Bank) Tobacco club membership causes an increase of between 40-74 percent in output per acre and an increase of between 45-89 percent in tobacco sales per acre • USAID (2012) funded milk bulking groups to improve quality and quantity of products in informal markets • INVEST Co-Op Malawi - Soya bean cooperative to aggregate products and negotiate better prices. Cooperative Development Association of Canada, MUSCCO, FUM	Yes
Reform commodity exchanges	• Suggested by academic advisor, Prof Patrick Kambewa during meetings Aug. 21 and Jacob Nyirongo, CEO of FUM on Sept 22. Impact is indirectly assessed through potential to increase the price received by farmers if COMEX function is improved. • There is evidence from India that improved management via consulting firms can generate significant value for inefficient enterprises over the short and long term (Bloom et al. 2013; Bloom et al. 2018).	Yes[2]
Quality control	• Njuki J. et al. (2007) found that accessing markets in Malawi requires upgrades in product quality, quantities, and business management • Anitha S. et al. (2019) Training programs for farmers on pre and post- harvest methods to reduce aflatoxin levels. Resulted in lower aflatoxin levels in sorghum and maize, but not groundnuts. Improved mulching but not grading practices • Msiska and Matumba (2018) Economic impacts of aflatoxin contamination in groundnuts	Yes

[2] Impact indirectly assessed through price gap data

Climate risk	• WFP and Oxfam America - Rural Resilience Initiative (R4) 2018. • Scottish Government's Climate Challenge Programme Malawi (CCPM) - agro-ecology approach, diversifying crops. • USAID - Wellness and Agriculture for Life's Advancement (WALA) project in southern Malawi 2009 - 2014. included training farmers in CSA (climate smart agriculture) practices to improve watershed restoration.	
Export bans and government policy	• Barrett (2008) reviewed studies on smallholder participation in staple food markets in eastern and southern Africa and found that volatile markets limit farm-level incentives to increase production and to generate surpluses for the market. • IFPRI 2016 Policy Note 24 - Have Market Policies Turned Malawi's Large Scale Farmers into Subsistence Maize Producers? Found that large farm operations only grow maize for their own consumption because of unprofitability and unpredictable government policy interventions • Diao X, Kennedy A, Mabiso A, and Pradesha A (2013). Economy Wide Impact of Maize Export Bans on Agricultural Growth and Household Welfare in Tanzania, IFPRI Discussion Paper 01287, Washington, DC. • Edelman, 2016 Discretionary Maize Policy Interventions in Malawi: An Impact Analysis of Export Bans and Minimum Farm Gate Prices	Yes

The selection of interventions to include in the feasibility analysis does not necessarily deny the importance of the other options, or suggest that they do not have impact.

Each option and its relevance to the feasibility study is discussed in more detail below.

Irrigation

Irrigation is not a priority for this research question because it is already being investigated through a separate, dedicated question in the Malawi Priorities series.

Storage

Increased storage capacity was not identified by local experts as a high priority. Currently, there is a surplus of underutilized storage facilities across the country. These are owned or leased by the two commodity exchanges and ADMARC. The issue does not, therefore, stem from lack of storage capacity, but rather from poor coordination between these entities and consequently barriers to accessing storage for smallholder farmers.

Cooperatives

Farmers cooperatives are useful as a means of organizing farmers to improve their access to credit, promote aggregation of products to improve bargaining power, and as a platform to provide training to farmers on improved agricultural practices. There is also a clear performance gap to be addressed, since less than 15 percent of households participate in either National Association of Smallholder Farmers (NASFAM) or Farmer's Union of Malawi (FUM) farmer's groups in the past year and among those communities with active farmer's groups, approximately half of the groups have been active for less than one year (FTF, 2013 Baseline Report).

However, when examining the quantifiable benefits of an intervention focused on promoting cooperatives or farmers groups, the evidence is not clear. Specifically, the main benefit of promoting cooperatives would be improving bargaining power and allowing farmers to realize better prices for their commodities, yet this removes profits from traders, who provide a service in the value chain by transporting goods to larger markets. Although cooperatives could serve as a platform for farmer training, an additional intervention to provide such service would still be necessary. This implies that cooperatives may not be the most effective method to address the barriers to accessing markets. However, we do recognize the importance of empowering farmers to sell at minimum farmgate prices, access training, and have better access to storage facilities, which would be goals of a cooperative arrangement. Furthermore, we believe that these issues would be addressed more in tandem with COMEX reform.

Provision of market information

Although programs designed to provide market information to farmers are addressing a very important issue - that most smallholder farmers continuously sell their products below minimum farm gate prices, usually to intermediary traders - there is no evidence of impact. Even after farmers are aware of market prices, they still sell below them. This is found repeatedly in the literature (Ochieng et al., 2020; Ochieng, 2019; Chikuni and Kilima, 2019).

The reasons for this phenomenon are due to poor access to alternative markets, low volumes of trade, and because buyers often purchase commodities before the price announcements when farmers are more desperate to sell their crops for household cash needs. As such, we would expect the benefit-cost ratio (BCR) for this intervention to be less than 1.

Transportation

Improved transportation could improve farmers' direct access to markets by increasing their time savings benefits. This is a priority

for the Ministry of Transportation, but not explicitly mentioned by the Ministry of Agriculture, nor was it prioritized by local experts and advisors. In addition, a number of CBA studies were conducted for the Ministry of Transportation in order to select the most appropriate transportation improvement scenario (Malawi Ministry of Transport, 2017). Transportation interventions are being considered under another research stream focusing on urbanization issues.

Quality standards

Improving quality standards of agricultural commodities is a high priority for Malawian institutions and local experts. There is evidence that better grading standards and certification would allow smallholder farmers to distinguish between different graded qualities and receive premiums for higher grades. Higher grade products would also be accepted by regional and international markets. In addition to the price benefits, there are also health benefits to improving grading practices; if more farmers are incentivized to produce higher quality products, aflatoxin levels decrease in maize and groundnuts, which are staple foods in Malawi and neighbouring countries.

This issue is very closely linked to the other agricultural-sector research question on how Malawi can export greater volumes of high value crops to countries with low-cost transportation links. By improving the domestic grading process, it creates more confidence in the quality of products being exported and enables key value chains, such as groundnuts and maize, to meet quality standards specified by different regional markets. Therefore, we believe that although it has great relevance to this research stream, it would be more appropriate to model its impact under the umbrella of the other research question.

Commodity exchange reform

Reform of the commodity exchanges in Malawi (ACE and AHCX), has emerged as a high priority for all local advisors and experts interviewed throughout the research process.

Currently, the two exchanges have differing policies related to quality control standards, warehouse receipts, and storage facilities. They operate inefficiently, and remain underutilized. Evidence to this is the significant share of the trade performed outside these two commodity exchanges. Farmers find it difficult and less profitable to go through the exchanges, and prefer to sell to traders at low prices. The largest buyer of maize in Malawi, the government, procures its maize through traders too.

The proposed intervention is to reform the commodity exchanges in a way that would incentivize:

- Maximizing the value that is paid to farmers - farmers are typically paid 75% of the minimum farm-gate prices for key commodities such as maize and soybeans (Baulch, B. et al, 2020);
- Minimizing the travel to storage facilities for farmers - reduced opportunity cost from travel to storage locations by merging of the two warehouse receipt systems so that farmers can access whatever storage facility is closest to them.

It is expected that such incentives will help the sector by:

- Increasing and standardizing the quality of end products - the two exchanges currently have different quality grading standard systems.
- Minimizing the storage times for farmers - reduce the storage fee cost for farmers.

Currently, the exchanges earn profit through storage fees. However, storage remains underutilized and creates disincentives for farmers. Instead, the exchange should earn profit by increasing the value of outputs, thereby incentivizing efficiency and quality.

The government could support the exchange reform by committing to purchase reserve stocks of maize through the exchange once certain milestones are met. The government can make these purchases while respecting the minimum farmgate prices. Finally, the government must allow farmers to use the nearest warehouse to their farm to reduce the transportation barrier. Such a reform would address multiple barriers currently facing smallholder farmers in a sustainable way.

Removal of export ban

The export ban on maize has been in place consistently since 2005, mostly from concern about national food security. However, Edelman et al. (2016) concluded that only 40% of the price fluctuations in maize were due to seasonal factors; 60% of the variation was due to a combination of long term price trends (inflation) and domestic policy, such as the export ban. This price volatility can lead to decreased commercial production of staple foods. Barrett (2008) reviewed studies on smallholder participation in staple food markets in eastern and southern Africa and found that volatile markets limit farm-level incentives to increase production and to generate surpluses for the market. In Malawi, only 17% of smallholder farmers sell maize at all, and only 10% are net-sellers of maize (Edelman et al, 2016). Aragie et al. (2018) also found that maize export bans in Malawi only benefit the urban non-poor, while poor farmers' incomes and maize consumption levels decline in the long run. Finally, the bans also deter farmers from diversifying away from tobacco, which is experiencing a decline in demand and sales (World Bank, 2020b).

Although the issue of export bans is very interesting from a policy perspective and has high potential to impact development outcomes, it is more aligned with the other agricultural research questions addressed through the Malawi Priorities project. As such, it is included in the "high value crops" research stream instead of under the access to markets one, though we recognize the overlapping relevance.

Selection criteria

The research team used a number of criteria to screen and select a subset of interventions to include in the feasibility analysis. These criteria have been applied to other CCC pre-feasibility research projects as well.

Sector expert priority: The intervention is identified by sector experts as important and relevant to local context. Experts can provide input through several channels: the Reference Group questionnaire, inferences from the NPC research agenda, the academic advisory group, and during individual interviews.

High benefit-cost ratio or cost-effectiveness in similar previous research: The purpose of the Malawi Priorities project is ultimately to identify interventions of outsized benefits relative to costs. Input into this factor is determined from the economics literature, particularly previous research conducted by the Copenhagen Consensus Center. In the Center's experience BCRs above 15 are among the highest across all interventions. Due consideration is given to contextual differences between previous research and the current situation in Malawi in determining the effect of this criterion.

Addresses a problem of sufficient size: some interventions could be considered highly effective but only address a small percentage of a given problem, limiting the overall net benefits of the approach. To avoid focusing on solutions that are too small, each intervention must have the potential to address a problem that is significant.

Significant gap in current levels of intervention coverage: all analysis conducted in Malawi Priorities focuses on marginal benefits and costs. Therefore if an intervention already has high coverage rates, then additional resources provided towards that intervention are unlikely to be effective, or will suffer from the 'small-size' problem.

Availability of crucial data or credible knowledge of impact: due to time and resource constraints, all analyses conducted by Malawi Priorities are based on secondary data. No primary research is conducted, such as field experiments or trials. Therefore, each intervention is constrained by the availability of data. In many cases, one key constraint is knowledge concerning the impact of a given intervention. It is typical to formally deal with uncertainty via sensitivity analyses. However, in some cases the uncertainty is so great that it precludes even researching the intervention at all.

Final selection

In order to identify the final subset of interventions to include in the feasibility analysis, we apply the selection criteria to each of the intervention options that were outlined in the previous section. This is summarized below, in Table 2.3.

Table 2.3: Selection of final interventions for inclusion in CBA

Intervention	Sector Expert Priority	High BCR or cost-effectiveness	Sufficient size	Gap in current coverage	Availability of data	Overall
Farmers cooperatives	High	Unknown	Yes	Yes	No	No
Increased storage	Low	Low	No	Yes	No	No
Improved grading standards	High	Yes	Yes	Yes	Yes	Yes
Irrigation	Low[3]	Yes	Yes	Yes	Yes	No
Improved transport	Medium	Yes	Yes	Yes	Yes	No
Provision of market price information	Medium	No	Yes	Yes	Yes	No
COMEX reform	High	Yes	Yes	Yes	Some	Yes
Export ban	High	Yes	Yes	Yes	Yes	Yes

The final intervention chosen for inclusion in the pre-feasibility study is reform of the two commodity exchanges in Malawi. The other high priority interventions are addressed in the high value crops research question.

[3] Already addressed through a separate research question

3. Cost-benefit analysis methodology

Cost-benefit analysis provides a way to assess which intervention options will result in the greatest impact at the most efficient cost, allowing policy makers and program managers to make informed decisions regarding their program models.

This section summarizes the methodology of a cost-benefit analysis (CBA) for the assessment of reforming the two commodity exchanges in order to increase access to formal markets for smallholder farmers.

General summary of the model

Malawi currently has two commodity exchanges; ACE and AHCX. The two exchanges have differing policies related to quality control standards, warehouse receipts, and storage facilities. They operate inefficiently and remain underutilized. They also do not perform a much-needed coordination role in local markets. The proposed intervention is to merge and reform the commodity exchanges in a way that would incentivize maximizing the value that is paid to farmers who access the COMEX.

Reform of Malawi's commodity exchange would include:

- Merging the two COMEX into one
- Specifying a number of performance benchmarks that the COMEX would have to meet in order for the government to purchase maize through the platform, thereby increasing volume of trade. Benchmarks would include:
    - Use standardized grading methods
    - Help farmers to form cooperatives (or other models) to operate at scale
    - Become financially independent

Reform of the commodity exchange is associated with the following costs and benefits:

- Cost 1: Management contract cost
- Cost 2: Outreach and training costs
- Cost 3: Grading and training costs
- Benefit 1: Increased revenue for farmers who can sell at min farmgate prices

This intervention would take place over a period of ten years, with a discount rate of 8%. The main beneficiaries would be smallholder farmers.

Some of the main assumptions are summarized in the table below.

Table 3.1: Key assumptions in the model

Assumption	Description
Main currency	Malawian Kwacha (MWK)
Other currencies	United States Dollar (USD)
Timeframe	10 years with two periods: Y1-Y5 - planning and management Y2 - Y10 - implementation
Discount rate	5%, 8%, and 14%
Portion of farmers using COMEX	0 - 25% which will be explored through a sensitivity analysis
Price received at farmgate per crop	Price data is provided by Baulch and Ochieng (2020), including standard deviation of price data distribution. The price data at 2±standard deviations will be explored in the sensitivity analysis

Benefits, costs, and stakeholders

Table 3.2: Benefits, Costs and Stakeholders

Impacts	Small holder farmers	COMEX	Government
B1 Increased value of commodities	✓		✓
C1 Management contract		✓	
C2 Monitoring and reporting		✓	
C3 Grading and training		✓	

CBA model specification

B1 Reduction in gap between 'actual' and minimum farmgate prices

A recent study by Baulch and Ochieng (2020) and Ochieng (2019) found a significant difference between the prices farmers receive for common crops at the farmgate, compared to the minimum farmgate price set by the government each season. The price differential is due to inefficiencies in the market structure, which makes it more time and cost-intensive for farmers to access COMEX storage facilities and markets. As a consequence, they prefer to sell their commodities to intermediary traders at lower prices.

With the reform, we expect more farmers to be able to sell their commodities at the advertised minimum farmgate prices.

The benefit is calculated by multiplying the minimum farmgate price per crop by the proportion of farmers receiving this price at point of sale by the average amount of crop sold. From this, you subtract the average actual farmgate price received by farmers multiplied by the average amount of crop sold by a farmer times the proportion of farmers not able to sell at minimum farmgate prices. This is also adjusted for the standard deviation in the actual price received by farmers at the farm gate by using a standard deviation multiplier. The multiplier allows us to adjust the formula for multiple crops in one equation, thereby allowing us to include it the sensitivity analysis. The result is the potential increase in crop sale profit that could be realized by farmers if they sold at the minimum farmgate price. This is multiplied by the quantity of the commodity produced each year and the proportion of the commodity expected to be sold through the COMEX each year.

Timeframe(s)

Implementation (Y3-Y10)

Inputs		Dimensions	Value	Unit	Source of verification
P_c^{min}	Minimum farmgate price for crop c set by government	Crop	Annex 1	MWK	Baulch and Ochieng, 2020
P_c^{actual}	Actual average farmgate price received by farmer for crop c	Crop	Annex 1	MWK	Baulch and Ochieng, 2020
SD^m	Standard deviation multiplier for actual farmgate price			#	
SD^{actual}	Standard deviation for actual farmgate price for crop c	Crop	Annex 1	MWK	Baulch and Ochieng, 2020
Q_c	Quantity of crop produced of crop c	Crop	Annex 1	Tonnes	Baulch and Ochieng, 2020
δ	Proportion of commodity sold through COMEX		10	%	Author's estimate

Calculation

Benefit:

$$B1_t^{farmer} = \sum_c \left\{\left[P_c^{min} - \left(P_c^{actual} + (SD^m \times SD^{actual})\right)\right] \times Q_c \times 1000\right\} \times \delta$$

C1 Management contract costs

One cost associated with the reform would come from hiring a management consulting firm for a period of five years to provide guidance and oversight throughout the merger process and to monitor performance against agreed upon financial and operational targets. Upon reaching agreed-upon targets, the Comex would receive certain benefits, such as the government using Comex for purchase of maize stocks, etc.

The management team would comprise two foreign experts and three national experts, who would provide legal, strategic and operational expertise in business matters.

Timeframe(s)

Planning and management (Y1-Y3)

Inputs		Dimensions	Value	Unit	Source of verification[4]
S^{rate}	Senior consultant rate per day		2,500	USD	Author's estimate
$S^{incidentals}$	Senior consultant cost per day in Malawi		200	USD	Author's estimate
D^{legal}	Consulting days on legal framework		15	#	Author's estimate
D^{ops}	Consulting days on business structure and operations		20	#	Author's estimate
T	Travel cost per trip to Malawi		3,500	USD	Author's estimate
M^{legal}	Days in Malawi for legal framework		5	#	Author's estimate
M^{ops}	Days in Malawi for business and operations		5	#	Author's estimate
N^{legal}	Number of trips for legal framework		3	#	Author's estimate
N^{ops}	Number of trips for business structure and operations		3	#	Author's estimate
MWK	Exchange rate USD to MWK		1:745		World Bank, 2020

Calculation

Cost: $C1_t^{COMEX} = (S^{rate}[(D^{legal} + D^{ops}) + T(N^{legal} + N^{ops}) + S^{incidentals}(M^{legal} + M^{ops})]) \times MWK$

C2 Outreach and training costs

One of the milestones that the COMEX reform would need to achieve is establishing better communication and outreach to farmers in order to educate them on the services offered by the COMEX, as well as to assist farmers in forming cooperatives or other types of farmer groups to aggregate their products to a sufficient volume for trade through the COMEX.

The outreach and training costs for the agricultural extension work that would be undertaken by the COMEX can be estimated by the impact evaluation and associate cost-effectiveness study of a village savings and loans program in Malawi by Ksoll et al. (2016). Ksoll et al. estimate the total program costs per year, then divide this by the number of program participants to determine the cost per member. Their cost per member is higher than the typical cost for such programs because of the need to use trained staff during implementation, rather than village agents. This makes it an appropriate conservative estimate.

The number of farmers trained per year for each year is the author's estimation. This value is also captured in the benefits side, through the parameter 'proportion of farmers trading through COMEX', which is included in the sensitivity analysis.

The cost is calculated by multiplying the cost per member in a farmer group training by the number of farmers and the exchange rate from USD to MWK.

[4] Implementation data, performance evaluation, or impact evaluation

Timeframe(s)
Implementation (Y3-Y10)

Inputs		Dimensions	Value	Unit	Source of verification[5]
MWK	Exchange rate USD to MWK	1:45		World Bank, 2020	Baulch and Ochieng, 2020
FG	Cost per member for farmers group trainings	75	USD	Ksoll et al., 2016	Baulch and Ochieng, 2020
$N^{farmers}$	Number of farmers reached in training activities	300	#	Author's estimate	

Calculation

Cost:

$$C3_t = FG \times N^{farmers} \times MWK$$

C3 Grading technology costs

The cost can be estimated based on an existing project. The Standardization, Quality Assurance, Accreditation, Metrology Project (SQUAM), funded by the EU, which includes interventions aimed at improving MBS policy framework and capacity for verifying grading standards, provides a reasonable cost estimate. The authors also include a portion of the overall cost as the annual maintenance cost for the laboratory.

The cost is calculated by adding the cost per year of establishing the testing laboratory and the annual maintenance cost and multiplying it by the USD to MWK exchange rate.

Timeframe(s)
Planning and management (Y1-Y3) Implementation (Y3-Y10)

Inputs		Dimensions	Unit	Source of verification[6]
MWK	Exchange rate USD to MWK	1:45		World Bank, 2020
CL	Annual cost of establishing the aflatoxin testing laboratory	2,500,000	USD	USAID, 2019
CM	Annual maintenance cost of laboratory	100,000	USD	Author's estimate

Calculation

Cost:

$$C3_t = (CL + CM) \times MWK$$

[5] Implementation data, performance evaluation, or impact evaluation
[6] Implementation data, performance evaluation, or impact evaluation

4. Results and Conclusion

The results of the CBA clearly demonstrate that reforming Malawi's two commodity exchanges can generate significant benefits that greatly outweigh the potential costs.

Although the majority of Malawi's population rely on subsistence rain-fed agriculture for their livelihoods, there are multiple intersecting barriers preventing farmers from accessing formal markets, limiting their income and growth. Among these many barriers, the poor functioning of institutions, lack of quality control standards for key commodities, long distance and high cost of travel to markets and storage facilities, and difficulty farmers face in aggregating production emerged as some of the key gaps preventing market access.

This analysis has focused on improving the market coordination function of the commodity exchanges, while the other agriculture sector development question focused on the remaining barriers.

One of the overarching issues in market coordination and access is the poor functioning key institutions, including the unrealized potential of the commodity exchanges. Malawi currently has two commodity exchanges; ACE and AHCX. The two exchanges duplicate efforts, operate inefficiently, are currently poorly structured, and remain underutilized. For example, they have differing policies related to quality control standards, warehouse receipts, and storage facilities, and poor relationships with farmers. They also rely on storage fees for profit. However, farmers typically do not understand the warehouse receipt systems, do not produce enough volume to trade through the COMEX alone, and find it difficult and less profitable to use their services. The majority of trade is therefore performed outside of the commodity exchanges, even though it means farmers have to sell to traders at lower prices. In addition, the largest buyer of maize in Malawi, the government, also procures its maize through traders, rather than through the COMEX.

In order to improve the function of the commodity exchanges, the two institutions should ideally be merged into one. There is no other country in Africa that has multiple commodity exchanges, even in situations where market access and functions are strong. The resulting single commodity exchange would then have to be restructured to earn profit through increased value of outputs, thereby incentivizing efficiency and quality, rather than through storage fees.

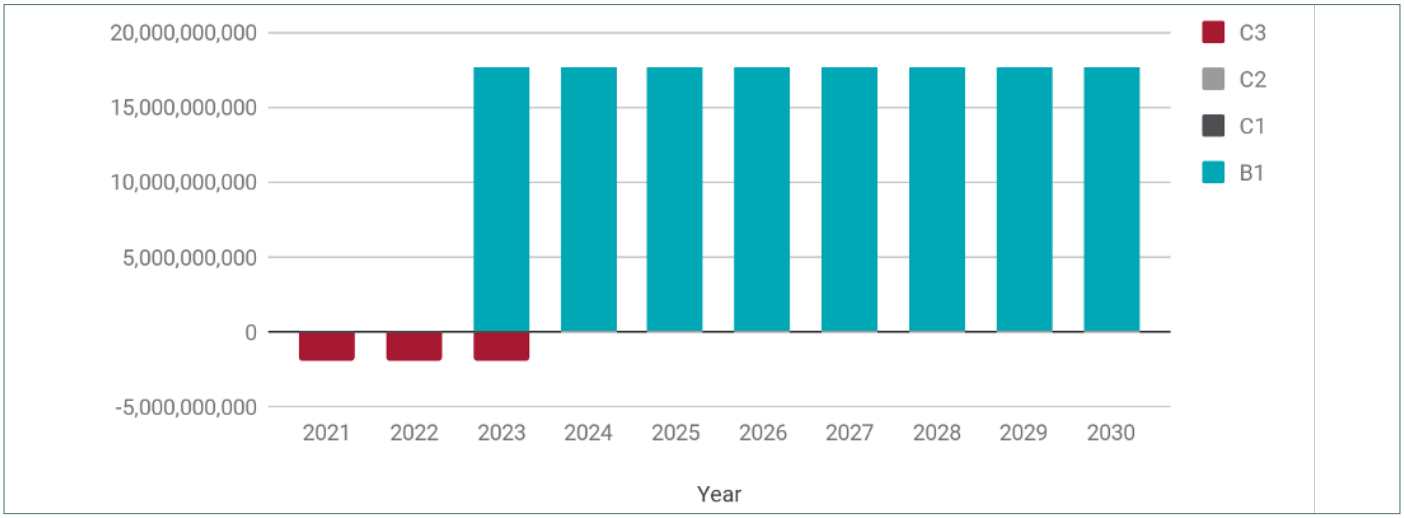
Therefore, the proposed intervention is to reform the commodity exchanges in a way that would incentivize good business practices and maximizing the value that is paid to farmers in order to achieve thicker trade volumes. Farmers are typically paid a fraction of the minimum farm-gate prices for key commodities such as maize and soybeans (Baulch, B. et al, 2020). This price difference reflects inefficiencies in the market, which would be addressed through the COMEX reform.

The government could support the exchange reform by committing to purchase reserve stocks of maize through the exchange once certain milestones are met. The government can make these purchases while respecting the minimum farmgate prices. Finally, the government must allow farmers to use the nearest warehouse to their farm to reduce the transportation barrier. Such a reform would address multiple barriers currently facing smallholder farmers in a sustainable way.

The primary benefit examined in this model is the increased price paid to farmers for their agricultural commodities. Farmers are typically paid well below the minimum farmgate price for their crops when they sell directly to traders at the farmgate. By trading through the COMEX, farmers would receive the minimum farmgate price instead.

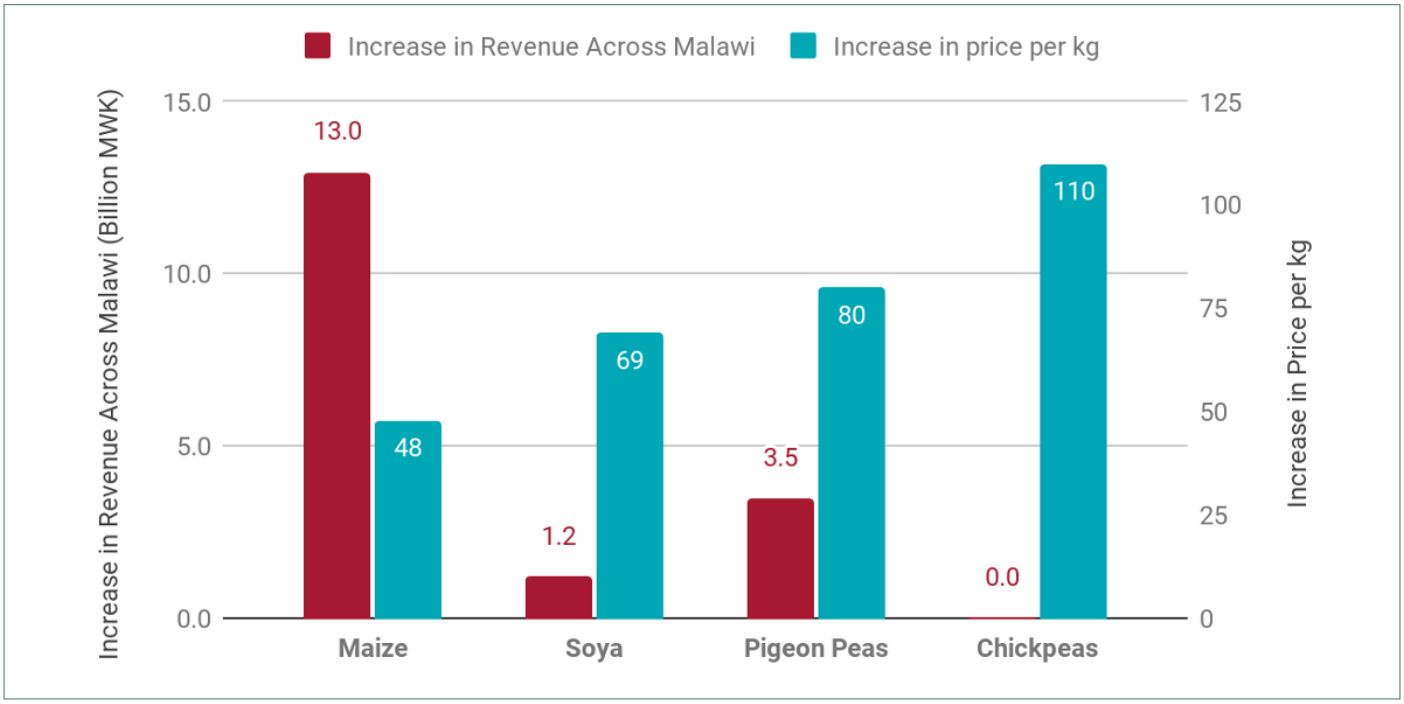
The cost parameters are estimated based on conservative estimates of the cost to reform the policies and business practices for the COMEX. There is some uncertainty around cost estimates because there are no commodity exchange reform interventions that provide reasonable comparisons or benchmarks. However, this is explored in the sensitivity analysis.

Figure 4.1: Summary of results for COMEX reform CBA



In the figure below, the main benefit is disaggregated by crop type. It depicts the total increase in farmer revenue across Malawi, as well as the increase in price per kilogram of crop.

Figure 4.2: Disaggregation of benefit by crop type, assuming 10% is traded through the COMEX



Sensitivity analysis

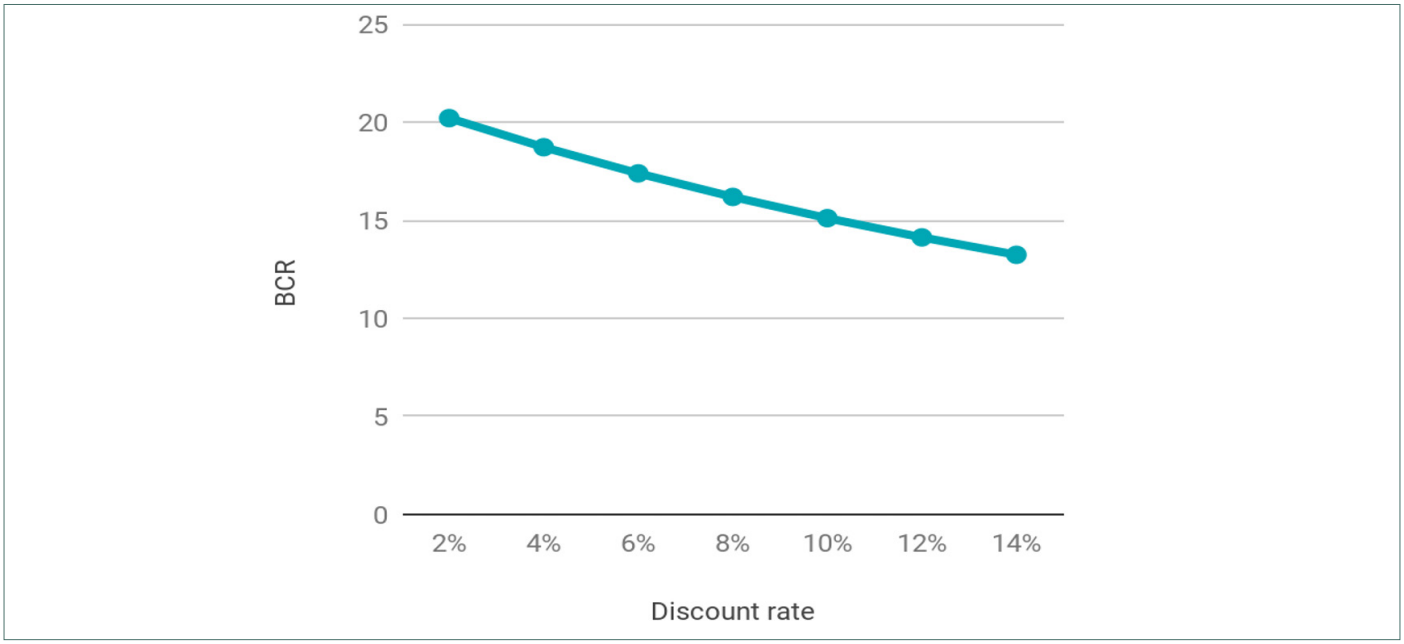
In order to identify which assumptions are the most critical to the success of each intervention, the team has conducted some basic sensitivity analyses. The following tables report the BCR when alternative input values are assumed for key parameters.

The first parameter we explore is the discount rate. As a default, the model uses a 8% discount rate, for which the BCR is 16. We find that the BCR remains well above 0 despite changes in the discount rate (at 5% and 14%).

Table 4.1: Sensitivity analysis for discount rate

	Discount rate		
Discount rate	5%	8%	14%
Benefit Cost Ratio	18	16	13

Figure 4.3: Change in BCR by discount rate



Baulch, B. et al. (2020) conducted a study that measured the gap between the actual price farmers receive when they sell their crops at the farmgate, compared to the minimum farmgate price set by the government each season. The actual farmgate price was consistently below the minimum standard across various crops. However, depending on the crop, there is a wide distribution of prices received by farmers.

The analysis has included the change in standard deviation as a way of conducting sensitivity analysis on all prices for all crops while maintaining different prices for each crop. This allows the study to acknowledge the variation in the standard deviations, rather than assuming that all crops are subject to the same level of absolute volatility. The standard deviation multiplier allows us to look at what will happen to the BCR if we change the price gap. The BCR remains above zero across most price gap scenarios.

Table 4.2: Sensitivity analysis for actual farmgate price received

	Actual Farmgate Price (with discount rate @8%)				
SD Multiplier	-2	-1	0	1	2
Benefit Cost Ratio	42	29	16	4	-9

Finally, the analysis considered how the BCR would be affected by the percentage of agricultural production that is traded through the COMEX, recognizing that many farmers will likely continue to rely on intermediary traders, but that through training and outreach, the COMEX could attract thicker trade from farmers over time.

The sensitivity analysis finds that even if the COMEX can only attract a small portion of total agricultural trade, the benefits would still be positive. Over time, if the COMEX could increase the amount of trade, the BCR would increase exponentially.

Table 4.3: Sensitivity analysis for portion of commodities sold through COMEX

	Portion of commodity sold through COMEX (with discount rate @8%)				
Parameter value	1%	5%	10%	15%	25%
Benefit Cost Ratio	2	5	16	25	42

Despite the uncertainty on the cost of the reform, the analysis clearly demonstrates that reforming the COMEX could result in significant benefits. These benefits are primarily accrued to small holder farmers who can increase their profit by receiving proper prices for their crops. Furthermore, the benefits will increase if the COMEX can successfully work with farmers to increase the portion of production traded through the exchange, regardless of discount rate.

Limitations

There are a number of limitations to this analysis. First, the model would benefit from having more accurate data on some of the key assumptions, such as the portion of crops that would be sold through the COMEX if functions improved, as well as the cost of merging the two current COMEX and the subsequent management reform. To accommodate these uncertainties, the research team has provided conservative estimates of these figures and conducted a sensitivity analysis to explore how the BCR is affected by different scenarios and assumptions. Secondly, the results of the model are presented as an average country-level impact, however a regionalized analysis would provide a more accurate picture of how benefits are distributed.

5. References

- Aku et al. 2018. Effect of market access provided by farmer organizations on smallholder vegetable farmer's income in Tanzania. Cogent Food & Agriculture. 4. 10.1080/23311932.2018.1560596.
- Aragie A, Pauw K, and Pernechele V. 2016. Achieving Food Security and Industrial Development in Malawi: Are Export Restrictions the Solution? Rome: FAO.
- Atlas of Economic Complexity, 2018. The Atlas of Economic Complexity by @HarvardGrwthLab. atlas.cid.harvard.edu/countries/152.
- Anitha S et al. 2019. Knowledge, Attitude and Practice of Malawian Farmers on Pre- and Post-Harvest Crop Management to Mitigate Aflatoxin Contamination in Groundnut, Maize andSorghum—Implication for Behavioral Change. Toxins. 11:716.
- Barrett C. 2008. Smallholder market participation: Concepts and evidence from eastern and southern Africa. Food Policy 33: 299–317.
- Baulch B and Botha R. 2020. Can a maize price band work in Malawi? MaSSP Policy Note 38. Washington, DC: International Food Policy Research Institute (IFPRI).
- Baulch B and Ochieng D. 2020. Most Malawian maize and soybean farmers sell below official minimum farmgate prices. MaSSP Project Note August 2020. Washington, DC: International Food Policy Research Institute (IFPRI).
- Baulch B, Gross A, Nkhoma JC, Mtemwa C. 2019. Commodity exchanges and warehouse receipts in Malawi: Current status and their implications for the development of structured markets. MaSSP Policy Note 33. Washington, DC: International Food Policy Research Institute (IFPRI).
- Bloom, N., Eifert, B., Mahajan, A., McKenzie, D., & Roberts, J. (2013). Does management matter? Evidence from India. The Quarterly Journal of Economics, 128(1), 1-51.
- Bloom N., Mahajan A., McKenzie D and Roberts J, 2018, Do management interventions last? Evidence from India, working paper, Stanford University
- Campos F, Goldstein M and McKenzie D. 2019. The impacts of formal registration of businesses in Malawi, 3ie Impact Evaluation Report 96. New Delhi: International Initiative for Impact Evaluation (3ie). Available at: https://doi.org/10.23846/OW4IE96
- Chikuni T, Kilima FTM. 2019. Smallholder farmers' market participation and mobile phone-based market information services in Lilongwe, Malawi. E J Info Sys Dev Countries; 85:e12097. https://doi.org/10.1002/isd2.12097
- Chilemba J, and Ragasa C. 2019. The Impact on Farmer Incomes of a Nationwide Scaling Up of the Farmer Business School Program: Lessons and Insights from Central Malawi. The European Journal of Development Research, Vol. 32:4: 906–938, doi:10.1057/s41287-019-00246-y.
- Diao X, Kennedy A, Mabiso A, Pradesha, A. 2013. Economy Wide Impact of Maize Export Bans on Agricultural Growth and Household Welfare in Tanzania: A Dynamic Computable General Equilibrium Model Analysis. IFPRI Discussion Paper 01287, Available at SSRN: https://ssrn.com/abstract=2343157 or http://dx.doi.org/10.2139/ssrn.2343157
- Edelman et al. 2016. Have Market Policies Turned Malawi's Large-Scale Farmers into Subsistence Maize Producers? Policy Brief, IFPRI.
- Fafchamps M and Gabre-Madhin E. 2001. Agricultural markets in Benin and Malawi : the operation and performance of traders. The World Bank, Policy Research Working Paper Series.
- FAO, 2015. Country Fact Sheet on Food and Agricultural Policy Trends.
- Feed the Future. 2013. Feed the Future Malawi Zone of Influence Baseline Report. Rockville, MD: Westat.
- Feed the Future. 2016. A Spatial Examination of Agricultural Land Use Potential in Malawi: An agricultural zonation scheme for Malawi for agricultural planning purposes. Presentation at Malawi Land Symposium, Lilongwe. April 2016.
- Ferris S. et al. 2014. Linking Smallholder Farmers to Markets and the Implications for Extension and Advisory Services. MEAS Discussion Paper 4
- FEWS NET. 2018. Malawi Enhanced Market Analysis. Washington, DC: FEWS NET.
- GIZ and AGRA, 2018. Strengthening Structured Markets in Malawi Securing Sustainable Markets for Farmers: Workshop Report. Bingu International Conference Center, Lilongwe, 28/08/2018
- Ksoll et al. 2016. Impact of Village Savings and Loan Associations: Evidence from a cluster randomized trial. Journal of Development Economics, Vol 120: 70-85.

- Msiska F and Matumba L. 2018. Economic Impact Assessment and Management of Aflatoxin in Malawi. Final report for Ministry of Agriculture, Irrigation and Water Development, Ministry of Trade and Industry, Ministry of Health and African Union-PACA Secretariat
- National Agricultural Investment Plan (NAIP): Prioritised and Coordinated Agricultural Transformation Plan for Malawi FY2017/18-2022/23, Ministry of Agriculture, Irrigation and Water Development, 2018.
- National Planning Commission (Malawi), 2020, Malawi's Vision 2063, National Planning Commission.
- Negri M, Porto G. 2008. Burley Tobacco Clubs in Malawi : Nonmarket Institutions for Exports. Policy Research Working Paper; No. 4561. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/6497 License: CC BY 3.0 IGO
- Njuki J, Kaaria S, Sanginga P, Magombo T. 2007. Empowering Communities through Market led Development: Community Agro-enterprise Experiences from Uganda and Malawi. Geography.
- Ochieng R. 2019. Report on a Pilot Study to Crowdsource Farm Gate Prices for Legumes in Southern Malawi. IFRPI
- Ochieng D, Botha R, Baulch B. (2020). Market Information and Access to Structured Markets by Small Farmers and Traders Evidence from an action research experiment in central Malawi.
- Omiti M. et al., 2009. Factors influencing the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. African Journal of Agricultural and Resource Economics, African Association of Agricultural Economists, Vol. 3(1): 1-26.
- UNESCO, 2020. World Heritage List: Lake Malawi National Park. https://whc.unesco.org/en/list/289/
- USAID, 2012. Dairy Development Alliance (MDDA) Final Report.
- USAID, 2018. Assessment of the Wellness and Agriculture for Life Advancement (WALA) Activity. IBTCI, VA.
- World Bank, 2017. Malawi Agricultural Commercialization Project: Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS).
- World Bank, 2018. Malawi - Systematic Country Diagnostic: Breaking the Cycle of Low Growth and Slow Poverty Reduction. Report No. 132785.
- World Bank, 2020. The World Bank in Malawi: Overview. www.worldbank.org/en/country/malawi/overview.
- World Bank, 2020b. Malawi Economic Monitor: From Crisis Response to Strong Recovery. July 2020.
- World Food Program, 2018. R4 Rural Resilience Initiative. https://docs.wfp.org/api/documents/b9a3d33bd9974e5aaf01b11a3e3da410/download/
- Wouter Z. 2019. If smallholder farmers have access to the world market: the case of tobacco marketing in Malawi, European Review of Agricultural Economics, Vol. 47 (4): 1402–1437, https://doi.org/10.1093/erae/jbz039

Annex 1

Inputs - Crops						
Crop			**Maize**	**Soya**	**Pigeon Peas**	**Chickpeas**
Reference			[4]	[4]	[5]	[5]
Actual average farmgate price received by farmer per crop		MWK	152	231	250	200
Minimum farmgate price per crop per kg		MWK	200	300	330	310
Standard deviation in actual average farmgate price		SD	36	45	65	237
Quantity produced per year		Tonnes	2,697,959	175,475	434,792	1,786
Standard deviation multiplier	0	#				
References						
[4] Baulch and Ochieng, 2020						
[5] Ochieng, 2019						

2021

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