IFPRI

MYANMAR

STRATEGY SUPPORT PROGRAM | WORKING PAPER 46 DECEMBER 2023

Traders and Agri-Food Value Chain Resilience: The Case of Maize in Myanmar

USAID FROM THE AMERICAN PEOPLE

FEED THE FUTURE The U.S. Government's Global Hunger & Food Security Initiative

CONTENTS

TABLES

FIGURES

ABSTRACT

Myanmar has experienced a sequence of dire crises beginning in 2019 including the unexpected closure of a principal trade route, COVID-19 lockdowns and travel restrictions, and a military coup leading to years of disruptions in the banking and transport sectors, inflation, and conflict. Yet, through these cascading shocks Myanmar's maize sector experienced robust growth in production and exports. This paper examines the reasons underlying this apparent paradox and our findings contribute to the small but growing literatures on agri-food value chain (AVC) resilience and adaptation by traders. Strengthening the resilience of AVCs to shocks has important implications for welfare in developing countries and is increasingly drawing attention from policymakers and development partners. Using data from several sources including rare panel data sets of traders and farmers, and key informant interviews, we show that crop traders have been critical to the resilience of the maize value chain in Myanmar during this turbulent period. Maize traders performed three key functions contributing to resilience: (i) market discovery when primary trade routes were closed; (ii) overcoming transportation disruptions and bank closures to move maize from the farmgate to local and export markets; (iii) maintaining flows of credit to farmers throughout the crises in the form of selling inputs on credit and lending cash, thereby injecting much needed liquidity at times of incredible uncertainty, disruptions in the banking sector, and rising input prices.

Keywords: agri-food value chains, traders, conflict, resilience, maize, Myanmar

1. INTRODUCTION

Myanmar's maize sector has experienced a sequence of dire crises beginning in 2019 causing overlapping and cascading shockwaves throughout its economy. The first in 2019 was a trade shock from the unexpected closure of a principal export route that lasted for several years. Then came the COVID-19 crisis in early 2020 with subsequent policy responses to curb disease transmission through movement restrictions and lockdowns. On the heels of the second wave of COVID-19 the military seized power in a coup in February 2021, leading to years of disruptions in the banking and transport sectors, inflation, and conflict, resulting in a dramatic decline in welfare, pushing more than half the population into poverty (Boughton et al. 2023). Yet, through these cascading shocks Myanmar's maize sector was able to overcome successive challenges and experienced robust growth in numbers of farms, production, and exports. This paper examines the reasons underlying this apparent paradox.

Myanmar's maize value chain – not unlike its other agri-food value chains (AVCs) - is complex, composed of long, interconnected, and international chains of actors contributing to the production, processing, and marketing. To comprehensively analyze shock responses and adaptations in such a complex sector, we draw from multiple data sources at different nodes in the value chain including a rare panel data set of about 80 domestic maize traders, a survey with more than 400 maize farmers, more than 30 key informant interviews, and secondary data on maize prices and export volumes. We analyze changes in the behavior of traders and other actors in the maize AVC during a period of rapid growth prior to 2019 and then during one of extreme political and economic turmoil from 2019 on. We find that all types of actors in the value chain were impacted by waves of successive shocks. But that traders, broadly defined as AVC intermediaries involved in crop arbitrage, including agents, brokers, wholesalers, and exporters,[1] are the source of much of the sector's resilience, due to their role in market discovery, transport and finance, and credit.

Our findings contribute to the small but growing literature on AVC resilience and traders. The ways in which AVCs respond to shocks have important consequences for welfare – particularly in developing countries – and are increasingly drawing attention from policymakers and development partners (e.g., IFPRI, 2023). The effects of conflict on AVCs in particular is receiving increasing attention as there is a recent increase in conflicts globally (Lay, 2023). However, despite the significance of these challenges, our understanding of how AVCs navigate and adapt to these threats, including conflict remains limited (Bellemare et al., 2022). The literature on conflict impacts on AVCs has focused on farm production (Adelaja & George, 2019; Fjelde, 2015), and the literature on value chains more generally has often overlooked the 'hidden middle' actors, including crop intermediaries. But an emerging body of evidence points to their importance in AVCs (e.g., Barrett et al., 2022). Ksoll et al. (2021) analyze the impact of violence on Kenya's cut flower exporters and show significant disruptions that are mitigated by formal contractual agreements. Minten et al. (2023) look at the impacts of violence on domestic trade for a non-perishable crop – rice – in Myanmar and find that violence increased spatial arbitrage margins between millers and retailers. However, these two papers focus solely on spatial arbitrage and say little about other roles crop traders play in value chains, including informal credit provision to farmers.

[1] We use this broad definition of traders throughout the paper. Agents and brokers mediate crop sales and purchases, but do not themselves take possession of the maize. Wholesalers buy maize and sell again without any major processing.

This paper makes three contributions to the literature. First, we provide evidence of the role of the understudied, but important 'hidden middle' value chain nodes—e.g., crop traders and transporters—to AVC resilience to multiple shocks. We particularly explore the impacts of and responses to violence among AVC intermediaries. Second, we take a comprehensive view of maize trader roles and describe changes in intranational trade, exports, and credit provision to farmers through multiple shocks. Third, we analyze data from multiple sources – both qualitative and quantitative interviews, and secondary data – to deepen our insights and add important contextual detail that could not be achieved by either qualitative or quantitative data alone.

We show that Myanmar's maize sector exhibited remarkable resilience to multiple concurrent shocks. National maize production and export volumes continued to grow through the period of disruptions between 2019 and 2022 caused by trade barriers, conflict, and economic instability. At the farm level, use of inputs (e.g., chemical fertilizers) remained stable while adoption of mechanization services increased. Private maize traders provided three key functions contributing to resilience. First, traders led the way in market discovery when primary trade routes were closed, by creating informal trading routes that were later formalized. Second, traders – in coordination with logistic service providers – overcame significant transportation disruptions and bank closures to continue spatial arbitrage of maize from the farmgate through Myanmar en route to export markets. Relying on their networks, traders utilized the informal *hundi* payment system when banks closed, allowing maize trade to continue when bank transfers were not possible. Local marketing margins as a percentage of market prices held relatively stable through these disruptions. The third key role traders played was in the provision of credit to farmers in the form of inputs and cash, injecting much needed liquidity early in the monsoon season at times of incredible uncertainty and rising input prices.

This paper proceeds with a background on the Myanmar's maize sector during a period of rapid transition under a partly democratic government and multiple recent shocks. Section 3 describes our diverse data sources highlighting the relevant areas of information used from trader surveys, key informant interviews, maize farmer surveys, and secondary price and trade data. We present our results in Section 4 in two main sections. The first documents the high-level patterns in the maize sector in production, exports, prices, and trade and farm operations in the decade to 2022. The second set of results dives into the trader-level responses to recent shocks that have enabled resilience structured around three main periods of shocks: (1) shift from China border to Thai border (2019); (2) COVID-19 (2020); and (3) the military coup (2021). Section 5 concludes by distilling the patterns of results into messages about value chain resilience beyond Myanmar.

2. BACKGROUND

Agriculture has historically been a cornerstone of Myanmar's economy, contributing nearly ¼ of national GDP, employing more than 2/3rd of the rural population, and accounting for 1/3rd of national export earnings in 2021.[2] Myanmar's proximity to large economies, including land borders with India, China, and Thailand, provide market opportunities for the export of agricultural products and maize in particular. Myanmar also benefits from favorable land and water resources and diverse agro-ecologies.

Maize is Myanmar's second most important cereal crop after rice, accounting for 4.2 percent of total planted crop area, and about 15 percent of annual export value, making it one of the top ten agricultural export crops by value.[3] The maize sector's growth to prominence has been led by the private sector. Area planted to maize increased from near zero in the 1980's to more than 500,000 hectares in 2022. Maize production is mostly concentrated in Shan state due to its agroecological suitability, large population of smallholder farmers, and proximity to China, the primary market for Myanmar's maize for most of the past decade. Shan State occupied more than 50 percent of total harvested area and production volume in 2019.

Figure 1 shows the evolution of Myanmar's maize sector policies and key events from 1989 to 2023. Prior to 1988, the military government tightly controlled the agricultural economy with mandatory rice quota systems, non-transferable agricultural land use rights, and government-controlled markets and trade systems (Fujita and Okamoto, 2006). In 1988, a slow transformation towards a more market-based economy began, enabling foreign direct investment and regional trade in agricultural commodities. The transition permitted closer integration between Myanmar and its neighbors, and official maize exports to China began in 1989. The first major investments in maize came in circa 1993 with the arrival of Charoen Pokphand (CP) company, a global agro-industrial and food conglomerate headquartered in Thailand. CP's core businesses are animal feed and poultry production, but success in those areas necessitated broader investments in Myanmar's nascent maize sector. With CP's introduction of a hybrid maize seed variety in 1998 – produced by Myanmar farmers for CP under informal arrangements – the hybrid maize production system was introduced in Myanmar and concentrated geographically in the upland hills of Shan state.

The hybrid maize system, together with high regional market demand for maize spurred by rising incomes and increased demand for animal-sourced foods, enabled growth in the maize sector. Around the same time, Vietnam and Laos underwent similar growth trajectories, while Thailand's maize sector growth began sooner, but continued concurrently (Belton and Fang, 2022).

Continued economic evolution towards a more open market economy continued through the 1990s and 2000s (Okamoto, 2004), but the transition to democratic government starting in 2011 brought faster policy reforms favouring private sector growth and farmer freedom that continued through the partial democracy until 2021. The result was a rapid influx of foreign direct investment (FDI) to Myanmar's maize sector as other new-entrant foreign firms invested in livestock feed and farms.

Over the same period, informal exports to China increased as China's demand for maize for animal feed grew. Most trade occurred without formal trade agreements, and China would

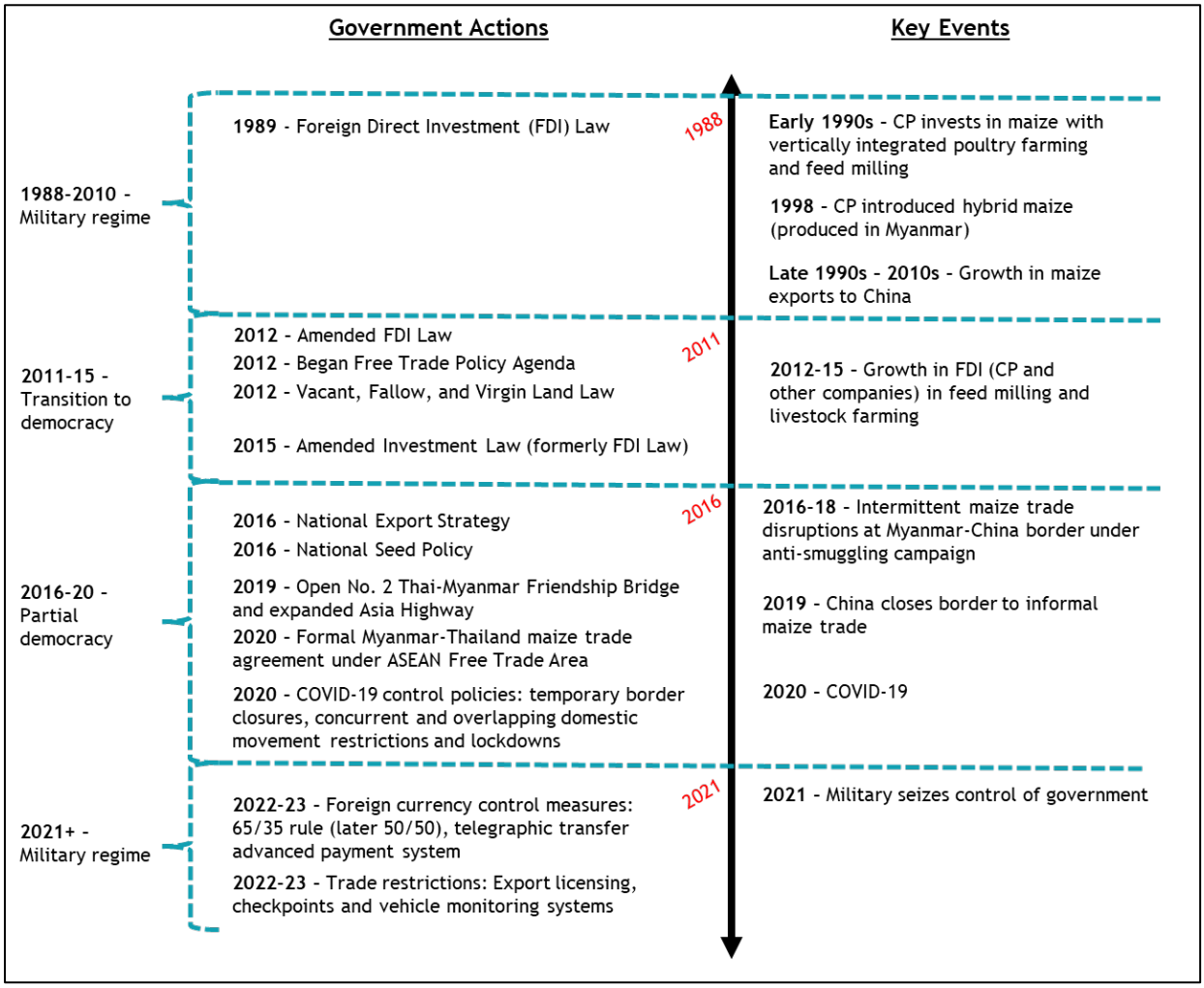
[2] Authors' calculations from government data.

[3] Authors' calculations from government data.

intermittently and temporarily halt maize imports from Myanmar. Infrastructure investments targeted lower costs of trade, most notably the expansion of the Asia Highway and the Thai-Myanmar Friendship Bridge completed in 2019 specifically for trade between the two countries.

Beginning in 2019, Myanmar's maize sector experienced a sequence of three seismic shocks. The first was a halt of maize exports to China. The trade bans were usually temporary, but in October 2019, China began an informal trade ban lasting for several years. The second major shock was the COVID-19 pandemic – and corresponding government policies to curb transmission – beginning in early 2020. The third major shock was a military coup in February 2021. We discuss these shocks and their impacts on the maize sector in detail below.

Figure 1. Timeline of policies and key events in Myanmar's maize sector, 1989-2023



3. METHODS AND DATA

Our analytical methods consist primarily of a set of descriptive analyses using a mix of qualitative and quantitative data from several sources to reconstruct the trajectory of Myanmar's maize VC during a turbulent period and to describe the resilience observed. To provide a broad and deep picture of Myanmar's maize sector through a turbulent decade, we utilize data from several sources in our analysis (Table 1).

The first source of data is panel interviews conducted by phone with a sample of domestic maize traders (wholesalers and brokers) in March 2021 and March 2023. A panel survey of traders is rare in any context but especially during a conflict. The sample of traders is constructed from a previous in-person study of the maize value chain designed to be representative of the sector in Myanmar's main maize producing region in southern Shan state. The survey instruments contained detailed information on business disruptions and how traders respond, including credit provision to farmers.

Table 1. Interviews by maize value chain level, N of interviews in parentheses

AFS level	Interviews
Upstream	Seed companies (5; KI) Tractor service providers (4; KI)
Farm	Maize farming households (474; Q)
Downstream	Domestic traders (wholesalers and brokers) (80; Q) Feed mills (3; KI) Poultry/Pig farms (4; KI) Exporters (12; KI)
Others	Myanmar Corn Industry Association (MCIA) (3; KI)

Notes: Q denotes quantitative surveys; KI denotes Key Informant interviews

Our second data source is a panel survey of maize farmers. The maize farmer sample was drawn from a listing of maize farmers in enumeration areas selected by the Department of Population designed to be representative of the southern Shan state. Shan state accounts for 50-70 percent of Myanmar's annual maize production. The sample was first interviewed following the 2021 season, then interviewed again in 2022 and 2023. The questionnaires included detailed production information as well as questions to better understand farmer relationships to traders.

Our third data source is a set of structured, qualitative interviews with key informants knowledgeable of Myanmar's maize sector, including 12 maize exporters and 3 interviews with officials in the Myanmar Corn Industry Association. The interviews were open-ended but structured to discuss the changes in maize businesses through the past decade and to document responses to the various shocks. In conjunction with the qualitative interviews and secondary data, the key informant interviews provide a more complete and deeper picture into maize sector resilience.

From each of these data sources we collected recall data for important practices and information that allow us to track the transition and modernization within the maize sector. Although recall data are imperfect, we try to provide reference points to respondents to help reduce bias and collect data at three points in time: 2012 (near the start of opening economy under the democratic government), 2019 (pre-COVID), and 2022/23 (contemporaneous).

Finally, we use secondary data on maize production, exports, and prices obtained from USDA publications, and government and key informant sources to document the overall patterns and trends through growth and shocks from 2012 to 2022.

4. RESULTS

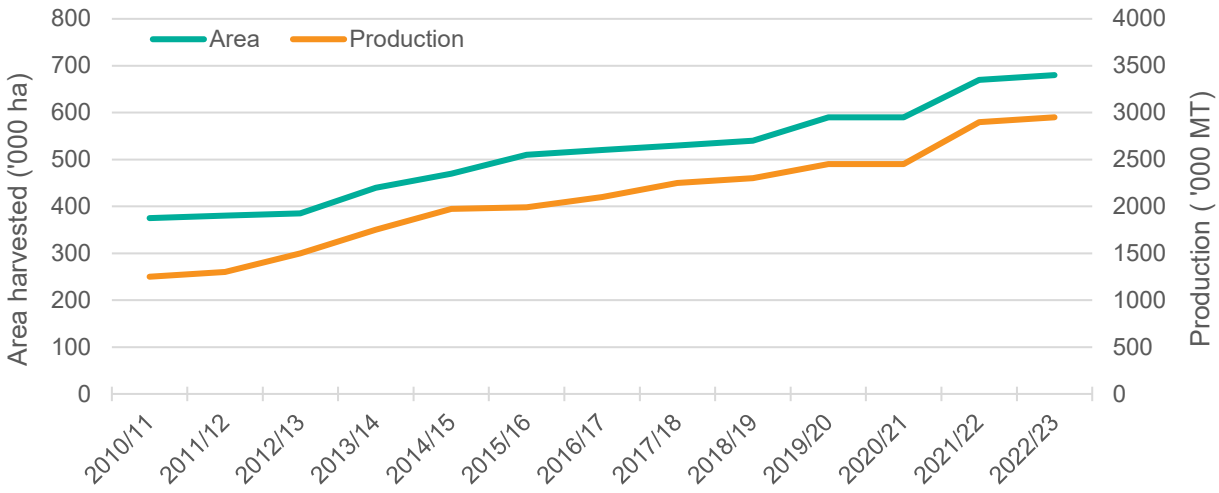
4.1 High-Level Patterns in Maize Agri-Food Value Chain

4.1.1 Liberalization and Modernization (2010-2018)

After opening the economy to trade and foreign direct investment under the partially democratic government, Myanmar's maize sector entered a period of sustained growth, driven by the ability to tap into global markets at a time of increasing maize prices. Estimates show steady increases in both maize production and area planted between 2010/11 and 2018/19 (Figure 2) with production increasing by 84 percent and acreage by 44 percent, implying yield growth of 28 percent over the period.

Key informants emphasized that the sector's growth after liberalization was largely driven by foreign direct investment. CP – a Thai agro-industrial firm – was at the forefront investing in maize production at the farm-level and supplying high quality seed varieties and inorganic fertilizers. CP built a vertically integrated business including maize input provision to farmers and buying maize harvests, and extending to feed and poultry production. Several Chinese, Southeast Asian and European companies followed, though CP remained the dominant player in the sector throughout the period of expansion.

Figure 2. National maize acreage and production, 2010/11-2022/23



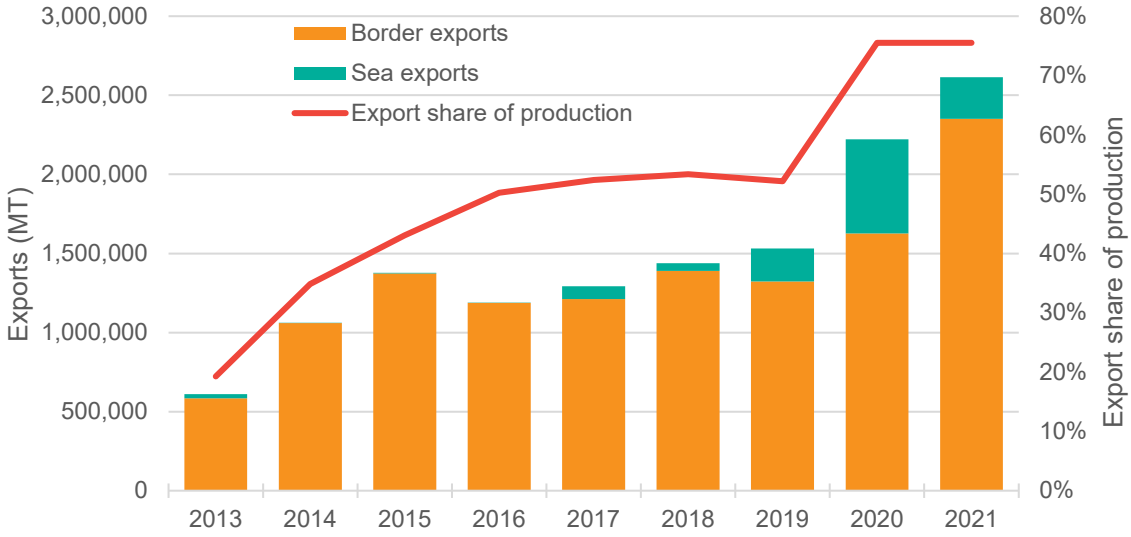
Source: USDA

The growth in maize production was partly driven by growing domestic demand for maize in animal feed production which grew by 25 percent and accounted for about half of all maize production from 2011 to 2019. While domestic demand was important, it was outpaced by exports which grew by 150 percent between 2013 and 2019 (Figure 3). The share of maize production that was exported grew rapidly from just 19 percent in 2013 to 50 percent in 2019.

Over that period, nearly all of Myanmar's maize exports were over land to China. The vast majority of this border trade was conducted informally (i.e., outside of the regulated and official

trade) through the trade zone near the Muse border. Myanmar's traders preferred informal trade to skirt China's high maize duties on formal maize imports. China tolerated the informal trade because it allowed them more flexible control over the incoming supply of maize than could be expected with more formal trade bilateral trade agreements. When domestic production was low, China would allow informal maize to flow in, thereby ensuring sufficient supply for their feed demands. In contrast, when production was high, China could simply crackdown on the informal maize imports from Myanmar with little to no political repercussions because the trade was already outside of the legal agreements. The informal system also provided China with some political leverage over Myanmar, as the maize sector was essentially dependent on the export market.

Figure 3. Export volumes by sea and land trade, 2013-2021



Source: Ministry of Commerce, USDA

The signs of a modernizing and structurally growing maize sector between 2012 and 2019 can also be seen at the farm and business levels. On the structural growth side, there was a large increase in farmers growing maize, with 89 percent of the sample of maize farmers interviewed in 2023 growing in 2019, compared to just 63 percent in 2012 (Table 2, Panel B). The growth in crop traders was more modest, though still significant with 76 percent of our sample interviewed in 2022 also trading in 2012. There was also an increase in the number of processors operating in the traders' townships, from an average 0.36 in 2012 to 1.03 in 2019. There appears to be strong clustering of processors with numbers increasing in a few townships as there was only a modest increase in the share of traders with at least one maize processor in their township from 16 to 21 percent over the same period. While the progression of rural processors likely has important implications for rural economies, most of the maize milling is located in urban areas outside of the production zones.

The modernization throughout the maize VC was striking. We see a dramatic rise in the use of modern inputs: purchased seed increased by 19 percentage points to nearly everyone using in 2019, signaling a near complete shift to hybrid maize production systems; urea and compound fertilizer adoption increased from about half of farmers in 2012 to about 70 percent in 2019; while pesticide adoption more than doubled from just 20 percent of farmers in 2012 to about 50 percent in 2019.

Mechanization increased rapidly as well. Four-wheel use increased from just 18 percent in 2012 to 46 percent in 2019 and two-wheel tractor adoption increased from 45 percent to 67 percent over the same period. Subsequently the use of animal traction for land preparation fell by 38 percentage points to just 7 percent. A large share of farmers (42 percent) had no 4-wheel tractor service providers in their area in 2012, but that share fell to just 13 percent by 2019. The use of mechanized threshers rose by about 50 percent (29 percentage points) to 89 percent adoption in 2019. Combine harvester use also increased but farmer use rates were still less than 10 percent in 2019.

Crop traders also had a rapid increase in machinery use between 2012 and 2019. Use of dryers increased from 5 to 29 percent, and moisture readers from 16 to 80 percent. This likely led to an increase in maize quality as the share of traders that grade maize into different quality groups increased by 12 percentage points to 89 percent in 2019. Cho and Belton (2019) also observed large increases in maize trader adoption of quality improving equipment and practices from 2013 to 2018.

Table 2. Maize sector evolution 2012, 2019, 2022

Panel A: Maize trade changes (N=80)			
Monsoon year	**2012**	**2019**	**2022**
Share trading maize	0.76	0.81	1.00
Change in credit lent to farmers since year			
Increase	0.59	0.46	
Decrease	0.22	0.35	
Change in credit taken in since year			
Increase	0.59	0.46	
Decrease	0.18	0.33	
Number of other local traders since year			
Increase	0.74	0.48	
Decrease	0.10	0.22	
Number of maize processors in township	0.36	1.03	0.80
Share with >=1 processor in township	0.16	0.21	0.14
Share grading maize into different qualities	0.77	0.89	0.87
Machine/equipment use			
Moisture reader	0.16	0.80	0.85
Dryer	0.05	0.29	0.24
Panel B: Maize farmer inputs and mechanization use (N=474)			
Monsoon year	**2012**	**2019**	**2022**
Share growing maize	0.63	0.89	1.00
Input use			
Purchased seed	0.79	0.98	0.99
Urea	0.51	0.70	0.67
Compound fertilizer	0.53	0.67	0.67
Insecticide	0.18	0.53	0.37
Herbicide	0.20	0.50	0.60
Land preparation method			
Tractor 4-wheel	0.18	0.46	0.56
Tractor 2-wheel	0.45	0.67	0.64
Animal traction	0.45	0.07	0.05
# of 4-wheel tractor service providers available, share			
None	0.42	0.13	0.06
Few (1-5)	0.53	0.70	0.70
More than 5	0.05	0.17	0.24
Use a thresher for harvesting	0.60	0.89	0.92

Source: Maize farmer survey 2023, Crop traders survey 2023.

4.1.2 Sustained Growth Through Multiple Shocks 2019-2022

Myanmar's maize sector displayed incredible resilience and growth between 2019 and 2022 despite the unprecedented sequential shocks of China's trade ban, COVID-19, and the coup, (discussed in detail below). Maize production and planted area both grew by about 25 percent over this period (Figure 2), and export volumes increased by more than 70 percent (Figure 3). The large increase in exported volumes reflects a steep decline in demand for maize by Myanmar's mills due to the country's protracted economic downturn from 2020 onwards, with surplus maize grain then redirected to exports. Lower incomes in Myanmar led to declines in consumer demand for poultry and widespread declines in poultry production (Fang et al., 2021). There were clear knock-on effects back to feed and maize demand. COVID-19 control measures also added frictions in the labor market and feed mills had a difficult time hiring laborers under the COVID-19 testing requirements and movement restrictions. As a result, Myanmar's consumption of maize – about 90 percent of which is for animal feed – fell significantly in 2020. USDA estimated a domestic maize demand reduction by 50 percent with the share of Myanmar's total maize production used domestically falling to just 23 percent, but key informants estimated a domestic feed sector contraction of 20-30 percent.

Farm-level data shows that average maize area planted increased, but with a statistically significant decline in average yields (Table 3). The yield declines are a result of a slight decline in input use (Table 2) linked to rising costs stemming from the Russia-Ukraine war. Urea prices increased by about 50 percent in 2021 and the share of maize farmers using urea dropped by 3 percentage points while use rates per farmer declined by about 6 percent. Compound use rates were flat, and insecticide use dropped by 16 points to 37 percent.

However, the multiple shocks did not slow the expansion of labor-saving technologies, including mechanization. Herbicide adoption – saving labor from hand weeding – increased from 50 to 60 percent of maize farmers between 2019 and 2022. Adoption of 4-wheel tractors for land preparation increased from 46 percent in 2019 to 56 percent in 2022. The share of maize farmers with access to more than five service providers for 4-wheel tractor plowing increased to almost 24 percent while the share with no access declined to just 6 percent by 2022.

Over the period from 2019 to 2022 there was a large increase in agricultural credit taken in by maize farmers. Credit has long been important to maize farmers as a way to finance hybrid seed and fertilizers, with half of the farmers taking some credit for inputs in 2019. Somewhat surprisingly, credit to maize farmers increased markedly in 2022 when 72 percent of farmers took credit and the average value of credit taken per acre of maize nearly doubled. It is not surprising, with rising input costs, that farmer demand for credit increased, but it is surprising that with all the shocks farmers were able to find creditors. Interestingly, the sources of farmer credit changed between 2019 and 2022 with a particularly large increase in informal credit from family and friends – 25 percent in 2022 compared to 9 percent in 2019.

Still, traders are the most important credit source for maize farmers by a wide margin. They provide credit as cash and in-kind, sometimes on an output-tied basis, to secure harvested maize grain from the farmers they sell the inputs to. Yet, many of the credit agreements from the farmer side are to repay credit with interest, not necessarily on guarantee for maize sales. From the trader side, a majority of the credit lent to farmers have no contract, and formal written contracts account for less than 5 percent of all credit provision.

Interest rates for credit lent to farmers held largely unchanged between 2019 and 2022 at about 3 percent per month. Just under half of traders reported an increase in lending to farmers or borrowing for their business from 2019 to 2022. However, there is considerable heterogeneity in trader lending and credit access as about one-third of traders reported declines in lending or borrowing.

Nevertheless, maize traders are much more likely than those in other crops to provide credit to farmers. Calculations from a broader sample of traders show that 80 percent of maize traders provided at least some credit to farmers in the 2022 monsoon season, compared to 46 percent of traders of all other crops, and conditional on providing credit, maize traders were more likely to increase the total value of credit lent in 2022 relative to 2021. The willingness of traders to provide credit reflects high rates of repayment by farmer over this period due to high maize prices, which rose after 2019, and jumped significantly in 2021 after the onset of the Russia-Ukraine war. Maize traders could provide credit to farmers and be relatively assured that they would be repaid.

Table 3. Maize acreage, yields and credit detail, 2019 and 2022

	2019	2022
Farm-level production (N=474)		
Area planted to maize (acres per farmer)	7.0	7.7
Yield (kg/acre)	1,790	1,695
Farmer credit detail (N=474)		
Share taking	0.50	0.72
Value (MMK/acre, conditional)	147,982	293,347
Sources of ag credit		
Trader	0.40	0.36
Green revolution fund (Mya Sein Yaung)	0.21	0.22
MADB	0.17	0.15
Microfinance Institution/ NGO	0.12	0.14
Relatives/Friend	0.09	0.25
Agricultural input suppliers	0.09	0.09
Private money lender	0.04	0.06
Department of Cooperatives	0.01	0.01
Credit received		
Cash	0.52	0.65
In-kind	0.40	0.24
Both	0.08	0.11
In-kind input received		
Seed	0.76	0.81
Urea	0.81	0.63
Compound	0.90	0.64
Credit agreement type		
Interest on cash or in-kind credit	0.84	0.84
Sell output/harvest to credit source	0.29	0.21
Trader credit provided to farmers (N=80)		
Share providing credit	0.56	0.80
Trader credit agreement types with farmers1		
None	0.68	0.64
Formal (written contract)	0.05	0.04
Informal (no contract)	0.29	0.33

1 credit includes both in-kind and cash.
2 is data from the crop traders survey.
Sources: Maize farmer survey 2023, Crop traders survey 2023.

Perhaps a second reason maize traders willingly provided credit to farmers was that competition in maize trade has remained strong since 2019. Of the traders in our sample active in 2022, 19 percent started trading after 2019, suggesting the presence of competition from new entrants into maize trading. Nearly half of the traders sample reported an increase in the number of other crop traders near them since 2019 and nearly three quarters reported an increase since 2012. Relatively few traders reported declines in competition. Equipment adoption results are mixed for traders. Moisture reader adoption increased modestly between 2019 and 2022, but dryer use declined, perhaps driven by the high costs of fuel in 2022. Further, the average number of maize processors operating in the trader's township declined since 2019, possibly reflecting a downturn in the domestic feed milling industry which key informants attribute to lower poultry demand and increased costs.

4.2 Trader Responses to Shocks

Having documented the resilience of the maize sector through a turbulent period from 2019 to 2022, we now discuss the impacts of the three main shocks and how farmers and traders responded, using details shared during key informant interviews, supported by our quantitative data.

4.2.1 China Export Shock & Pivot to Thailand (2018-19)

In late 2018, China unexpectedly closed its border with Myanmar to informal trade, thereby cutting off the route for nearly all of Myanmar's maize exports. Crop traders – mostly exporters, but also to a lesser degree domestic wholesalers and brokers – played a central role in adapting to this shock by orchestrating a hard pivot in maize border trade to Thailand. While the initial disruption caused by China's export ban was severe, its medium-term impact on annual aggregate exports proved to be minimal. Between 2019 and 2021, export volumes jumped by more than 70 percent while the share of maize production exported climbed from around 50 percent to 75 percent (Figure 2).

Until 2019, nearly all maize exports from Myanmar were over land to China, most of which was traded through the trade zone between Muse in Myanmar and Shwe Li in China.[4] A small portion of the border trade (less than 10 percent) was 'formal' with required licenses and documentations and exported with minimal tariffs under a special opium reduction program between Chinese and Myanmar governments. But all formal maize trade beyond the allowed quotas was subject to an import duty of 65 percent. Thus, most maize exports to China were 'informal' and smuggled across the boundary river from Myanmar to China, with consent of an ethnic armed organization acquired for a fee. Chinese authorities usually turned a blind eye to this trade, but would occasionally crack down and temporarily block informal trade.

However, in October 2019, China began a prolonged and near complete blockage of informal cross-border trade. No formal reason was given for this policy shift, but the timing coincided with an outbreak of African Swine Fever in China that led to a dramatic reduction in demand for corn for feed (Mason-D'Croz et al., 2020). Together with China's near record maize production in 2019, this situation led to a large reduction in China's maize import requirement (Lohmar 2023).

The trade cutoff came as a surprise to Myanmar's maize exporters, some of whom lost large shipments of maize which were confiscated at the border, costing them thousands of

[4] Trade diversified from the 105-mile trade zone to other border crossings in Muse township, including Man Win, Sin Phyu and Nan Daw, around 2017.

dollars. The period immediately following the closure was one of uncertainty with maize traders holding large volumes of maize in storage but having no immediately available market channels. The held supply was more than the domestic feed industry could absorb and there were no other established export channels.

Traders began exploring new markets. Thailand, Myanmar's neighbor to the East with a large poultry sector already requiring large quantities of maize imports, was a prime candidate. A few intrepid largescale traders traveled to Myawaddy (the Myanmar side of the main overland border crossing with Thailand) to establish trading partnerships and routes. At first, maize trade to Thailand was informal and limited, but as the routes became better established, more traders followed and large volumes of maize began to flow. According to our key informant interviews, many traders moved from the China border to Myawaddy to continue their maize trading business. Although they needed to find new connections and form new relationships to buyers, their knowledge of the business and connections to Myanmar's suppliers was strong enough to allow them to continue exporting.

In the Thai market, Myanmar's maize was competitively priced relative to other global suppliers because of its proximity, and imports by truck from Myanmar arrived much faster than sea freight from more distant countries. Recognizing the mutual benefits in the burgeoning trade and with established trade relationships through the ASEAN Free Trade Area (AFTA), Myanmar and Thailand quickly worked to facilitate maize trade through formal channels. A dedicated bridge for trade (the Myawaddy-Mae Sot Friendship Bridge) opened in 2019 which, together with other infrastructure improvements (e.g., the India-Myanmar-Thailand Trilateral Highway) enabled more fluid flow of maize to Thai markets. Thailand formalized maize imports with a no tariff maize import agreement with Myanmar from February to August each year. Ultimately, there was a near complete pivot in the flow of maize exports, with maize leaving Myanmar north to China before 2019, to a majority leaving east to Thailand from 2019 onwards (Figure 4).

Amazingly, overall export volumes increased after the pivot to Thailand. From our nine key informant interviews with exporters, average trade volumes declined by 17 percent between 2018 and 2019 while trade routes adjusted, but then rebounded over time growing by 7 percent and 9 percent in 2020 and 2021 (Appendix Table A1). The aggregate data show an even larger jump in exports by 45 percent in 2020 (Figure 3). This highlights the speed and success of traders in finding a new market. The increased export volumes also reflect the rapid adjustments traders made by routing excess maize to export markets as the domestic maize consumption in Myanmar had declined following the pandemic in 2020.

The trade shift is clearly seen in the relative maize price differences between Myanmar and the Thai and Chinese markets (Figure 5). Prior to China's cessation of imports, Myanmar's maize prices were slightly closer to China's. But in the eight months afterwards, price differences between Thailand and Myanmar fell by 60 percent, to below the Myanmar-China price differences. Statistical tests of the relationships in monthly price differences between Myanmar and China and Thailand confirm that Myanmar-China price relationships weakened after October 2019, while the Myanmar-Thai price relationships strengthened (Table 4). Simple correlations of contemporary price changes between Myanmar and China fell from 0.46 before the land border closure to 0.25 after, and the correlations between Myanmar and Thailand increase from 0.34 to 0.40 in the same periods.

Regression tests show that lagged price changes in China have a strong, positive, and significant association to Myanmar's price changes prior to the border closure, then a negative

and insignificant association afterwards. In Thailand the contemporaneous price changes have a significant relationship to Myanmar's price changes both before and after China's border closure, and the coefficient magnitude increased after the closure. The fact that Myanmar's price changes are more closely related to lagged price changes in China but contemporaneous price changes in Thailand reflects the relative transport times to reach the main maize consumption zones in both countries.

Figure 4. Maize trade flows, before and after October 2019

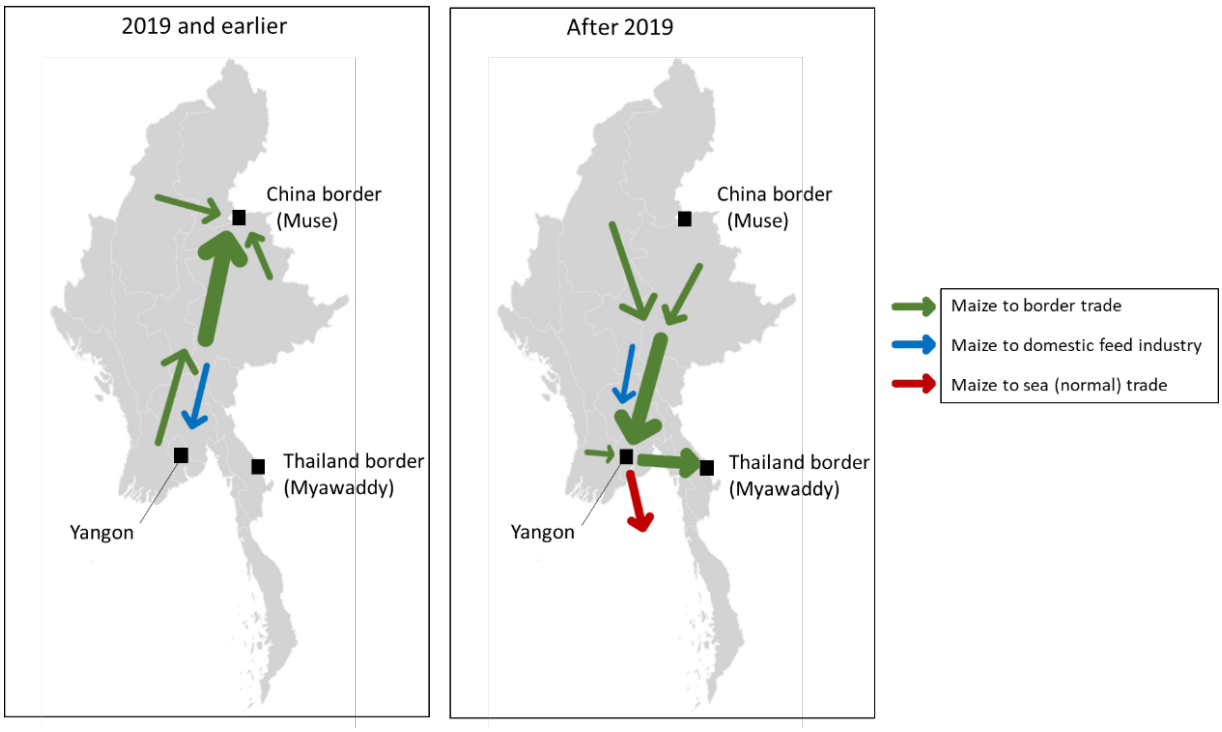
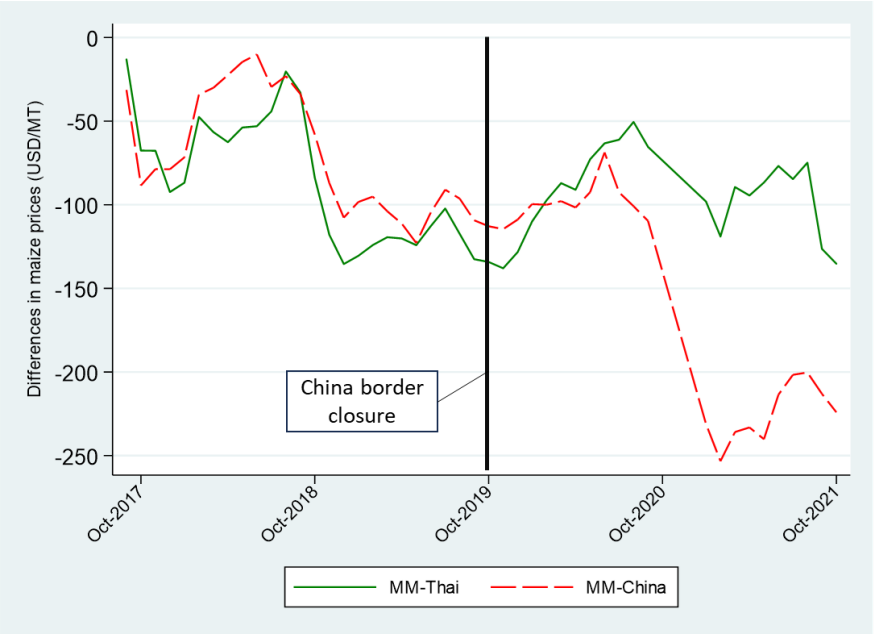


Figure 5. Monthly maize prices over time, Myanmar, China, and Thailand



Sources: Mandalay Commodity Exchange Center, World Food Programme

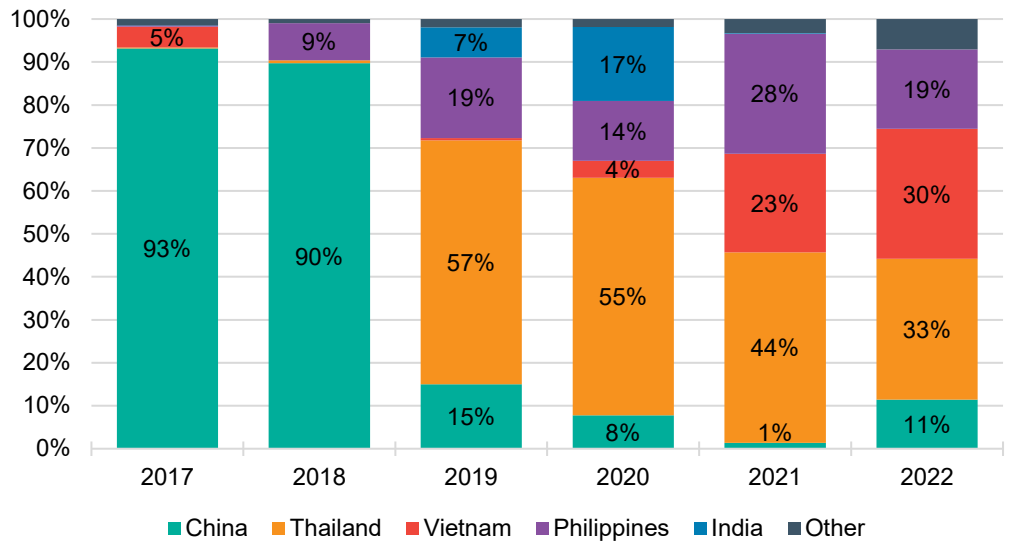
Table 4. Tests of relationships between monthly maize price changes in Myanmar and (i) China and (ii) Thailand, before and after China border closure

	(i) China		(ii) Thailand	
	Price change	Lagged price change	Price change	Lagged price change
Correlations				
Before China border closure	0.46	0.36	0.34	0.37
After China border closure	0.25	-0.05	0.40	0.12
Regression tests				
Before China border closure	0.28	0.57**	0.42***	0.13
After China border closure	0.28	-0.37	0.45***	0.20
Differences - before vs after	0.00	-0.94**	0.03	0.07

Regression tests are coefficient estimates for regressions estimated separately for Chinese and Thai price relationships. Each regression includes both contemporaneous and lagged price changes and interactions with a 'post' variable after the border closure, along with month fixed effects to control for seasonality. Significance levels: ** p<0.05; ***p<0.01.

Simultaneously with the pivot to border trade with Thailand, Myanmar began exporting maize by sea (Figure 6). This is primarily conducted by large multi-national companies exporting through Yangon to other southeast Asian countries. Ninety percent of all maize exports were to China in 2018, but China's receiving share fell to 15 percent in 2019 (before the October border closure). Thailand's receiving share went from less than 1 percent in 2017 and 2018 to 57 percent in 2019. As trade by sea increased, Thailand's share fell to one third of Myanmar's maize exports in 2022 with Vietnam receiving a similar share (30 percent) and the Philippines receiving 19 percent. As a result, Myanmar's maize trade is much more diversified in 2022 than it was in 2018.

Figure 6. Receiving country shares of Myanmar's maize exports, market years 2017-22



Source: UN Comtrade

4.2.2 COVID-19 (2020-21)

The COVID-19 pandemic struck in early 2020, less than one year after the shift in export channels. Myanmar, like many countries, implemented strict movement and business operation restrictions to limit the potential spread of the disease (Maredia et al. 2022). These restrictions were a major disruption to Myanmar's entire agri-food system including traders. Though AVCs showed early signs of resilience to these disruptions (Boughton et al. 2021). Maize and maize trading rebounded faster than other segments of Myanmar's food system.

Aggregate maize production and planted area plateaued in the first year of the pandemic, a slowdown from previous trajectories (Figure 2). Our farm-level data show small increases in average cultivated areas of maize and yields in 2020 relative to 2019. Although Myanmar imports a high percentage of its maize seed, fertilizers, and agrochemicals, these inputs were largely still available to maize farmers during the pandemic. Importantly, farmers were able to procure inputs despite lower incomes related to movement restrictions. The share of farmers taking credit increased from 50 percent in 2019 to 64 percent in 2020, and the size of loans taken by farmers also increased. Increased demand for farm credit in 2020 may have been driven partly by a decline in maize farming income as maize prices for the 2019 harvest were slightly below those in 2018 in part due to the trade shift. Declining off-farm income earning opportunities during the pandemic and lower input availability and higher transport costs may have also contributed to lower maize incomes. On the credit supply side, the Myanmar government released COVID-19 relief loans for agriculture through both the Myanmar Agricultural Development Bank and NGOs/MFIs intended to mitigate the effects of an anticipated economic downturn. Maize farmers more often received loans through NGOs/MFIs in part because land titles are a prerequisite for MADB loans and are uncommon among maize farmers. Yet, despite the relief lending, traders remained the leading source of farm credit through the pandemic.

Movement restrictions implemented to limit the potential spread of the disease had a particularly acute effect on crop traders whose core business is spatial arbitrage of commodities, resulting in widespread challenges in both buying and selling crops (Goeb et al. 2020). This complicated both domestic and international shipping. Logistic service providers and traders worked to finding paths through the overlapping movement restrictions. While many traders are often directly involved in the logistics when they arrange and contract the spatial arbitrage of maize, they often contract the transport of maize to third-party services who then transport the maize to buyers.

International maize trade was also disrupted by both China and Thailand officially closing their borders to all overland trade with Myanmar. China's border closed to formal trade for only two months (while informal trade was still curtailed) and trade to Thailand continued unofficially even during closures (Goeb et al., 2020). Perhaps in part because unofficial trade continued during the pandemic Thailand officially opened its border again to receive maize after only a few months, albeit with COVID testing and tighter controls. These control efforts combined with domestic travel restrictions layered at different administrative levels and unpredictably enforced, led to delays in maize orders arriving in Thailand, though still with shorter delivery times than sea trade. Traders increased cellphone use in coordinating sales to buyers and utilized online applications such as Facebook groups for prices and market information.

Key informants reported that the decline in domestic demand for maize during the pandemic only had minor impacts on maize marketing. As domestic maize trade for processing is routed through many of the same cities and markets as maize bound for export

markets, traders were able to rather seamlessly shift maize to export marketing channels once these were established.

4.2.3 Military Coup (2021-23)

Myanmar's economic downturn associated with the initial stages of the COVID-19 pandemic was worsened considerably by a military coup in February 2021. The period that followed was one of widespread and diverse shocks that compounded the disruptions from COVID-19. The initial public response to the coup was peaceful protests and employees in government or businesses with close ties to the military vacating their positions as part of the Civil Disobedience Movement (CDM). This led to a decline in public service provision to agriculture including farmer extension and financial services. With large shares of bank employees participating in the CDM, many banks closed their branch locations creating challenges for traders who, prior to the coup, used in-person bank transfers for a high share of their maize purchases and sales (Table 5).

Table 5. Maize trader payment methods, shares of all transactions before and after the coup

	Purchases		Sales	
	Before coup	After coup	Before coup	After coup
Cash (%)	50	66	31	49
In-person bank transfer (%)	44	5	58	5
Mobile payment (%)	5	6	8	7
Hundi (%)	1	24	3	40

Notes: 'Before coup' is January 2021; 'After coup' is March 2021. *Hundi* is an informal system of payments outside of formal banking. N = 27. Source: Crop Traders Survey March 2021 round.

Following the coup, traders made more payments in cash and dramatically increased their use of the *hundi* payment system, a transaction method outside of the formal banking system whereby payment is made by a third party with cash available, who is then repaid by the trader at a later date. For a small sample of maize traders, *hundi* payment shares for sales went from less than 3 percent in January 2021 to 40 percent in March 2021. The ability to quickly pivot payment mechanisms for maize enabled trade to continue after the coup and the use of *hundi* again reveals the resilience of traders through their ability to capitalize on their personal networks.

By 2022, many bank branches re-opened and in-person bank transactions resumed. However, traders reported persistently high demand for farm credit. Input prices increased dramatically due to international supply shocks caused by the Russia-Ukraine war. Yet, as mentioned earlier, traders were largely still able to provide credit to farmers and maintained their position as the most prominent maize farm credit source even during the coup and rising input prices in 2022. Informal credit from traders is increasingly important as foreign governments withdraw support for Myanmar's microfinance institutions (Zan, 2023).

Following the coup, there was also a sequence of disruptions causing overlapping obstacles to maize trade including domestic transport restrictions, rising fuel prices, and violent conflict (World Bank, 2022). Moreover, the military controlled Ministry of Commerce issued changes to export and import policies including strict licensing requirements in May 2023 (Naing, 2023). As with transport disruptions related to COVID-19, traders and logistics service providers worked through these obstacles to continue trading maize.

However, these disruptions caused transport costs, particularly by road, to increase sharply. Key informants reported a doubling of costs in domestic transport and several informal fees charged at check points controlled by the military or Ethnic Armed Organizations. The large traders we spoke to have detailed knowledge of the logistical challenges at every level and coordinate directly with transport service providers when challenges arrive. Even the agents that arrange purchases but are not directly responsible for the trade logistics know where and when fees are paid.

As a comparison to maize, in rice markets, both violence and transport costs and disruptions increased nominal domestic marketing margins (Minten et al. 2023). There was a similar increase in nominal marketing margins for maize. Marketing margins between southern Shan and Mandalay increased 2 to 4-fold between 2018 and 2023 (Table 6). However, when expressed as a percentage of market price, marketing margins are similar between the two years – ranging from 10-19 percent in 2022/23 and 11-17 percent in 2017/18 – indicating resilience in trading with traders not capturing a disproportionate share of the market prices despite the obstacles.

Table 6 also shows a large increase in maize prices between 2018 and 2023. Nominal prices increased following the coup, but the biggest increases came when global prices jumped after the onset of the Russia-Ukraine war in early 2022. The high maize prices enabled farmers to continue investing in high-priced inputs, but without the continued linkages to export markets enabled by traders, farmers would not have benefited from the rise in global prices.

Table 6. Maize prices and marketing margins

	Prices (MMK/viss)		Marketing margins	
Month	Farmer	Mandalay Market	MMK/viss	% of market price
2017/18				
Oct	339	382	43	11
Nov	354	403	49	12
Dec	367	417	49	12
Jan	392	472	80	17
2022/23				
Oct	795	986	191	19
Nov	898	1069	172	16
Dec	957	1065	108	10
Jan	1011	1156	145	13

Notes: Farm prices are all from Southern Shan State and reported only for months when >100 observations are available, covering ~80 percent of all maize sales.
Sources: SHARES 2019. Maize Farmer Survey 2023. Mandalay Commodity Exchange Center.

Yet, keeping the export channels open following the coup has not been straightforward. Key informants emphasized that the new normal following the coup is characterized by uncertainty and irregular challenges. Since 2022, the military has sporadically enforced the following policies: (i) required all exporters and importers to formally register their businesses and pay increased licensing fees, (ii) ceased issuance of new exporting and importing licenses, (iii) manipulated foreign currency exchange rates by mandating 'official' rates well below markets, (iv) required formal bank receipts for payment transfers for exports, and (v) implemented foreign currency rules where a large share (50-65 percent) of foreign exchange earnings must be converted to kyat at the official rate. These changes have been introduced without warning. Traders must accept delayed payments for exports to comply with foreign exchange regulations which consequently delays payments to farmers. Key informants told

us that smaller maize exporters have had to close their businesses and instead use their trading connections to operate as brokers negotiating maize exports to Thailand for a larger exporter with more capital and government registration and export license. The foreign exchange restrictions and the wide gap between the official and unofficial exchange rates has also incentivized large importing companies to enter the maize exporting business, seeking valuable foreign currency to pay for imports.

5. DISCUSSION AND CONCLUSION

The analysis above documents the remarkable resilience of Myanmar's maize sector in the face of multiple sequential and concurrent shocks and stresses. Maize production and exports underwent substantial growth during extremely testing conditions that impacted the value chains for some other agricultural commodities (e.g., melons, poultry) much more negatively. Data from our quantitative surveys with traders and farmers, along with key informant interviews, highlight the role crop traders played in this, enabling resilience by working around and overcoming multiple logistical and financial challenges including the closure of key trade routes, restrictions on mobility, lack of access to cash, farmer credit needs, and capricious government policies, often via informal or semi-formal means and through the mobilization of social capital. The problem-solving functions that traders play during times of crisis, and their centrality in maintaining supply chain resilience has rarely been acknowledged. Recognizing the role that traders play in keeping supply chains functioning during times of duress has significant policy implications beyond Myanmar.

In complement to the role of traders, there are three key insights from this paper with important implications for other AVCs and countries. First, the resilience of Myanmar's maize sector to what might have proven a catastrophic trade shock when its only international market for maize was suddenly closed is a function of the industry's success in rapidly diversifying export markets, first to Thailand overland, and then to a rapidly growing array of other trading partners in ASEAN and South Asia by sea. Search efforts were driven by traders themselves, without government or industry association support. Nevertheless, formal bodies established to proactively support producers and traders of other export dependent commodities could be helpful in facilitating preemptive export market diversification during non-crises periods.

Second, high commodity prices have maintained the growth of Myanmar’s maize sector. The prices of maize and agricultural inputs in Myanmar reflect the confluence of highly contingent local, regional, and global circumstances. High global maize prices in the wake of Russia's blockade of Ukrainian grain exports, and high demand for maize from animal feed manufacturing industries in ASEAN countries as they rebounded post-COVID-19, have kept maize farming viable even as input, transport, transaction and borrowing costs have risen. Without high global and regional prices for maize, and the ability to access those markets through export channels, Myanmar’s maize sector would not have demonstrated such robustness.

Third, the results here add further to the generalized finding emerging from the huge body of work on AVCs during COVID-19 that AVCs often proved more resilient to shocks than initially expected. This paper expands on that general conclusion with reference to a wider range of shocks over a longer period of time, and is perhaps unique in identifying traders, and their problem-solving roles, as the source of much of this resilience.

REFERENCES

Adelaja, A., & George, J. (2019). Effects of conflict on agriculture: Evidence from the Boko Haram insurgency. *World Development*, *117*, 184–195. https://doi.org/10.1016/j.worlddev.2019.01.010

Barrett, C. B., Reardon, T., Swinnen, J., & Zilberman, D. (2022). Agri-food value chain revolutions in low-and middle-income countries. *Journal of Economic Literature*, *60*(4), 1316-1377.

Belton, B., & Fang, P. (2022). Hybrid livelihoods: Maize and agrarian transformation in Southeast Asia's uplands. Journal of Rural Studies, 95, 521-532.

Bellemare, M. F., Bloem, J. R., & Lim, S. (2022). Producers, consumers, and value chains in low-and middle-income countries. In *Handbook of Agricultural Economics* (Vol. 6, pp. 4933-4996). Elsevier.

Boughton, D., Goeb, J., Lambrecht, I., Headey, D., Takeshima, H., Mahrt, K., Masias, I., Goudet, S., Ragasa, C., Maredia, M., Minten, B., Diao, X. (2021). Impacts of COVID-19 on agricultural production and food systems in late transforming Southeast Asia: The case of Myanmar, Agricultural Systems, 188, 103026

Boughton, D., Headey, D., Mahrt, K., Cho, A., Diao, X., Lambrecht, I., Minten, B., Goeb, J., Masias, I., Belton, B., Aung, N., & San, C. C. (2023). Double jeopardy: COVID-19, coup d'état and poverty in Myanmar. *Applied Economic Perspectives and Policy*, *45*(4), 1998–2016. https://doi.org/10.1002/aepp.13390

Cho, A., & Belton, B. (2019). Growth and transformation in off-farm segments of the maize value chain in Shan State. Feed the Future Innovation Lab for Food Security Policy Research Papers 303063, Michigan State University, Department of Agricultural, Food, and Resource Economics, Feed the Future Innovation Lab for Food Security (FSP).

Fang, P., Belton, B., Zhang, X., & Win, H. E. (2021). Impacts of COVID-19 on Myanmar's chicken and egg sector, with implications for the sustainable development goals. Agricultural Systems, 190, 103094.

Fjelde, H. (2015). Farming or Fighting? Agricultural Price Shocks and Civil War in Africa. *World Development*, *67*, 525–534. https://doi.org/10.1016/j.worlddev.2014.10.032

Fujita, K., & Okamoto, I. (2006). Agricultural policies and development of Myanmar's agricultural sector: an overview. *Discussion Papers*, *63*.

Goeb, J., Myint Zu, A, Zone, P. P., Synt, N.L.K., Boughton, D., and Maredia, M. (2020). Monitoring the impact of COVID-19 in Myanmar: Agricultural commodity traders - Synopsis of results from three survey rounds through early August 2020. Myanmar SSP Policy Note 32. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.134038

IFPRI. 2023. Global food policy report 2023: Rethinking food crisis responses. International Food Policy Research Institute, Washington, DC. https://doi.org/10.2499/9780896294417

Ksoll, C., Macchiavello, R., & Morjaria, A. (2021). Electoral violence and supply chain disruptions in Kenya's floriculture industry. In *GWU Africa Political Economy*. John Hopkins Carey.

Lay, T. (2023). *Escalating Violence and the Worsening Civilian Burden*. The Armed Conflict Location and Event Data Project (ACLED). https://acleddata.com/2023/01/31/global-disorder-2022-the-year-in-review/

Lohmar, B. (2023). Will China's Corn Imports Continue? *Choices*, *38*(3).

Maredia, M.K., Goeb, J., Ortega, D., Synt, N.L.K. & Zu, A.M. (2022). Preferences for COVID-19 Recovery Policies: Perspectives of Myanmar Agri-food System Participants. *Journal of the Agricultural and Applied Economics Association*. 1(3): 334-351. https://doi.org/10.1002/jaa2.30

Mason-D'Croz, D., Bogard, J. R., Herrero, M., Robinson, S., Sulser, T. B., Wiebe, K., Willenbockel, D., & Godfray, H. C. J. (2020). Modelling the global economic consequences of a major African swine fever outbreak in China. *Nature Food*, *1*(4), 221-228.

Minten, B., Goeb, J., Win, K. Z., & Zone, P. P. (2023). Agricultural value chains in a fragile state: The case of rice in Myanmar. *World Development*, *167*, 106244.

Naing, J. W. (2023, May). *CHANGES IN MYANMAR EXPORTER AND IMPORTER REGISTRATION PROCEDURES*. VDB-Loi. https://www.vdb-loi.com/mm_publications/changes-in-myanmar-exporter-and-importer-registration-procedures/

Okamoto, I. (2004). Agricultural Marketing Reform and Rural Economy in Myanmar The Successful Side of the Reform. World, 5(11.4), 1-1.

World Bank. (2022). *Transport and Logistics: Myanmar Infrastructure Monitoring*. Transport and Logistics: Myanmar Infrastructure Monitoring

Zan, H. H. (2023). Myanmar Junta Drives Largest Micro Lender out of Business. *Irrawaddy*. https://www.irrawaddy.com/news/burma/myanmar-junta-drives-largest-micro-lender-out-of-business.html

APPENDIX

Table A.1. Exporter maize trade volumes, 2018-2022

	2018	2019	2020	2021	2022
Year-over-year % change in mean traded volumes					
Moving sample (%)		-17	7	9	2
Common sample only 2018-22 (%)		-17	7	0	-2
Respondent-level quantities of maize trade (MT)					
R1		1,750			
R2		1,600	1,600	1,600	6,400
R3				1,000	1,000
R4	37,500	37,500	37,500	37,500	35,000
R5			5,000	15,000	15,000
R6	45,000	45,000	45,000	45,000	45,000
R7	5,000	5,000	5,000	5,000	5,000
R8	5,000	5,000	2,000	1,500	1,500
R9	25,000	5,000	15,000	15,000	15,000

Source: Key informant interviews. Blank cells indicated trade values not reported.

ACKNOWLEGEMENTS

This work was undertaken as part of the Myanmar Agricultural Policy Support Activity (MAPSA) led by the International Food Policy Research Institute (IFPRI) in partnership with Michigan State University (MSU). Funding support for this study was provided by the CGIAR Research Program on Policies, Institutions, and Markets (PIM), the United States Agency of International Development (USAID), and the Livelihoods and Food Security Fund (LIFT). This Policy Note has not gone through IFPRI's standard peer-review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect those of IFPRI, MSU, USAID, LIFT, or CGIAR.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
1201 Eye St, NW | Washington, DC 20005 USA
T. +1-202-862-5600 | F. +1-202-862-5606
ifpri@cgiar.org
www.ifpri.org | www.ifpri.info

IFPRI-MYANMAR
IFPRI-Myanmar@cgiar.org
www.myanmar.ifpri.info

The Myanmar Strategy Support Program (Myanmar SSP) is led by the International Food Policy Research Institute (IFPRI) in partnership with Michigan State University (MSU). Funding support for Myanmar SSP is provided by the CGIAR Research Program on Policies, Institutions, and Markets; the Livelihoods and Food Security Fund (LIFT); and the United States Agency for International Development (USAID). This publication has been prepared as an output of Myanmar SSP. It has not been independently peer reviewed. Any opinions expressed here belong to the author(s) and do not necessarily reflect those of IFPRI, MSU, LIFT, USAID, or CGIAR.