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Opportunities and constraints for production and income growth in rural Myanmar

Inter-regional variations in the composition of agriculture, livelihoods, and the rural economy

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ABSTRACT

This working paper synthesizes findings from four large household and community surveys in Myanmar, each covering a major agro-ecological zone, to evaluate inter-regional variations in the composition of agriculture, livelihoods, and the rural economy, and prospects for production and income growth. We find the following:

1. With the partial exception of paddy, most field crop production is strongly commercially oriented, and most farmers are well-integrated into markets.
2. Grain crops perform less well than elsewhere in Southeast Asia, suggesting the existence of large yield and income gaps. However, climatic variability may dissuade investments at what appear to be economically optimal levels of input use, and the highly unequal distribution of agricultural land means that most yield and income gains associated with improved agricultural technologies accrue to larger farms. Expansion of decentralized small-scale groundwater irrigation services may reduce agricultural risk and support intensification, particularly in the Dry Zone.
3. Production of higher value, more labor and input intensive crops, such as fish, poultry, and some fruits, has potential to create spillovers through employment linkages on-farm and upstream and downstream in value chains. There are numerous examples of farmers in Myanmar rapidly taking up production of new commercial crops that appear to offer an advantage. However, potential for agricultural diversification is highly contextually specific and can be risky.
4. Rural livelihoods are increasingly diversified. There is a positive association between landownership and income in all zones surveyed, but the most direct pathways to income growth and economic and social mobility often lie off-farm.
5. Migration has accelerated rapidly since 2011, reducing the availability of labor and bidding up rural wages. This has been advantageous for land-poor households who depend disproportionally on sales of labor for their income.
6. Economic reforms and investments in rural infrastructure and public services since 2011 have played a pivotal role in the emergence of an increasingly dynamic rural non-farm economy. Increasingly, there is a need for these to be accompanied by investments in human capacity development, expansion of social safety nets, and social protection to buffer against shocks, such as COVID-19, and to protect vulnerable people from being left behind.

1. INTRODUCTION

The regional context in which agriculture and rural livelihoods in Myanmar are embedded is diverse, varying widely in physical geography, climate, agrarian structure, infrastructure provision, institutions, and ethnicity. There are also many similarities that cut across the economic and social characteristics of each geographic zone and the processes that are shaping them. These include: low levels of agricultural productivity relative to other countries in the region in terms of both land and labor (World Bank 2016); poor, though rapidly improving, public infrastructure and services, including electricity, roads, schools, health services, and rural credit (Belton et al. 2017; Lambrecht and Belton 2018); low levels of diversification and capital in the rural non-farm economy; high levels of both international and domestic outmigration (World Bank and LIFT 2016; CHIME 2019); legacies of land confiscation and unresolved struggles over land rights and access (Mark and Belton 2020); and histories of ethno-political conflict (South 2009).

This complex context means that each administrative and geographical zone of the country confronts a different set of challenges and opportunities with respect to its prospects for agricultural and rural development. This working paper synthesizes analyses from four large household surveys, each covering a major agro-ecological zone, to evaluate inter-regional variations in the composition of agriculture, livelihoods, and the rural economy and prospects for production and income growth in each zone. The four zones examined are the Delta (Ayeyarwady and Yangon), the Dry Zone (Mandalay, Magway, Sagaing), the hills (represented by Southern Shan), and the coast (represented by Mon State).

The paper is organized as follows: In the next section we present a brief synopsis of the geography, history, and agroecology of each of the four zones. In the third section we provide a summary of the four surveys from which information presented in this working paper is drawn. In the fourth section, we examine and compare across the four zones: (1) infrastructure and public services; (2) landholdings and land tenure; (3) crops, farming systems, and agricultural performance; (4) off-farm work and the rural non-farm economy; and (5) rural income composition and wages. In the final section of the paper, we synthesize these findings to identify common and zone-specific challenges and opportunities to production and income growth on and off-farm and discuss openings for policy interventions and investments.

2. GEOGRAPHY, HISTORY, AND AGROECOLOGY

Myanmar is bisected from north to south by its largest river, the Ayeyarwady (Figure 1). The Dry Zone, a semi-arid area that lies along the river's middle course, was Myanmar's historical center of state power for many centuries. The Ayeyarwady Delta is located several hundred kilometers south of the Dry Zone and is a large expanse of low-lying alluvial land, crisscrossed by rivers and canals. The Delta was brought into agricultural production during the British colonial period to facilitate export-oriented paddy cultivation and continues today to be Myanmar's 'rice bowl'.

The lowland agricultural corridor running from the Dry Zone to the Delta is bordered to the west by the sparsely populated hills of Chin and Rakhine, which grade into a coastal plain adjoining the Bay of Bengal in Rakhine, and to the north and east by the tail end of the Himalayan foothills, which run from northern Sagaing, across Kachin and Shan, and down into Kayin and Kayah. This hilly territory is home to an extremely diverse array of ethnic groups and languages. Myanmar's southeastern border is formed by the coastal states of Mon and Tanintharyi, comprised of hills and a narrow coastal plain, and the islands of the Mergui archipelago.

Figure 1 Map of Myanmar

Source: Authors.

Farming in the Dry Zone is strongly commercially oriented, and all major crops yield a large market surplus (Belton and Filipski 2019). The two main official categories of farmland in Myanmar are rainfed upland ("*ya*") and flat, irrigable 'lowland' ("*le*"), officially designated as land for paddy cultivation. *Ya* accounts for approximately two-thirds of agricultural land in the Dry Zone and *le* comprises most of the remainder (Hein et al. 2017). Oilseeds and pulses (most importantly, sesame, groundnut, pigeon pea, chickpea, and green gram) are the dominant *ya* crops in the Dry Zone. *Le* is utilized mainly for paddy cultivation. Monsoon paddy is the main crop, with dry season paddy concentrated in a few townships (sub-districts) that have reliable year-round irrigation access. Most monsoon paddy in the Dry Zone is also dependent on irrigation due to often erratic seasonal rainfall patterns (Mather et al. 2018). Myanmar's second largest city, Mandalay, is located in the Dry Zone and serves as a major crop trading hub, lying approximately equidistant between Myanmar's major port city of Yangon and the Chinese border at Muse in northern Shan.

Most agricultural land in the Delta is *le* and is utilized for paddy cultivation. Monsoon paddy is the dominant crop in most areas of the Delta, followed by black gram and green gram, which are grown during the dry season using residual moisture. In areas prone to heavy flooding, post-monsoon paddy is the main crop, being grown after flood waters have receded. Pulses are produced mainly for export (Okamoto 2008; Boughton et al. 2018). Similar to the Dry Zone, agriculture in the Delta also is strongly commercially oriented (Cho et al. 2017). In addition, inland and coastal capture fisheries have historically played an important role in the Delta's livelihoods and economy (Tezzo et al. 2018). Myanmar's largest commercial center, Yangon, is located in the eastern Delta. Areas of the Delta close to Yangon have become centers for fish farming and intensive poultry production since the 1990s (Belton et al. 2018; Cho et al. 2020).

Shan, Myanmar's largest state, is situated on a plateau comprised of wide valleys interspersed with ridges of hills with a warm-temperate climate. Monsoonal rainfall is received from May to

October. The main type of agricultural land is *ya*, accounting for 77 percent of all farmland, with irrigated lowland *le* accounts for most of the remainder. In southern Shan, most households cultivate crops in a small garden in their home compound (Win and Zu 2019). Wet, irrigated rice is the predominant crop on valley bottoms, while dry, upland rice the predominant subsistence crop in hilly areas. However, the range of microclimates and relatively dependable rains permit cultivation of a diverse mix of crops both for subsistence and for cash. Hybrid maize is the most widespread crop in Shan after rice. It is produced for use in the rapidly growing domestic animal feed milling operations and for export to China and, increasingly, to Thailand. Vegetables and fruits are widely grown both for subsistence and commercial use, and most households cultivate a small garden in their home compound (Win and Zu 2019).

Shan is ethnically diverse. Similar to most of upland Myanmar, Shan's post-WWII history has been characterized by extended conflicts over the right to self-governance, territory, and resources between the Burmese army and ethnic armed organizations (Lintner 1994; South 2008; Woods 2012). Ceasefire agreements were signed by several of the main ethnic armed organizations in southern Shan between 1989 and 1994, but conflicts continue to flare up periodically elsewhere.

Mon is a narrow coastal state in southeastern Myanmar with a population of around 1.7 million. Mon sits at the apex of the Gulf of Mottama, aligned north to south along the Andaman Sea and shares a short southeastern border with Thailand. Two major rivers, the Sittaung and Thanlwin, flow into the Gulf at the state's midpoint, close to Myanmar's fourth largest city, Mawlamyine (population 440,000). Monsoon rainfall is particularly heavy in Mon, which receives about 4 meters of rain per year, a quarter of which falls in August (CESD, IFPRI, and MSU 2016). Whereas lowlands on the coastal plain are used mainly for paddy cultivation, the hills are used to grow rubber and tropical fruits. Marine fisheries are an important source of livelihoods in coastal villages.

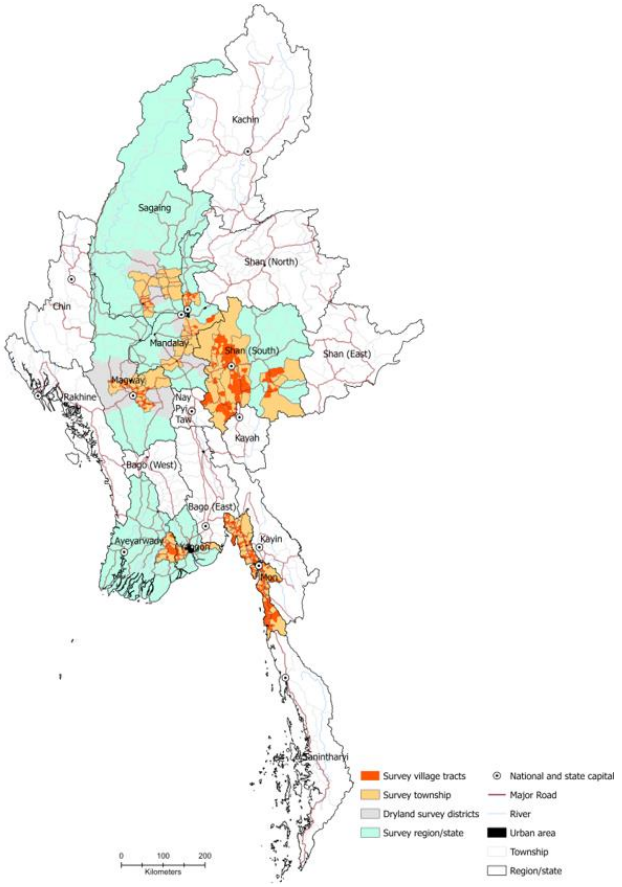
Mon's largest ethnic groups are Mon and Bamar (CESD, IFPRI, and MSU 2016). The New Mon State Party and the Myanmar government were engaged in armed conflict from 1949 until 1995, when a ceasefire was initiated. Mon has since been relatively stable and peaceful (UNHCR 2014).

3. SURVEYS AND DATA

The primary sources of data used in this chapter are four large household surveys, conducted by Michigan State University, the Center for Economic and Social Development, and the International Food Policy Research Institute between 2015 and 2018. The survey locations are illustrated in Figure 1. Each survey included household and community questionnaires designed to answer a unique set of research questions and followed a similar structure in terms of content, design, and implementation.

The surveys were designed to capture detailed information on livelihoods. All included modules on household demographics (age,

Figure 2. Map of survey locations



Source: Authors' compilation.

gender, level of education), assets (land and other productive assets), and income generating activities (agriculture, off-farm employment, natural resource extraction, migration). Additional detailed information was collected on production of crops of interest, which varied from survey to survey. These crop-specific modules include details on the quantity, cost, and type of production inputs and seed; labor, machinery, and draft animal use; crop yields; and marketing behavior and sales revenues. The surveys in Mon state, the Delta, and Shan state also included modules on food and non-food consumption and expenditure. Details on each survey are summarized in Table 1.

Table 1. Summary of survey details

Item	Mon	Delta	Dry Zone	Shan
Survey year	2015	2016	2017	2018
Area & population represented	Rural population of all 10 townships of Mon State.	Population of 40 rural village tracts from four townships in Ayeyarwady and Yangon: • 25 with high concentrations of fishponds • 15 with paddy and pulses as main crops	Rural population of four townships in Magway, Mandalay and Sagaing regions covering major Dry Zone agroecologies.	Population in 99 rural village tracts producing maize or pigeon pea in nine townships in southern Shan.
Household sample size	1,632	1,102	1,578	1,562
Population represented, households	273,000	37,400	160,500	201,300
Communities surveyed	143 villages in 10 townships	73 villages in 4 townships	300 villages in 14 townships*	323 villages in 12 townships*
Survey questionnaire modules	• Household demographics • Employment • Migration • Agriculture • Land and other productive assets • Credit • Consumption • Shocks • Wellbeing	• Household demographics • Employment • Migration • Agriculture • Agricultural mechanization • Land and other productive assets • Credit • Consumption	• Household demographics • Employment • Migration • Agriculture • Agricultural mechanization • Land and other productive assets • Credit	• Household demographics • Employment • Migration • Agriculture • Agricultural mechanization • Land and other productive assets • Credit • Consumption
Crops of interest	• Rice • Rubber • Orchard crops • Marine fisheries	• Aquaculture • Rice • Green & black gram	• Rice • Groundnut • Sesame • Green gram	• Maize • Pigeon pea

Source: Authors' compilation.
Note: * Community surveys in Dry Zone and Shan covered more townships than the household survey

Household survey sample selection procedures varied with the purpose of each survey. The Mon sample was drawn to represent the entire rural population for the state. The Delta survey was designed to compare livelihoods in areas with high concentrations of aquaculture farms to those in areas with little or no aquaculture, which dictated the choice of village tracts surveyed. The Dry Zone survey was designed to represent the rural population of four townships selected in each of the three regions surveyed to include the main agroecologies, farming systems, and forms of irrigation present in central Myanmar. The Shan survey was designed to represent the rural population of village tracts from nine townships in southern Shan where maize or pigeon pea was farmed and where the security situation permitted access for survey implementation. For all surveys, enumeration areas were

selected randomly by probability proportional to size using the sample frame of the 2014 National Census and with support from staff of the Department of Planning.

The community questionnaires administered as part of each survey were designed to capture complementary information to that obtained from the household questionnaires. In all cases, the community questionnaires were administered to groups of four to six knowledgeable male and female residents of each village where the household survey took place. In the Dry Zone and Shan, the community survey was expanded to cover a larger geographical area than the household survey (14 and 12 townships, respectively). Both the community and the household questionnaires included multi-year recall questions designed to track 'landscape' level changes over the past five or ten years on issues such as access to infrastructure and public service provision, travel times, wage rates, and numbers of rural enterprises.

4. SYNTHESIS OF RESULTS FROM SURVEYS

In this section, we present a comparative summary of key trends across surveys and zones. These key trends include (1) recent changes in access to infrastructure, transport, and public services; (2) land ownership, access, and tenure; (3) farming systems characteristics and the productivity and profitability of key crops; (4) off-farm employment and the rural non-farm economy; and (5) the composition of rural incomes and rural wages.

4.1 Infrastructure and services

Provision of most infrastructure and services is uneven across zones, reflecting variations in physical geography and legacies of settlement and conflict (Table 2). Access to surfaced roads is lowest in southern Shan (54 percent of villages), perhaps reflecting the hilly terrain and history of conflict in some areas, followed by the Delta (59 percent), where water-based transport is still the primary means of access to many villages. Mon has the highest rate of access by paved road (95 percent). Partly as a result, Mon has the shortest transport times to nearby urban areas, with implications for the ease with which individuals can commute for nonfarm work, access inputs, or sell products. Travel times in the monsoon season are roughly 20 to 40 percent longer than in the dry season across zones, indicating that even surfaced roads may be poorly constructed.

Table 2. Community level access to infrastructure and public services, by zone

Village characteristic	Mon 2015	Delta 2016	Dry Zone 2017	Shan 2018
With paved road, %	95	59	80	54
Accessible by car in monsoon, %	87	32	99	79
Dry season travel time to closest urban center, avg. minutes	33	47	46	51
Monsoon travel time to closest urban center, avg. minutes	40	57	66	60
Primary school, %	80	-	79	80
Post-primary school, %	37	-	31	15
Public electricity supply, %	51	12	34	25
Access to at least one cell phone provider, %	97	-	-	97
Number of communities surveyed	143	73	300	323

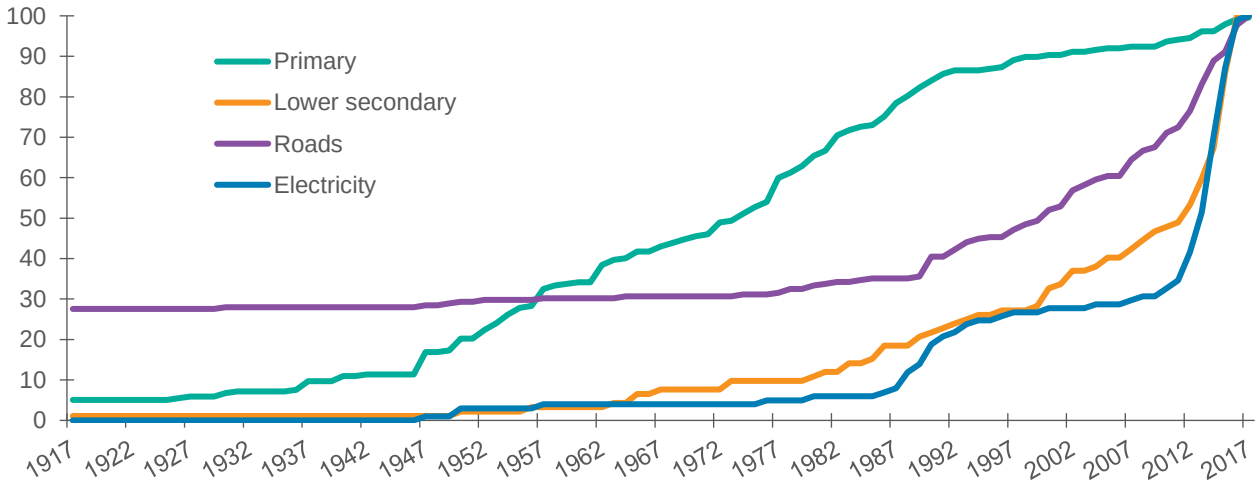
Source: Authors' analyses of survey datasets.

Primary schools are the public service with the highest levels of provision and access and are present in about 80 percent of villages in all surveyed zones (Table 2). The share of villages with a post-primary school is lower and much more variable across zones, being lowest in southern Shan and highest in Mon. No data was collected on this indicator in the Delta.

Access to publicly provided electricity connections is also variable across regions but generally low, with the highest levels of provision in Mon, and the least in the Delta, with just 12 percent. Many villages access electricity through private transformers, often purchased with pooled community resources. However, even in villages with public electricity supply, not all households are able to afford an electricity connection and power outages are frequent in some areas. For example, in Shan only three out of four households in villages with access to publicly provided electricity are connected to the network, and these households report facing power cuts lasting an average of five hours about two times per week. Solar cells are now a widely used source of power, mainly for charging mobile phones and lighting. Access to mobile phone providers is almost universal, following the extremely rapid expansion of services that started in 2014.

Although often starting from a low baseline, the rapid acceleration of infrastructure provision and geographical diffusion of public and private services have been key features of the economic reform period since 2010 in Myanmar. The construction of rural roads and post-primary schools and the establishment of public electricity supply and, to a lesser extent, health services, increased sharply during this time across all geographical zones surveyed. This dynamic is illustrated in Figure 3, which shows the cumulative share of primary and lower secondary schools, roads, and electricity connections established in surveyed villages in the Dry Zone by year over the past century. Road construction and provision of electricity connections and post-primary schools accelerated dramatically from 2011.

Figure 3. Cumulative share of schools, roads, and electricity connections established in surveyed communities in the Dry Zone, 1917 to 2017



Source: Authors' analysis of survey dataset.

Collectively, these changes in access to infrastructure and services are extremely significant. In combination with the liberalization of vehicle imports and financial services, the changes have contributed to improvements in mobility and communication with sharp reductions in costs and time required. For example, in Shan, average transport times from surveyed villages to the nearest urban area fell by around 40 percent between 2013 and 2018, an average reduction of 38 minutes, while motorbikes became the most common mode of transport in 87 percent of villages, up from 41 percent in 2013.

Greater mobility has expanded the economic options available to village dwellers. For example, having access to a wide choice of buyers means that markets for agricultural products, such as maize in Shan, tend to be competitive (Cho and Belton 2019). Ease of mobility has also increased the variety of employment that villagers might pursue. For instance, in the Delta, 44 percent of those

who reported being engaged in salaried employment commute to nearby urban areas or to other townships or regions for their work (Htoo and Zu 2016).

4.2 Landholdings and land tenure

Access to land is a prerequisite for direct participation in agriculture, and landholding status has historically been a key determinant of the social and economic status of rural households. Land restitution has been a key political issue in Myanmar since 2011. Moves to return confiscated land to rural households have been featured prominently in government policy since that time, but such efforts have often proven difficult to implement successfully (Mark and Belton 2020).

Rates of landlessness vary between zones but are high overall. An exception to this pattern is in southern Shan, where 85 percent of households have access to agricultural land. The land frontier there only closed within the past one to two generations, and patterns of differentiation have yet to emerge to a significant degree. In contrast, very high rates of landlessness in the Delta (58 percent) reflect legacies of foreclosure on land during the great depression of the 1930s, confiscation of land from households unable to fulfil stringent paddy procurement quotas during the socialist era, and confiscation of unregistered land from smallholders for allocation to agricultural concessions under the State Law and Order Restoration Council era agricultural industrialization policy (Vicol and Pritchard 2020). Rates of landlessness are also high in Mon (59 percent), perhaps reflecting histories of conflict and displacement. Landlessness is lower but still substantial in the Dry Zone (40 percent), mainly reflecting 'everyday' processes of land fragmentation resulting from inheritance patterns in this long-settled area (Boutry et al. 2017).

Average agricultural landholdings range from 5.2 acres in Shan to 10.2 acres in the Delta, but with a median size of around five acres in all zones except Shan (3.5 acres) (Table 3). The median agricultural landholding in most parts of the country thus is close to the two-hectare threshold globally used to define small farms (Lowder et al. 2016).

Table 3. Landownership and tenure status, by zone

Item	Mon 2015	Delta 2016	Dry Zone 2017	Shan 2018
Landless households, % †	59	58	40	15
Mean area agricultural land, acres *	7.3	10.2	6.5	5.2
Median area agricultural land (acres) *	5	5.5	5	3.5
Share of land operated by Tercile 3 HH, %	71	70	81	67
Share of land operated by Tercile 1 HH, %	7	5	4	9
Rented or borrowed parcels, %	14	7	6	15
Agricultural parcels with Form 7 or Form 105, %	36	85	87	20
Share of households with disposed parcels, %	-	20	15	24
Confiscated parcels as share of disposed parcels, %	-	51	15	30

Source: Authors' analyses of survey datasets.
Note: † Landless households are defined as those with no access to agricultural land. Households accessing farmland by borrowing or renting are counted as having land.
* Conditional averages, area of farmland operated.

Land is unevenly distributed among farm households, however. In all zones, the third of surveyed farms with the largest holdings (tercile 3) operates more than two-thirds of all agricultural land (up to 81 percent in the Dry Zone), whereas the smallest third of farms operates between 4 percent (Dry Zone) and 9 percent (Shan) of all land (Table 3). This has important implications for strategies that seek to increase rural incomes by raising agricultural productivity, as this distribution implies that most of the direct benefits of doing so (e.g., receipt of subsidized credit, earnings from crop sales) will accrue to larger landowning households. For instance, in the Delta, the smallest third of farms account for just 3 percent of the total monsoon paddy harvest, while farm households in tercile 3

produce 64 percent. The share of farm income derived from irrigated dry season paddy is also positively correlated with landholding size, accounting for about 50 percent of farm incomes for households in landholding tercile 3, as compared to 20 percent for those in tercile 1. This pattern is likely to reflect differences in investment capacity and access to irrigation. Similar patterns prevail in the other zones.

Land rental markets are limited across all zones. Most farmland that is not owner-operated is borrowed from the operators' parents prior to eventual inheritance. The share of borrowed or rented parcels of agricultural land ranges from 6 percent in the Dry Zone to 15 percent in Shan State.

Levels of tenure security vary widely by zone. Per Myanmar's constitution, all land is the property of the union government. Form 7, or its predecessor Form 105, is a certificate issued by the state that infers agricultural land use rights to the holder. Farmland for which formal user rights have not been granted is formally categorized as 'wasteland' and can be confiscated by the state for allocation to other users. Under an amendment to Farmland Law passed in 2018, users occupying wasteland can also be fined (Mark and Belton 2020).

The tenure security of unregistered land is thus weak. The highest levels of inclusion in land registries are found in lowland areas where the reach of the state is strongest. This is particularly the case for *le* land designated for cultivation of paddy, which has been the historical preoccupation of agricultural land use policy. Accordingly, possession of Form 7/105 is highest in the Dry Zone for 87 percent of parcels, and lower in more peripheral and upland areas–36 percent of parcels in Mon and just 20 percent in southern Shan.

These low levels of tenure security are reflected in the high share of parcels lost to confiscation. Confiscations accounted for 30 percent of all parcels which respondents reported having sold, given away, or otherwise lost access to in Shan. In the Delta, confiscations made up 51 percent of such parcels to which a household lost access, reflecting a history of land confiscations to facilitate establishment of large fish farms (Table 3).

Land accessed under customary tenure arrangements (e.g., for swidden) also falls under the definition of wasteland and is thus vulnerable to confiscation (Thein et al. 2018). In the areas surveyed in Table 3, there is little land accessed in this way. For example, just 2 percent of households surveyed in southern Shan reported practicing shifting cultivation, although one-quarter of households reported that either or both parents' households had done so, reflecting the relatively recent closure of the land frontier there (Win and Zu 2019). However, shifting cultivation is widespread in some other upland, areas such as Chin (Boutry et al. 2018), leaving practitioners of such cultivation patterns vulnerable to the possibility of future enclosures.

Similar to the case in many other countries in Southeast Asia (Rigg et al. 2016), the average size of agricultural holdings in Myanmar is shrinking since landholdings are usually subdivided at inheritance. For example, in Shan, though the share of landed and landless households has remained constant from the previous generation to the present one, the average area of land operated by each household shrank by 30 percent (Win and Zu 2019). In the Dry Zone, 69 percent of adults in farm households have landholdings that are smaller than those of their parents – the average landholding fell in size from 9.5 to 5.5 acres between the two generations (Hein et al. 2017).

A partial exception to this trend is seen in Mon, which experiences high levels of outmigration to Thailand–half of all households surveyed reported a member engaged in migration for work at the time of the survey. The average size of parcels used for paddy cultivation in Mon increased from 5.5 acres to 6.4 acres since the time of their first acquisition, while the number of individual parcels used to cultivate paddy fell slightly, suggesting that a nascent process of land consolidation might be taking place (CESD, IFPRI, and MSU 2016).

4.3 Crops and farming systems

Farming systems and cropping patterns vary widely between Myanmar's main agroecological zones, reflecting the country's diverse physical and economic geography.

4.3.1 Rice

Rice is the most widely cultivated crop, being grown by between 39 percent of farm households in Mon and 97 percent in the Delta (Table 4). Its prominence in farming systems across the country reflects its central place in the Myanmar diet, as well as the legacy of agricultural policies that historically promoted rice production almost to the exclusion of all other crops. Rice cultivation practices can vary widely between zones, though some broad similarities exist.

Table 4. Cultivation, yields, and incomes from key crops, by zone

Item	Mon 2015	Delta * 2016	Dry Zone 2017	Shan 2018
Rice, % of farm households growing	39	97	48	51
Mean yield monsoon rice, kg/ha	2,942 †	2,385	2,948	3262
Mean gross margin income monsoon rice, MMK/acre	124,972	105,615	160,604	143,314
Mean yield dry season rice, kg/ha	-	4,202	3,443	-
Mean gross margin dry season rice	-	172,701	198,892	-
Marketed surplus of rice, %	30	75 (monsoon) 79 (dry season)	59	21
Sesame, % of farm households growing	2	0	68	7
Mean yield sesame, kg/ha	-	-	246	409
Mean income sesame, MMK/acre	-	-	105,115	163,398
Groundnut, % of farm households growing	-	0	33	18
Mean yield groundnut, kg/ha	-	-	753	1380
Mean income groundnut, MMK/acre	-	-	111,060	141,570
Green gram, % of farm households growing	8	52*	21	5
Mean yield green gram, kg/ha	239	1,106	234	713
Mean income green gram, MMK/acre	-	320,500	52,210	141,154
Maize, % of farm households growing	0	0	0	53
Mean yield maize, kg/ha	-	-	-	3507
Mean income maize, MMK/acre	-	-	-	165,344
Pigeon pea, % of farm households growing	0	0	33	35
Mean yield pigeon pea, kg/ha	-	-	606	524
Mean income pigeon pea, MMK/acre	-	-	149,733	13,623
Vegetables, % of farm households growing	8	24	13	88
Fruit, % of farm households growing	15	14	16	63

Source: Authors' analyses of survey datasets.
Note: * Average among households outside aquaculture clusters.
† Average includes monsoon and dry season rice, but only 13 percent of rice farmers grow irrigated rice.

First, the monsoon season crop is the dominant paddy crop in all regions, but there is considerable regional variation. For instance, most monsoon paddy grown in the Dry Zone requires supplementary irrigation from surface water sources due to inadequate rainfall, whereas that in the Delta and in Mon requires no irrigation, while in Shan much monsoon paddy is rainfed 'dry rice' grown on *ya* land. The dry season paddy crop is limited to a relatively small number of geographical pockets, including the area around the Shwe Bo irrigation scheme in the Dry Zone, areas of the Delta that are flooded during the monsoon season, and some well irrigated valley bottoms in Shan.

Second, the use of inorganic fertilizer is widespread. For instance, 82, 96, and 87 percent of paddy farming households in Mon, the Dry Zone, and the Delta, respectively, apply inorganic fertilizers to the crop.

Third, uptake of improved rice varieties is generally quite low. The term 'improved variety' can be difficult to define, especially given that most farmers who report using improved seed varieties also report having obtained them from other farmers. In the Delta, 16 percent of monsoon paddy growers reported using improved seed, rising to 37 percent for dry season paddy producers. The average gross margin gained from growing improved varieties in dry season was 18 percent higher than that from local varieties. However, the difference in gross margins is not so strong in the monsoon season. In the Dry Zone, 42 percent of paddy farmers reported using an improved variety. In both the Delta and the Dry Zone, use of improved paddy varieties has increased over the past decade, increasing from 25 to 42 percent of dry season growers in the Dry Zone, and from 20 to 37 percent of dry season paddy growers in the Delta. However, the use of improved paddy varieties has remained constant for monsoon paddy growers. These rates of improved rice seed use are quite low compared to other Southeast Asian countries, such as Cambodia (59 percent improved), Laos (71 percent), Vietnam (96 percent), and Thailand (100 percent) (Maredia and Reyes 2016).

Fourth, paddy yields tend to be quite low. Monsoon paddy yields range from 2 to 3 mt/ha for monsoon paddy across all zones, putting Myanmar behind most other Asian countries. Dry season paddy yields are somewhat higher, averaging 3.4 mt/ha in the Dry Zone and 4.2 mt/ha in the Delta. Based on our scoping interviews in southern Shan, in recent years in low-lying areas with good irrigation access there has been substantial adoption of high yielding hybrid rice varieties imported from China. These varieties typically yield at least 5 mt/ha within a period of 100 days, making double cropping possible. However, details on this rice cropping pattern were not captured in our household survey in Shan State, as it focused on maize growing areas.

Fifth, rice is both a subsistence and a commercial crop. Production is most highly commercialized in the Delta, where it is dominant crop, with at least three-quarters of all harvested paddy in both seasons being sold. This pattern holds irrespective of farm size. The Dry Zone is intermediate, with 59 percent of the paddy harvest being sold, while most production of upland rice in Shan is for subsistence consumption (21 percent marketed). Paddy grown in Mon is also mainly for home consumption, with only 30 percent being sold.

4.3.2 Pulses and oilseeds

The next most widely grown and economically significant crop categories in Myanmar after rice are pulses–most notably green gram and pigeon pea, but covering a wide range of other crops, including black gram, chickpea, and lablab bean–and oilseeds–most importantly sesame and groundnut.

Green gram and black gram are major crops in the Delta, grown after monsoon paddy using residual soil moisture. Green gram is also produced throughout the country, including in the Dry Zone and Shan. Pigeon pea is a common rainfed monsoon season crop in Shan and the Dry Zone, often planted as an intercrop with maize or sesame and harvested around February. Pigeon pea and the grams are cash crops produced almost entirely for export, with India as the major market, though China also absorbs green gram. Pulse production for export in Myanmar boomed in the 1990s following the liberalization of crop marketing and exports (Okamoto 2008). Chickpea and lablab bean are produced in smaller quantities, mainly for domestic consumption.

As nitrogen-fixing legumes, pulse crops require limited fertilizer inputs, though pesticide application rates are often high and comprise a significant share of production costs. Labor for harvesting and threshing, for which there are low levels of mechanization (with the partial exception of threshing green gram), also accounts of a large share of production costs.

Sesame is the major Dry Zone crop, grown by 58 percent of farm households, and is also grown in Shan. Groundnut is also common in both the Dry Zone (33 percent of farmers) and Shan (18 percent). Both crops are used primarily to make edible oil, while the unmilled grain is mainly used for consumption in snack foods. However, domestic oil mills have faced stiff competition from much

cheaper imported palm oil following import liberalization in 2011, causing Myanmar's edible oil production to decline sharply. Most unmilled groundnut and sesame that is surplus to domestic needs is exported to China (Belton and Win 2019). Cultivation of black sesame, a higher value crop produced for export to South Korea and Japan, is thought to have increased significantly in recent years.

The productivity and profitability of rainfed pulse and oilseed crops can be highly variable by region and from year to year depending on weather and market conditions (Table 4). For instance, green gram was the most profitable of all crops listed in Table 4, yielding an average gross margin of MMK 320,500/acre in the Delta in 2016, but only generated MMK 52,210/acre in the Dry Zone in 2017, likely reflecting differences in growing conditions. Similarly, pigeon pea generated an average income of MMK 149,733/acre for Dry Zone farmers in 2017 but produced a return of just MMK 13,623/acre for farmers in Shan the following year after India instituted a temporary ban on pulse imports. Sesame is particularly sensitive to the timing and volume of rainfall, with average yields in a 'good' weather year in the Dry Zone nearly six times higher than those in a 'bad' weather year (Oo 2018).

Use of improved varieties of all pulse and oilseed crops is limited, in part because these are not always available to farmers, there having been relatively little investment in their development and dissemination in Myanmar. Boughton et al. (2020) found that in the Dry Zone the share of pulse and oilseed farmers growing self-reported improved varieties ranged from 8 percent for pigeon pea to 37 percent for chickpea.

Drought and flooding are common on both *ya* and *le* land in the Dry Zone. Drought is more prevalent on unirrigated upland *ya* (experienced by 39 percent of parcels) relative to *le* (28 percent), while flooding was more prevalent on *le* (41 percent of parcels) relative to *ya* (24 percent). In addition, 7 percent and 8 percent of *le* and *ya* parcels, respectively, were adversely affected by both drought and flooding (Mather et al. 2018). This context of risk helps to explain why farmers outside of well-watered areas and fully functioning irrigation schemes tend to grow a diversified mix of crops pulse and oilseed crops and practice intercropping, which is quite common in the Dry Zone. In such contexts, it is more appropriate to view farmers as seeking to manage risk rather than maximizing returns.

4.3.3 Maize

Cultivation of maize has boomed in Myanmar since the introduction of hybrid seed by the Thai agro-industrial company, CP, in 1998. Annual national maize production increased sevenfold to 2.3 million mt since 1998 (USDA 2020). Maize is a monsoon crop in the uplands, but small pockets of dry season maize cultivation are also found in parts of the Delta and Dry Zone. Shan accounts for approximately half of the country's planted area of maize.

Maize is among the most common crops in southern Shan, where it was reported grown by 53 percent of the farms. It is a highly commercial crop, produced almost exclusively for sale, and accounts for 54 percent of the value of crop sales among all farms in the areas surveyed. Maize grain supplies Myanmar's rapidly growing animal feed industry (Belton et al. 2020) and is exported overland to neighboring China through Muse in Northern Shan. Until very recently, each market utilized roughly half of Myanmar's maize output (USDA 2020), but prolonged closure of the Chinese border to informal trade in 2019 saw the opening of a new export market in Thailand, which imported 600,000 mt of Myanmar maize that year (Wai 2019).

Unlike other cereal and grain crops grown in Myanmar, maize varieties are overwhelmingly hybrids–86 percent of maize growers surveyed in Shan reported using hybrid seed. The maize seed market was formerly dominated by CP but has diversified rapidly in recent years so the CP's market share is now less than 50 percent. Hybrid seed is purchased from maize traders and private

agricultural input suppliers. Inorganic fertilizers were used by 90 percent of maize growers surveyed in Shan.

Maize yields in southern Shan average 3.5 t/ha, which is around 25 percent below the average for Thailand and Vietnam (Fang and Belton 2020). Gross margins for maize production in Shan in 2018 averaged MMK 165,344/acre, which is only slightly higher than returns from monsoon rice in Shan in the same year. However, this figure is almost three times lower than the average gross margin reported by the World Bank for maize producers in southern Shan in 2013/14 (World Bank 2016). The gap between these two figures is partly attributable to differences in the exchange rate at the time of the two surveys. It may also reflect the tendency of maize prices to fluctuate considerably from year to year, particularly due to periodic disruptions in access to the main export market in China.

4.3.4 Vegetables, fruits, and tree crops

A wide array of vegetables and fruits are grown throughout the country, both for commercial purposes and for own consumption. However, their spatial distribution is highly uneven. Unlike in some other countries in the region, peri-urban horticultural production around major cities, such as Yangon, is somewhat limited. In southern Shan, 83 percent of households have a small garden. These are used to produce a rich diversity of crops, primarily in small quantities for home consumption (Fang and Belton 2020). However, in many other areas of Myanmar, home gardens are relatively rare (Pritchard et al. 2018).

Some of the highest concentrations of commercial vegetable cultivation are found in Shan, where warm-temperate conditions favor the production of a wide variety of vegetables. These are exported to the rest of Myanmar. Mon state is one of Myanmar's main producers of tropical fruits. Rubber is also a major smallholder crop in Mon. Pockets of specialized commercial cultivation of crops such as onions and mangoes are found in parts of the Dry Zone. Melons are now a major Dry Zone crop. The export value of watermelons to China in 2016 was estimated at USD 169 million, which amounted to nearly half that of rice, the country's traditional export crop, in the same year (Kubo 2018). Myanmar also imports considerable quantities of fruits and vegetables from neighboring countries, particularly to make up for seasonal shortfalls in supply.

The high diversity of crops grown makes it difficult to generalize characteristics of production. Tropical fruits, such as mangoes and avocados, can generate high returns relative to annual crops, but are also vulnerable to collapsing prices in the event of gluts. Post-harvest handling of these crops is often sub-optimal, resulting in high levels of waste and loss. Production of most tropical fruits is extremely seasonal, unlike in countries such as Thailand and Vietnam where production seasons have been extended by use of improved varieties and other technological advances. Melon cultivation is among the most technically advanced forms of fruit production in Myanmar. Farm managers and specialized technicians, often hired by Chinese investors, closely oversee the capital- and labor-intensive melon production process. However, melon farming is highly risky, being subject to large fluctuations in price from day to day (Kubo 2018).

Commercial vegetable crops are also potentially lucrative, but can be risky, requiring high levels of chemical and labor inputs and are vulnerable to oversupply and low prices due to competition from imports. For example, garlic producers in Shan recently suffered a run of years in which prices for garlic, once considered a high value crop, fell far below the historical average, making it difficult to sell and causing some to dump their production.

Rubber cultivation in Mon boomed over the past 15 years with 39 percent of farm households surveyed in the state reporting growing the crop, primarily for export to China in an unrefined form. The profitability of rubber fluctuates widely in line with global commodity prices. Production practices, such as the use of improved cultivars or the level of primary processing of latex, are poor compared

to those used in other more established rubber-producing countries in the region, resulting in a low-quality product (van Asselt et al. 2016). Larger rubber plantations are also found in Mon, particularly in the southern part of the state. In addition, large areas have been given over to rubber concessions, as well as oil palm, in neighboring Tanintharyi. This has resulted in the displacement of former occupants and in logging of large areas of forest for timber extraction, but with little agricultural development – by one estimate, only 18 percent of the 1.65 million acres of land granted to oil palm concessions in Tanintharyi has been used for oil palm production (Thein et al. 2018).

4.4 Off-farm employment and the non-farm economy

Agriculture is the major livelihood activity in terms of number of households participating directly in all four survey zones, except the Delta where a higher proportion of surveyed households engaged in wage labor than in crop farming (56 vs. 42 percent). However, even among farm households, a complete dependence on agriculture is relatively uncommon. Most households and individuals pursue diversified livelihoods that combine multiple forms of employment and sources of income. For instance, among the wealthiest 20 percent of the population in the Delta, only 29 percent of households depend exclusively on agriculture for income. Among the poorest quintile, this figure is just 8 percent (Htun 2016).

Table 5. Livelihoods and income composition, by zone

	Mon 2015	Delta 2016	Dry Zone 2017	Shan 2018
Share of households engaged in activity, percent				
Crop production	51	42	57	82
Wage labour, of which:	42	56	55	61
Agriculture	22	42	48	53
Non-agriculture	28	17	14	20
Salaried work	8	6	8	7
Own non-farm business	29	21	21	16
Remittances	33	15	31	14
Livestock sales	25	22	21	52
Aquaculture	0	6	0	0
Natural resources	10	6	3	5
Share of total household income from activity, percent				
Crop production	24	20	37	47
Wage labour, of which:	15	15	21	12
Agriculture	6	11	16	7
Non-agriculture	9	4	5	5
Salaried work	5	3	5	8
Own non-farm business	18	34	18	13
Remittances	25	3	13	8
Livestock sales	1	1	5	10
Aquaculture	0	19	0	0
Natural resources	12	6	1	1

Source: Authors' analyses of survey datasets.

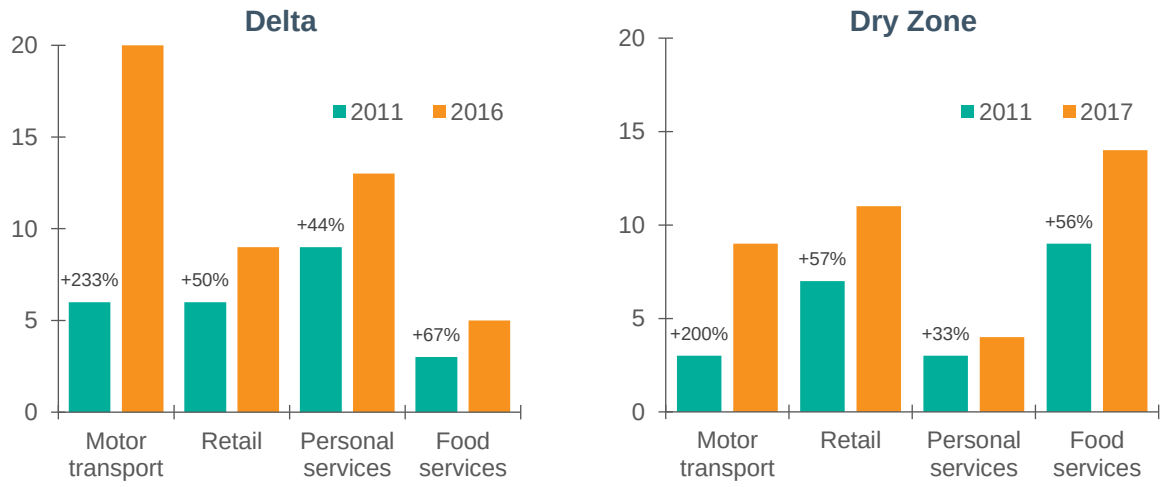
Uneven distribution of landholdings makes off-farm employment important for all but households with the largest landholdings. However, most casual wage employment remains closely linked to agriculture with agricultural day labor being the most important source of income for landless households and operators of marginal farms in all zones except Mon (Table 5). Agricultural wage labor is fairly gender-balanced in terms of levels of participation, though often with significant levels of gender differentiation by task and with significant gender wage gaps. Casual non-farm work skews

heavily male and is composed largely of manual work, such as construction, carpentry, and hauling loads, and employment in non-farm enterprises.

Self-employment in own non-farm enterprises is common across the survey zones. Levels are lowest in Shan (16 percent of households) and highest in Mon (29 percent), reflecting differences in the degree of development of the rural non-farm economy (Table 5). Men and women operate nonfarm businesses in equal numbers, but men tend be more likely to own more remunerative businesses with higher capital costs, such as machinery rental services, whereas women are more heavily represented as owners of smaller businesses, such as food retail (Aung et al. 2019).

The likelihood of a household operating a non-farm enterprise is not closely correlated with landownership, although the type and scale of a business may be linked to the resource base of the household. Most rural non-farm enterprises are very small and operate using only family labor. For instance, only 21 percent of such businesses surveyed in the Dry Zone reported hiring labor (Zu et al. 2017). Numbers of non-farm businesses have grown rapidly over the past decade (Figure 4).

Figure 4. Average number of non-farm enterprises per village in the Delta and the Dry Zone and percentage change between 2011 and 2016/17, by type of business*



Source: Authors' analyses of survey datasets.
Note: *Conditional on having a business of this type

Remittances from migrant household members are a significant source of income in Mon and the Dry Zone, received by more than 30 percent of households. Remittances are less common in southern Shan and the Delta, where a smaller share of households have migrant members. The importance of raising and selling livestock is highest in Shan, where 52 percent of households raise animals for sale, and a little over 20% in the other three zones.

Salaried employment provides work for a similar share of households across zones at around 7 percent, with a gender balance that skews towards women. Women account for a large majority of schoolteachers, which is by far the largest category of salaried employment for rural households.

Finally, participation in natural resource extraction, such as collecting firewood, cutting bamboo, harvesting non-timber forest products, or fishing, is quite common, except in the Dry Zone. However, these activities are practiced mainly for home use, with few households engaged in doing so on a commercial basis. The major exception to this is Mon, where 11 percent of households are involved

in marine fishing on a commercial basis (Table 5).[1] Most people involved in commercial natural resource extraction are men–for example, 72 percent in the Dry Zone (Zu et al. 2017).

4.5 Income composition and wages

The composition and size of rural incomes vary widely by zone, reflecting geographical differences in access to agricultural land, agricultural potential, the degree of development of the rural non-farm economy, and the extent of migration. In very broad terms, Shan is the zone that is most highly agrarian and Mon the least–crop farming accounts for about twice the share of rural income (47 percent) in surveyed areas of southern Shan that it makes up in Mon (24 percent). The share of crop farming incomes falls between these figures in the Dry Zone (37 percent). The share of crop income to total income in the Delta is just 20 percent, which reflects not only high levels of landlessness but also an effect of our selection of some village tracts with high concentrations of fish farming. Aquaculture accounts for 19 percent of rural income in the sampled areas of the Delta, though this is not representative of the entire Delta.

Conversely, the share of remittances and self-employment in non-farm enterprises is relatively low in Shan (totaling 21 percent), but high in Mon (totaling 43 percent), while also being substantial in the Dry Zone (31 percent). The contribution of agricultural wage labor to income is largest in the Delta and the Dry Zone, where there are high levels of landlessness relative to Shan, but fewer lucrative non-farm opportunities, such as international migration, than in Mon.

The extent of participation in non-farm activities, including migration, accounts for significant differences in average incomes across zones. For example, mean income from crop farming is similar in southern Shan and in the Dry Zone. However, average earnings from non-crop sources in the Dry Zone are 67 percent higher than in southern Shan, resulting in average Dry Zone incomes per capita being 38 percent higher than in southern Shan (Table 6).

Table 6. Mean and median total crop and non-crop rural incomes in Shan and the Dry Zone, MMK/capita

	Shan		Dry Zone	
Item	Mean	Median	Mean	Median
Total income	441,862	260,037	608,771	406,667
Crop income	205,445	69,646	213,133	11,250
Non-crop income	236,417	97,500	395,637	262,064

Source: Authors' analyses of survey datasets.
Note: Unconditional averages, i.e., including all households whether or not earning crop or non-crop income.

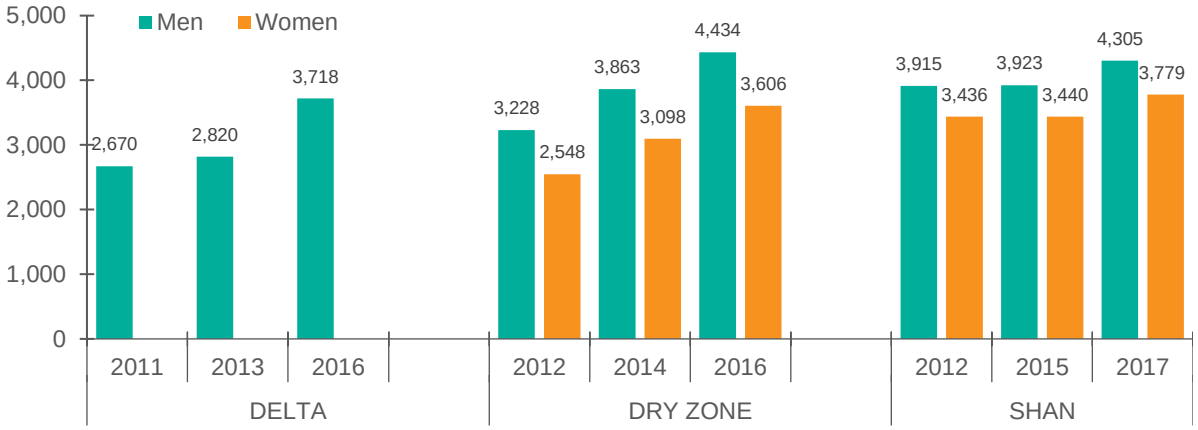
High levels of participation in off-farm work mean that rural wage rates play an important role in determining incomes, particularly for members of landless and land-poor households who are particularly dependent on casual employment. Wage rates are also important in relation to the profitability of agriculture, in which wages account for a significant share of production costs. Our surveys in the Delta and Dry Zone show that real rural wages (adjusted for inflation) jumped sharply in post-2010 economic reform period, rising by 39 and 37 percent, respectively (Figure 5). Wages in Shan were higher in 2012 than in either the Delta or the Dry Zone, but changed little until 2017, when they rose 9 percent to reach a level similar to that in the Dry Zone.

Significant increases in real rural wages since 2010 are linked to accelerating out-migration over the same period. This has driven labor shortages around periods of peak local demand for agricultural workers. Expansion of post-primary education has likely also played a role, both by

[1] Our survey in the Delta did not include any coastal areas, and thus likely underrepresents the importance of commercial fishing in the zone as a whole.

delaying entry into the workforce and producing a more educated workforce with higher wage-earning potential (c.f. Lui et al. 2020, for Vietnam). For example, the share of 17-year-olds in the Dry Zone having completed Grade 8 jumped from 35 percent in 2010 to 60 percent in 2017 (Belton and Filipski 2019).

Figure 5. Average real daily wage rates for casual agricultural workers in the Delta (2011-2016), the Dry Zone (2012-2016), and Shan (2012-2017), MMK*



Source: Authors' analyses of survey datasets.
Note: *Delta and Dry Zone calculated at constant 2016 prices for all seasons, Shan at constant 2017 prices, for monsoon season.

These rising wage rates appear to have contributed to rapid agricultural mechanization since 2011 (Win et al. 2018). However, mechanization in the Dry Zone has not generated sufficient savings to fully offset the costs to farm households of rising agricultural wages. Belton and Filipski (2019) suggest that this implies a shift in the underlying 'terms of trade' between agriculture and non-farm segments of the economy, consistent with a process of economic structural transformation under which the competitiveness of agriculture is eroding relative to more productive sectors. The authors argue that this pattern of development is resulting in a shift in relative economic status between landholders and the landless, favoring the latter.

This outcome, while seemingly troubling from the point of view of the future viability of agriculture, is positive to the extent that it suggests improvements in the relative economic status and mobility of at least some households with limited resources. Thus, the median income of landless households is only 13 percent less than the all household average for the rural Dry Zone (Belton and Filipski 2019). Similarly, in southern Shan, average per capita incomes of non-farm households are only 16 percent lower than those of households farming maize. Both these findings suggest that rural income earning potential has become partially delinked from ownership of land.

However, in all zones there is a significant gender wage gap in agriculture. This is lowest among maize and pigeon pea farmers in Shan, where women farmworkers earn on average 89 percent of the male daily wage. However, in the Dry Zone women can expect to earn only 81 percent of what men earn for agricultural wage work of equivalent duration. The reasons for these differences are not clear, though part of the explanation appears to relate to the gender division of labor across farming tasks, which vary from crop to crop. This gender gap appears persistent, having changed little even as men's and women's real wages have increased rapidly.

5. OPPORTUNITIES AND CONSTRAINTS TO INCREASING RURAL INCOMES

In this final section of the working paper, we identify key opportunities for and constraints to raising rural incomes, based on our synthesis of the results presented above with respect to the

characteristics of the four zones surveyed and the nature of recent changes therein. We examine the prospects for agriculture, contrast these with off-farm segments of the economy, and consider the outcomes of recent policies and investments.

First, with the partial exception of paddy, production of most field crops is strongly commercially oriented. Most output markets are reasonably competitive, and most farmers have ready access to inputs, including agricultural machinery. Thus, there is little need for efforts to further connect farmers to markets. However, upgrading products or processes, such as through better produce handling or traceability, could facilitate access to new or higher value markets in some cases.

Second, most grain crops grown in Myanmar perform less well than elsewhere in the region, appearing to suggest the existence of large yield and income gaps that might be closed through better research and extension, access to better varieties of seed, or more efficient use of inputs. However, particularly in the rainfed Dry Zone, climatic variability is a critical factor in determining crop productivity and profitability. The high degree of risk entailed in production of most crops in rainfed environments may dissuade investments at what appear to be economically optimal levels of input use. Moreover, the highly uneven distribution of land means that most of the yield gains associated with adoption of improved seeds and technologies will accrue to larger farms, while those with small landholdings will achieve only incremental increases. For these reasons, a focus on improving the performance of existing grain crops is unlikely to result in large broad-based improvements in rural incomes. Expansion of higher value, more labor and input intensive crops, such as fish, poultry, or melons, likely has greater potential than expansion of grain crops to create spillovers through employment linkages on-farm and in value chains upstream and downstream of the farm.

For rainfed areas with suitable topography and potential to access either ground- or surface-water, investments in irrigation could have large positive impacts on farm incomes by protecting crops from inadequate rainfall and drought and, thereby, reduce production risks, increase crop yields, expand dry season cropping, and create potential for diversification into higher-value crops. Rosegrant et al. (2018) estimate that there are several million hectares of land concentrated predominantly in the Dry Zone with potential for monsoon or dry season irrigation, with a large portion of the potential associated with groundwater utilization. Decentralized small-scale groundwater irrigation services will likely have an important role to play in this zone, as they have the potential to operate more efficiently than large-scale surface water irrigation schemes.

Third, the potential for diversification from production of low value grains into higher value vegetables, root crops, fruits, livestock, or fish, is highly contextually specific, being tempered by the suitability of local climatic conditions, the vagaries of markets, the occurrence of pests and disease, the availability of investment capital, and the capacity of farm households to bear risk. Not all attempts at diversification have been successful, and the fortunes of a crop that performs well one year may be rapidly reversed if conditions change. Diversification into higher value crops is thus no panacea for rural incomes.

Nevertheless, the examples of pulses (production of which exploded nationally in the 1990s, following liberalization of pulse exports and restrictions on cultivation), hybrid maize, and hybrid rice in Shan, rubber in Mon, watermelons in the Dry Zone, and poultry and fish in the Delta around Yangon, show that some farmers are capable of rapidly altering their behavior and investing heavily when economic opportunities are perceived to outweigh risks. It is difficult to predict where and when such new opportunities will emerge, but agricultural, marketing, and trade policies should be oriented to recognize and proactively support such developments as they arise, whether through provision of credit, information, or training, development of standards and market infrastructure, or efforts to support trade.

Importantly, we find that rural income earning potential is increasingly diversified. There is a positive association between landownership and income in all zones surveyed, though this relationship is weaker than might be expected based on the assumption that agriculture is the dominant rural livelihood activity. Given that agricultural land is a relatively fixed and increasingly scarce and expensive resource, ownership of which is highly concentrated in all zones, the most direct pathways to income growth and economic and social mobility often lie off-farm. This includes many activities linked to agriculture, such as machinery rental, transport services, crop trading, agro-processing, and food service and retail. However, non-farm activities, such as construction, shop keeping, manufacturing, and services, are also increasingly common in rural areas. Similarly, remittances from other locations make important contributions to rural incomes.

Migration also plays an important role in determining rural incomes by reducing the availability of labor, thereby bidding up wages. This process has important implications for the welfare of farm households for whom agricultural labor represents a major expense, and for landless and land-poor households who depend disproportionally on sales of labor for their income. However, the COVID-19 pandemic has shown that strategies for rural income growth predicated upon migration can also prove vulnerable to shocks (Suhardiman et al. 2021). Expanding access to secondary education may have a similar effect to migration in contributing to the tightening of supplies of rural labor, but with the benefit of raising the lifetime earning potential of those who remain in school.

Post-2011 investments and reforms including improvements in mobile communications, road infrastructure, rural electrification, and the liberalization of motor vehicle imports, have dramatically improved access to information, increased mobility, and reduced travel times and costs. This confluence of developments has contributed to the emergence of a rural non-farm economy that is increasingly better-connected and offers a greater diversity of livelihood opportunities than in the past, supported by rising real wages and remittance flows. Ensuring that recent investments in rural infrastructure and public services are maintained will be key to ensuring further rural transformation.

Increasingly, these will need to be accompanied by investments in ‘soft-infrastructure’–well trained teachers and medics, for example–to leverage further opportunities for human capacity development, wage growth, and a more diverse and robust economy (c.f. Okamoto, 2020). Expansion of social safety nets and social protection, such as maternal cash transfers, pensions, and public healthcare, can also play a critical role in buffering against shocks and protecting vulnerable people from being left behind in Myanmar’s ongoing rural transformation.

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