



Bhutan Policy Note

Harnessing Spatial Opportunities in Agriculture for Economic Transformation

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and Samuel Taffesse*



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Acronyms and Abbreviations

| | |
|----------|---|
| ASY | Agricultural Statistics Yearbook |
| BDB | Bhutan Development Bank |
| BLSS | Bhutan Living Standards Survey |
| BTN | Bhutanese ngultrum |
| FCB | Food Corporation of Bhutan Ltd. |
| FDI | Foreign direct investment |
| FMCL | Farm Machinery Corporation Ltd. |
| FYP | Five-Year Plan |
| GDP | Gross domestic product |
| GST | Goods and services tax |
| ICT | Information and communication technology |
| MFD | Maximizing finance for development |
| MHV | Mountain Hazelnut Venture |
| MoAF | Ministry of Agriculture and Forests |
| Nu. | Bhutanese ngultrum |
| p.a. | Per annum |
| REER | Real effective exchange rate |
| RGoB | Royal Government of Bhutan |
| RNR | Renewable natural resources |
| SME | Small and medium enterprise |
| SOE | State-owned enterprise |
| TFP | Total factor productivity |
| USDA ERS | United States Department of Agriculture Economic Research Service |

Executive Summary

The geography of Bhutan presents intersecting challenges and opportunities for agriculture and economic transformation. While the country is small and landlocked, and its mountainous terrain complicates transportation and connectivity, Bhutan is also well endowed with natural resources and surrounded by two of the world's largest economies, China and India. This Policy Note focuses on how to negotiate those challenges and harness those opportunities for agriculture. Serving as an initial overview of these issues, this Policy Note is intended to frame and promote ongoing dialogue on how agriculture can leverage the spatial opportunities emerging in Bhutan to foster economic transformation.

Bhutan has recently experienced rapid economic growth and poverty reduction, with the economy largely driven by hydropower exports and construction. Diversifying the economy—both *within* and *between* sectors—is a policy priority for the Royal Government of Bhutan (RGoB). Given its demonstrated success and array of emerging opportunities, Bhutan has substantial scope to deepen the diversification occurring within agriculture, including crop agriculture, livestock, and forests. Making the most of Bhutan's agricultural opportunities is critical for shared prosperity and the elimination of poverty, since most people continue to work in the agriculture sector. The analysis in *Chapter 2* indicates that crop agriculture in particular has been growing as fast as the rest of the economy. Economic and agricultural sector growth have translated into increased food security and improved nutrition outcomes. The drawback is that agricultural growth has largely come about through the intensification of input use, which is rarely a sustainable driver of growth in agriculture, especially in countries at Bhutan's level of development. Labor, land, and mechanization have not contributed substantially to growth. The availability of farm labor is decreasing rapidly as people move away from the countryside. Productive land for agriculture—already a particularly scarce resource—is becoming more scarce. Investments that could make agriculture more productive, such as irrigation and mechanization, remain limited. The compounding scarcity of the factors of production in agriculture implies an even greater need to use them efficiently.

At the same time, Bhutanese agriculture is experiencing a dynamic transformation in which the scarce factors of production are being reallocated in a more productive manner by shifting to higher-value crops and by specializing in strategic geographic centers. *Chapter 3* highlights this transformation at the local level, where producers are switching into crops with higher value per acre, produced for the market—for example, they are moving from lower-value to higher-value cereals and also from cereals to higher-value vegetables. High-value production is also increasingly concentrated in a few areas, particularly areas with easier access to large domestic markets in the western, more urban parts of the country and to export markets in southern border towns. These crop-specific shifts and spatial patterns in production will continue to evolve, especially as climate change alters the agroecological conditions for agriculture.

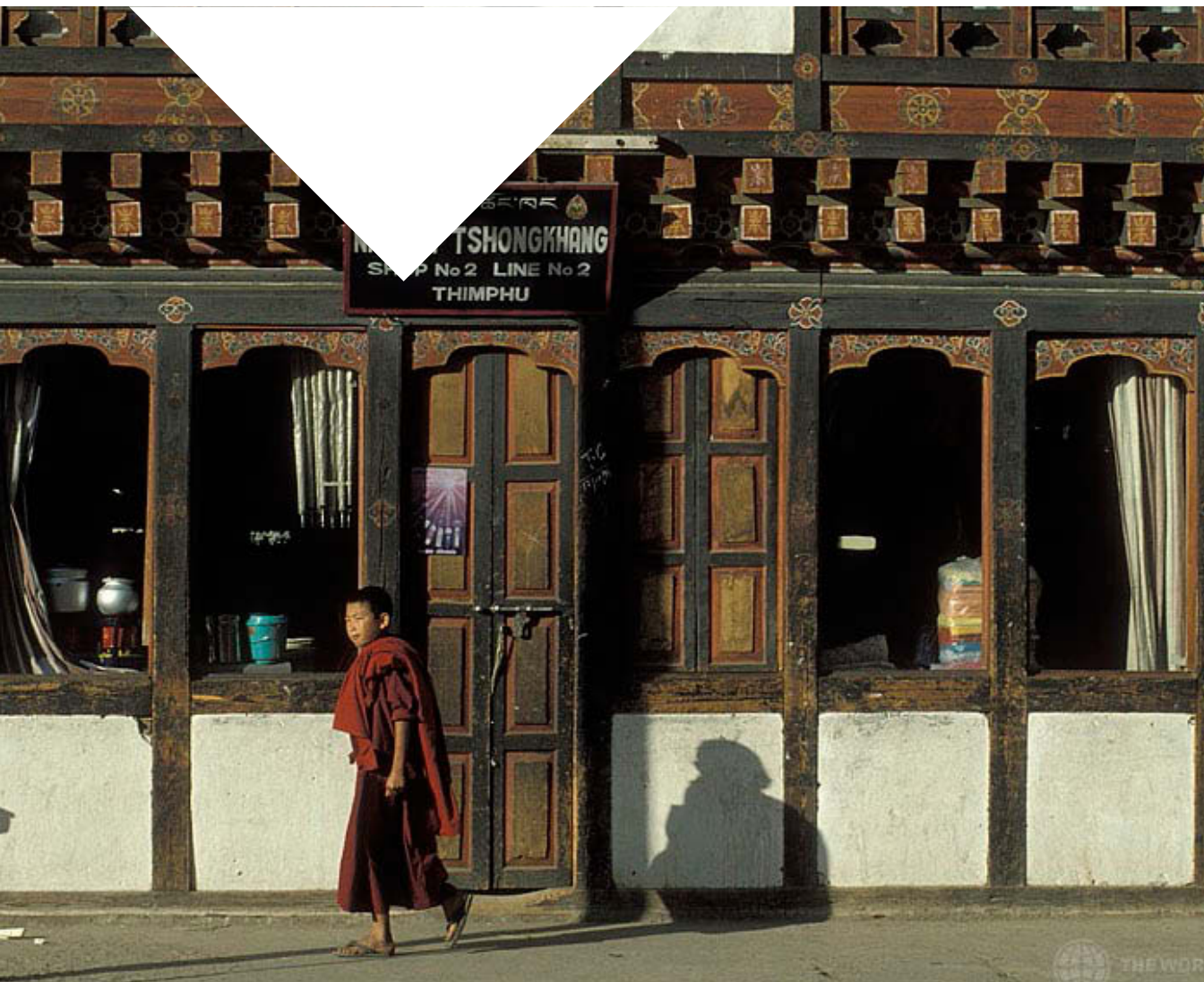
The agriculture sector is clearly responding to market incentives and opportunities, which calls for policy makers to pay close attention to the key constraints that may inhibit the sector from fully capitalizing on those opportunities. Rapid urbanization is one such opportunity for Bhutan's domestic markets, as urbanization increases the amount and kind of food demanded by consumers, who increasingly prefer higher-value commodities such as meat and other processed foods. In export markets, the opportunities lie in niche high-value commodities. If the nascent agribusiness sector is to serve these markets, it will have to expand. That expansion will not be possible without addressing constraints on effective value chains, which link agribusinesses backward to agricultural production on farms and forward to domestic and export markets. *Chapter 4* focuses on those constraints, which include restricted access to finance and investment, poor infrastructure, and weak markets.

The RGoB will play a key role in allowing the agriculture sector to seize new domestic and export market opportunities, by taking steps to enable more active private sector participation, supporting investments tailored to Bhutan's emerging economic hubs, and instituting cross-cutting reforms to enhance the regulatory environment. Examples include recasting public sector programs, subsidies, and incentives to better support the private sector; fostering a favorable business environment by simplifying and streamlining regulations; strengthening access to finance by allowing Bhutan Developing Bank (BDB) to develop a loan product to increase farm mechanization, and crowding-in private sector finance; and more aggressive actions to attract investment, possibly through the establishment of an investment promotion agency and the development of an investment promotion strategy with close involvement of the Bhutan Chamber of Commerce and Industry.

While many areas of Bhutan benefit from the opportunity to leverage the agglomeration economies in emerging production centers, this dynamism has bypassed some regions, particularly in the northern and eastern areas. These lagging regions, described in *Chapter 5*, need a different approach, in which efforts to address food insecurity and improve human capital are paramount.

Chapter 6 sums up the insights from this initial spatial analysis. It provides additional detail on the recommendations and approaches described in this summary to overcome the remaining challenges and harness the opportunities emerging in agriculture for economic transformation and the benefit of Bhutan's rural poor.

Background



Home to over 735,000 people, the Kingdom of Bhutan has achieved rapid economic growth and poverty reduction, despite the constraints of being a small, landlocked, and mountainous country. Its neighbors, China to the north and India to the south, are in contrast the two most populous countries in the world. Bhutan's land area is only 1 percent of India's and 0.5 percent of China's. Even surrounded by much larger economies, Bhutan has seen its economy expand rapidly in recent years, largely through hydropower exports to India and construction.¹ The country halved its poverty rate to 12 percent between 2007 and 2012, and by 2017 it had achieved a further reduction, to 8.2 percent (NSB and World Bank 2017). National policy remains centered on diversifying export-led growth beyond hydropower exports to India and on making Bhutan's economic growth more inclusive of all citizens. The agriculture sector, one of the five jewels in the Bhutanese economy, can play a key role in sustaining growth, reducing poverty, creating jobs, and expanding shared prosperity .

Bhutan's dense and virtually untouched forests, abundant water resources, and diversity of wild species are exceptional natural endowments, and correspondingly, environmental conservation is the cornerstone of Bhutan's development approach (World Bank 2014). The Constitution mandates that a minimum of 60 percent of the country—which has a total land area of 38,394 square kilometers—must remain forested for all time. Flat land is at a premium; elevations range from about 150 meters above sea level in southern Bhutan to about 7,000 in the northern areas. Ninety percent of the land area has a slope of 15 percent or more, and about forty percent has a slope of 50–100 percent. Soil erosion is a major concern (RGoB 2015). Bhutan's rugged topography, geography, and climatic features also make it prone to climate-related disasters such as floods, landslides, glacial lake outburst floods, drought, and earthquakes, which contribute to a loss of vegetation and biodiversity. Most of Bhutan's productive infrastructure (hydropower plants, roads, and airports), its fertile agricultural land, and over 70 percent of its settlements are located along the main drainage basins, which puts them at high risk of flooding. Additional concerns about water quality stem from the rise in domestic and industrial waste generation, along with improper disposal and runoff from agricultural fields and urban centers (World Bank 2016). Yet these same factors present significant opportunities. Bhutan has six agroecological zones with varied climates that range from subtropical to temperate and alpine and support production of a wide variety of crops.

This Policy Note reviews Bhutan's recent agricultural transformation from a spatial perspective and suggests measures to make further progress. The discussion focuses on crop-level drivers of productivity and spatial patterns of agricultural production in relation to markets, especially in relation to opportunities for expanding market potential to support the national development goals of the Royal Government of Bhutan (RGoB). The government has set targets in a number of policy areas where agriculture plays a critical role (Box 1).

¹ In 2016, Bhutan exported hydropower worth US\$190 million to India, or 40 percent of total exports and 9 percent of GDP (World Bank n.d.(b); CIA 2017; World Bank 2016).

BOX 1 Government policy goals

The development objectives of the Royal Government of Bhutan are embodied in national Five-Year Plans (FYPs). The 11th FYP, covering 2013–18, had the objective of “self-reliance and inclusive green socioeconomic development.” The plan encompassed three development milestones: the Bhutan Vision 2020, the Economic Development Plan 2010 (EDP 2010), and graduation from Least Developed Country status. The objective of the forthcoming 12th FYP 2018–23 is a “just, harmonious, and sustainable society, through enhanced decentralization.”

Economic diversification accompanied by sustainable economic development has been a central principle of Bhutan’s policy goals. Bhutan Vision 2020, launched in 2000, assessed the economy as aid dependent, import driven, and highly vulnerable. The 12th FYP seeks to increase the focus on decentralization by empowering local governments through greater financial planning, and administrative responsibilities and authority. The Bhutan Vision 2020 had already envisaged the development of priority areas as centers or hubs, with urban centers selected to anchor regional economic development in the western, central western, central eastern, and eastern regions.

The 12th FYP will continue previous strategies for the renewable natural resources (RNR) sector: encourage the transition from subsistence to commercial agriculture through targeted and commodity-focused interventions, ensure an enabling environment, and promote private sector participation. These strategies aim to address challenges consistently observed in the RNR sector, such as the loss of agricultural land, declining productivity, conflict between humans and wildlife, the shortage of farm labor and irrigation facilities, pest and disease management, and weak post-harvest management and facilities. The focus on enabling the private sector is reiterated in the Economic Development Policy 2016, which notes that “emphasis shall be on improving agricultural productivity and production to achieve national food security, supply raw materials to agro-based industries and for exports. Private sector participation shall be promoted in the RNR sector to augment the efforts of the Royal Government toward the sustainable development of the RNR sector” (RGoB 2016a). The Ministry of Economic Affairs is planning to establish and operate an incubator service for cottage and small industries, with some small equipment for training in a common facility. Cottage and Small Industries Development will be one of the flagship programs under the 12th FYP. Other prospective flagship programs are expected to include water security, organic Bhutan, Digital Drukyl, Startup Bhutan, one Gewog one product, highland livelihoods, and tourism.*

*For Digital Drukyl, see <http://www.moic.gov.bt/en/event-agency-head-meeting-on-digital-drukyl-flagship-program/>.

A wide array of data and information support the analysis for this Policy Note. The backbone for the analytical work consists of secondary sources, primary analyses commissioned for this study, and additional analyses of various datasets, including the *Agricultural Statistics Yearbooks* and the Bhutan Living Standards Survey (BLSS) from 2007, 2012, and 2017. See Box 2 for details.

BOX 2 Sources of data for the analysis in this Policy Note

Secondary sources and a primary analysis provided the data and other information used to develop this Policy Note. Secondary sources included a recent World Bank report, “Increasing Agribusiness Growth in Bhutan,”* and an upcoming World Bank Urban Policy Note, “Regional Development and Economic Transformation.” The primary analysis included a rapid value chain study of four commodities (dairy, vegetables, citrus, and maize). The *Agricultural Statistics Yearbooks* (ASys) and the Bhutan Living Standards Surveys (BLSSs) were the chief additional sources of primary data.

The ASY is published by the Department of Agriculture each year. It contains data on land use, crop area, yield (production), crop damages, and utilization of cultivated crops. The yearbooks are derived from the annual agriculture sample survey initiated in 2004. The sample covers a sizeable share of farming households. In 2016, for example, the sample was 19,339 households of the estimated total 61,509 farming households. The analysis for this report used combined yearbook data at the *dzongkhag* (district) level for 2005–16 (excluding 2008) to discern trends in production and yields for 21 key agricultural products: 4 cereals, 11 vegetables, and 5 fruits and nuts. The data covered harvested area (acres), production (in metric tons), and yield (in kilograms or metric tons per acre) of cereal and vegetable crops, and the total number of trees and bearing trees for the fruit and nut crops. The ASYs provide information on more than 70 agricultural products, although the analysis for this note focuses on the 21 most important commodities.

The BLSS is a nationally representative cross-sectional survey conducted every five years at the household level, and it is considered representative down to the district level. The analysis for this note used the 2007, 2012, and 2017 surveys, focusing on agricultural production data from farm households, defined as households operating some farmland or orchards. The sample of all households in the BLSS was 9,798 in 2007, 8,969 in 2012, and 11,660 in 2017. Of these, the sample of farm households (those with some farmland or orchards) was 6,019 (61 percent of the full sample) in 2007, 4,477 (50 percent) in 2012, and 6,803 (58 percent) in 2017. Extrapolating to the full population, the proportion of households considered to be farm households in the overall population of households is estimated at 61 percent for 2007, 59 percent for 2012, and 63 percent for 2017, suggesting that households with some agricultural land still constitute the majority of households. Notably, only the 2012 survey asked about the value of sales of agricultural produce, so 2012 is the only year for which the value of agricultural production (sold and consumed) can be aggregated. For that reason, BLSS 2012 data were used in the spatial analysis of household-level agricultural production. For various reasons, discussed in Annex 1, ASY and BLSS data may produce different results for the same calculations.

*Keturakis et al. (2017).

The Role of Agriculture in Bhutan's Structural Transformation, 2000–17



This chapter explores the role of agriculture in Bhutan's structural transformation.

Structural transformation typically entails a reallocation of the factors of production from low-productivity (agriculture) to high-productivity (manufacturing) sectors, but because not everyone moves from agriculture into manufacturing, the reallocation of labor is not absolute, which allows labor productivity and therefore incomes in agriculture to increase. This chapter broadly explores trends in factors of production between and within sectors, with a focus on agriculture. Two trends in particular are a source of concern: (1) labor on farms is decreasing, yet labor productivity in agriculture remains low, and (2) quality agricultural land, already scarce, is less available than ever.

Bhutan has experienced rapid, strong economic and income growth. Per capita income more than doubled between 2000 and 2017, rising from US\$3,539 to US\$8,709 (PPP, in constant 2011 U.S. dollars). Growth in gross domestic product (GDP) averaged around 5 percent per annum (p.a.) over the same period. The composition of GDP changed, with the share of agriculture to total value added decreasing, alongside an increase in the share of industry (Figure 1, panel a). Bhutan's labor force has been expanding quickly at around 3.6 percent p.a. over 2000–17, although industry and especially services have absorbed by far the largest share of labor, with a steady decline in the share of labor in agriculture (Figure 1, panel b).

Maintaining its importance, crop agriculture has grown as fast as the rest of the economy, while the livestock and forestry subsectors have grown more slowly. Looking at the broader set of sectors allied with agriculture, the share of forestry and livestock production in GDP has declined (Figure 2, panel a). Non-timber forest products are used primarily for subsistence purposes, but several have potential for the development of cottage industries. Livestock rearing is also important, especially as it is the main economic activity of communities living at higher elevations (World Bank n.d.(b)).^{2,3} At present, the national herd is composed of around 200,000 head of local cattle (including buffalos), 100,000 improved cattle, and around 50,000 yak and zo-zom. Crop production saw a marked expansion in fruit and nut production from 2005 to 2014 (Figure 2, panel b).

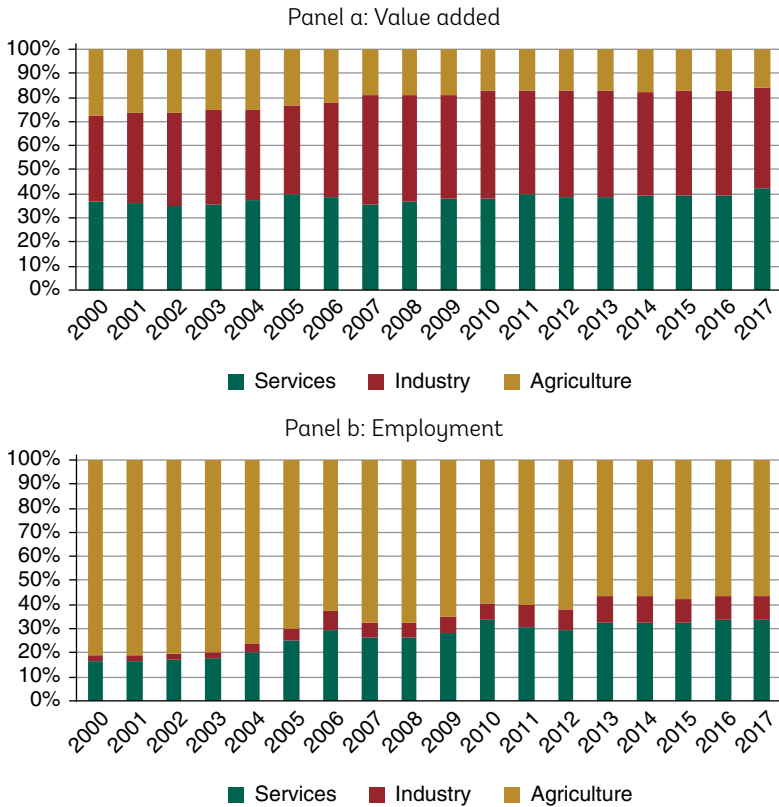
Labor productivity has been increasing slowly in agriculture but more rapidly than in industry and services. Labor productivity in agriculture increased from US\$1,200 per worker in 2000 to US\$1,300 a decade later and US\$1,500 in 2017, for a compound annual growth rate of a little over 1.2 percent (Figure 3). This rate of growth may be slow but still exceeds growth in labor productivity in services (0.5 percent) and industry (which declined by –3.5 percent).

The picture provided by these economic indicators is largely consistent with the typical trajectory of structural transformation associated with economic development,

2 Bhutan has three distinct large ruminant production systems. The transhumant yak system is limited to the alpine and cool temperate areas, and the migratory cattle system is based in the temperate subtropical areas. Herders in these two systems move with their animals to take advantage of seasonal variation in climate and vegetation. The third large ruminant production system is a sedentary livestock rearing system in other areas of rural settlement and in semi-urban areas (Reynolds and Wangdi 2012).

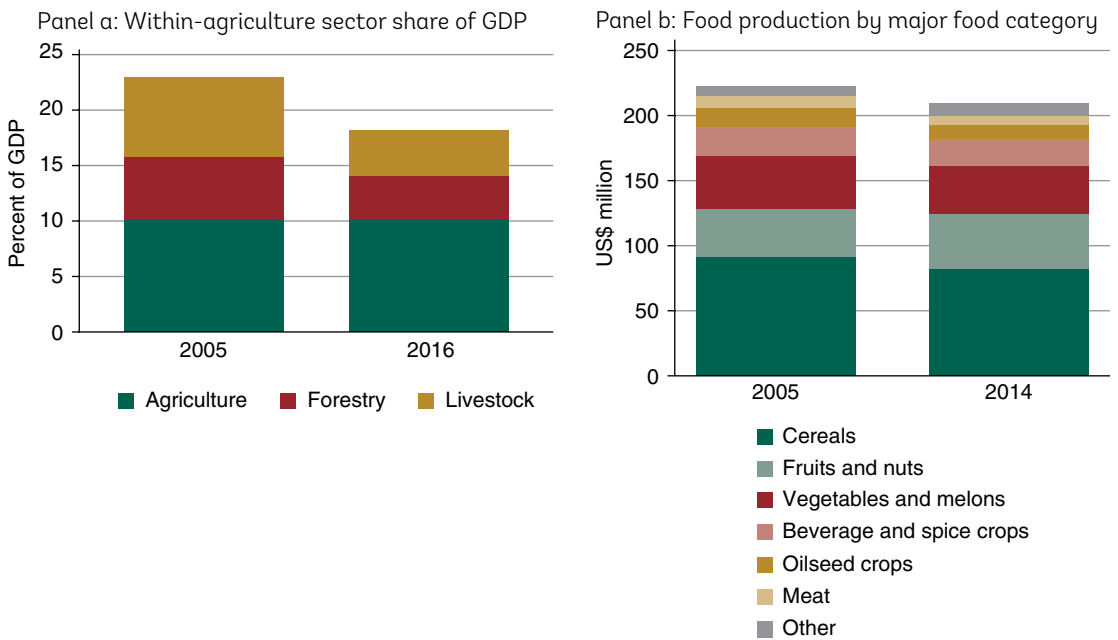
3 Fish farming has potential in some districts of Bhutan, but national fish output is very low at 119 metric tons in 2014, up from 64 metric tons in 2012, and 96.3 percent of fish (valued at US\$4.5 million) is imported (RGoB 2015; Department of Revenue and Customs 2016).

FIGURE 1 Changes in the structure of Bhutan's economy, 2000–17



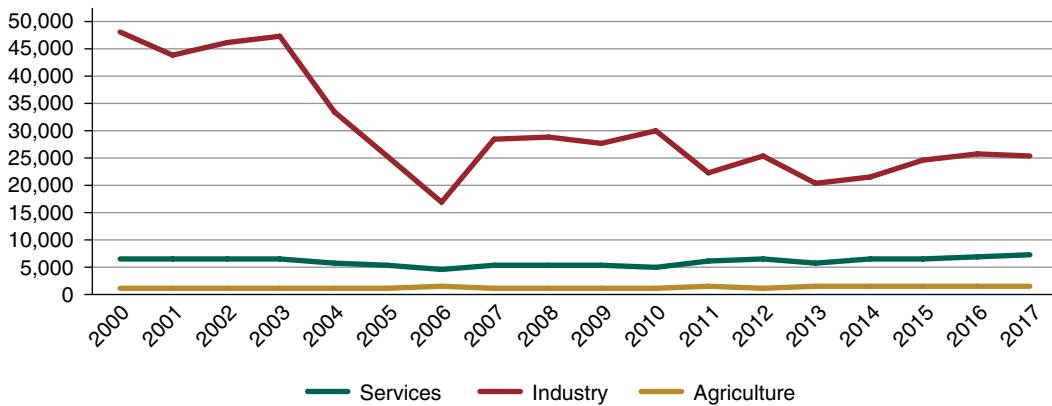
Source: World Development Indicators, World Bank.

FIGURE 2 Agriculture, forestry, and livestock production, 2005–16



Source: FAOSTAT.

FIGURE 3 Trends in labor productivity, 2000–17



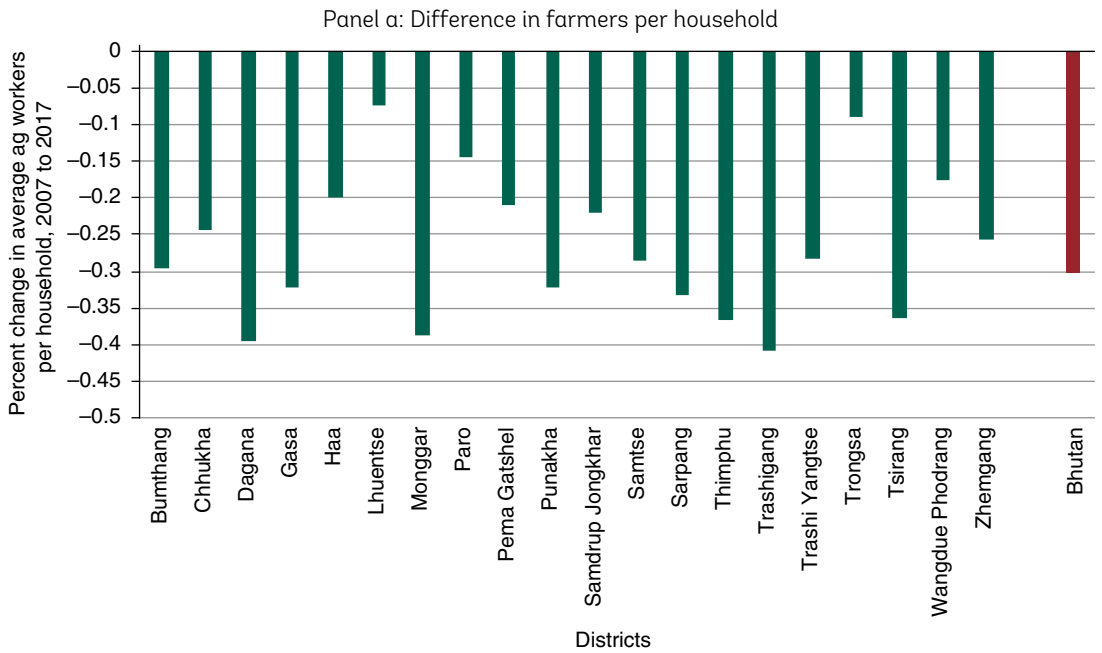
Source: World Development Indicators, World Bank.

with two caveats. First, the rates of increase in labor productivity in agriculture and services in particular are lower than one would expect, given the overall rate of economic growth. Second, the decline in labor productivity in industry is not consistent with the typical structural transformation story, but one explanation may be that the large increase in workers employed in industry (13 percent p.a.) exceeds the rate at which industrial GDP is growing (9 percent p.a.). The data suggest that workers are migrating from rural to urban areas at a pace that surpasses the capacity of the industrial sector to absorb them.

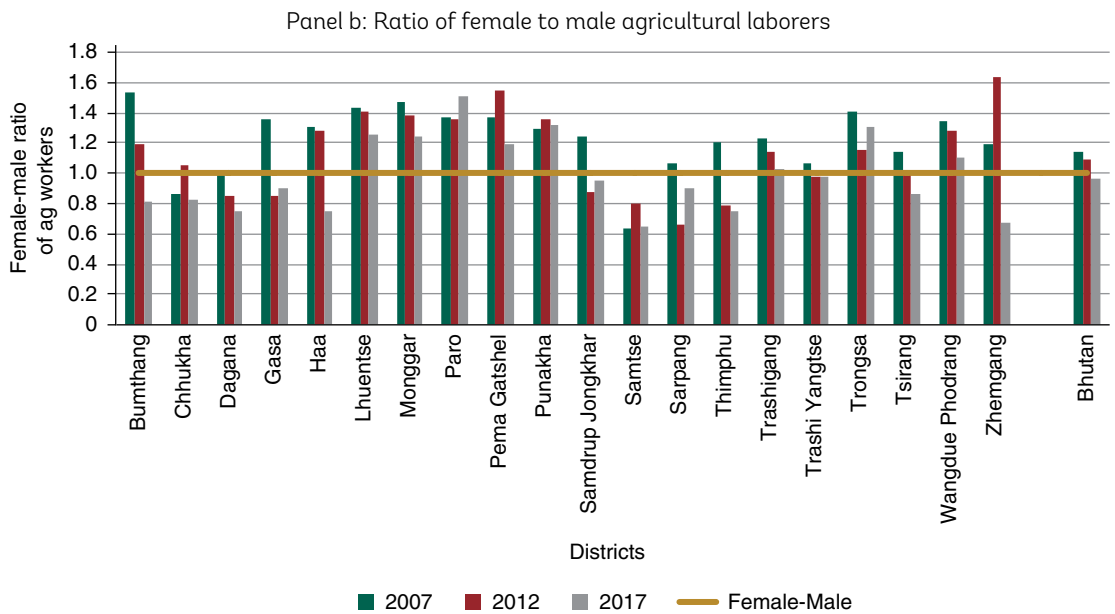
In line with increasing labor productivity in agriculture, farm labor per household has decreased in all districts of Bhutan. The average number of individuals in agriculture per household declined from 2.2 in 2007 to 1.5 in 2017—equivalent to a 30 percent decline over the 11-year period (Figure 4).⁴ This decline has occurred across all districts in Bhutan, with the largest declines seen in districts like Dagana, Monggar, and Trashigang, and smaller declines in districts like Lhuentse and Trongsa. The decline in household farm labor has coincided with a feminization of farm labor, although the pattern is apparent only in certain districts—namely, in Lhuentse, Monggar, and Paro, where the ratio of female to male farm workers in 2017 was greater than one. In contrast, in districts such as Bumthang, Gasa, and Haa the ratio of female to male farm workers decreased, and now more men than women are working on the farm on average. Nevertheless, women are more likely to stay in rural areas, as family responsibilities, land inheritance practices, and perceived insecurity limit female mobility (World Bank 2014). While men are normally the ultimate decision makers, women tend to be the legal owners of the land, and as such are expected to care for their parents (World Bank 2012).

⁴ Note that the definition of individuals working in agriculture used for this analysis varies because workers are classified differently in the three BLSS surveys. In BLSS 2007, they are defined as “subsistence agricultural and fishery-related workers” or “agricultural, fishery, and related laborers.” In BLSS 2012, they are defined as “field crop and vegetables growers,” “tree and shrub crop growers,” “gardener,” “farmer,” “dairy and livestock producers,” “cow herder,” or “timber assistant.” In BLSS 2017 they are defined as those “working in farming, raising animals, forestry, fishing.”

FIGURE 4 Farm labor in agricultural households, 2007–17



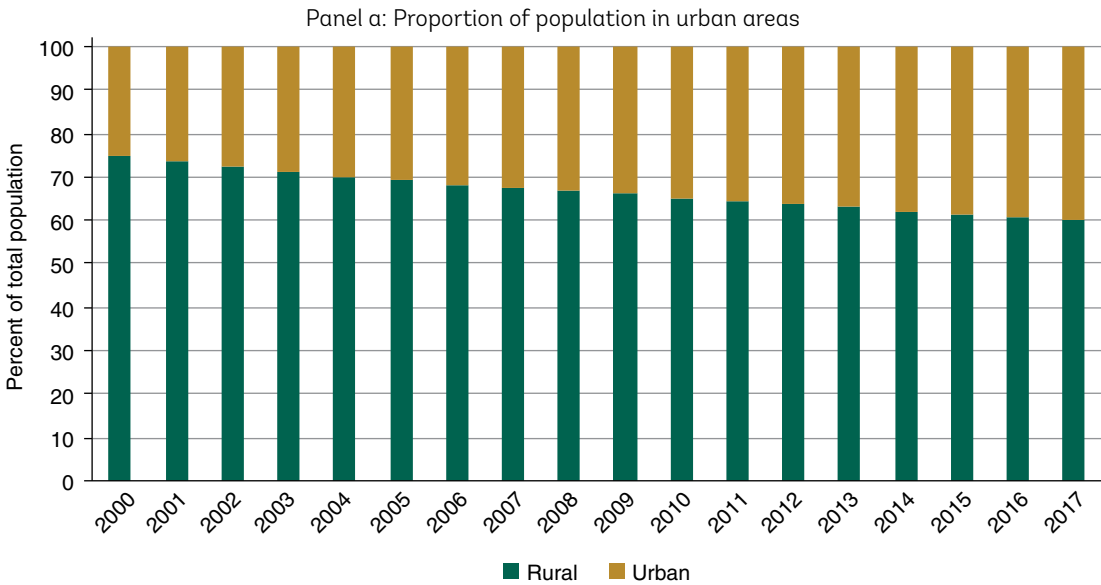
Source: BLSS 2007 and 2017.



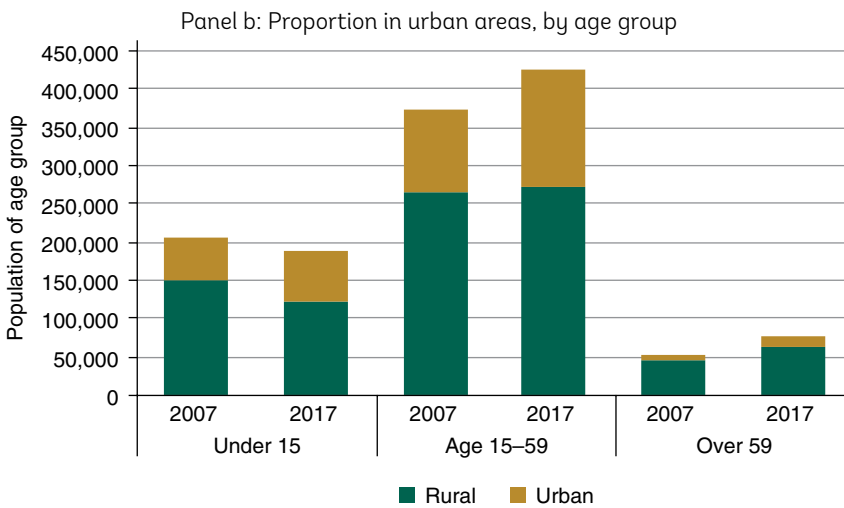
Source: BLSS 2007, 2012, and 2017.

Bhutan’s economic transformation is associated with rapid urbanization—in other words, the structural migration out of agriculture is synonymous with spatial migration into urban areas. The share of Bhutan’s population living in urban areas increased from 25 percent in 2000 to 40 percent in 2017 (World Bank n.d.(a)) (Figure 5). Over that period, although average total population growth was 2 percent, it was 4.8 percent in urban areas and only 0.8 percent in rural areas. An important demographic trend for Bhutan is that the economically active population—individuals ages 15–59 years—increased by 44 percent in urban areas (from 105,000 in 2007 to 152,000 in 2017), compared to an increase of only 2.7 percent in rural areas over the same period. This

FIGURE 5 Population in urban areas of Bhutan



Source: World Development Indicators, World Bank.



Source: BLSS 2007, 2017.

means that within a decade, the economically active age group (15–59 years) living in urban areas rose from 27 percent of the urban population (2007) to 36 percent (2017).

Despite productive land being a particularly scarce resource in Bhutan, a considerable area is underutilized. Given the country’s topography and the constitutional protection afforded to forested areas, the supply of productive farmland is limited—essentially, it is fixed—and vulnerable to urban encroachment. Yet in 2016, of 182,091 acres considered operational, about one-third was left fallow (Table 1). Fallow area varies considerably throughout the country, however. In the east, 83 percent of the land in Bumthang and 69 percent in Pema Gatshel was left fallow. In contrast, less than 10 percent of the land is left in fallow in the more populated areas surrounding Thimphu, Paro, and Punakha. Evidence that land is widely underused is reinforced by data

TABLE 1 Land utilization by district, Bhutan, 2016

| Dzongkhag | Fallow land (acres) | Operational land (acres) | Fallow (% of operational) |
|------------------|---------------------|--------------------------|---------------------------|
| Bumthang | 3,439 | 4,153 | 83 |
| Chhukha | 1,554 | 10,998 | 14 |
| Dagana | 2,285 | 14,318 | 16 |
| Gasa | 61 | 650 | 9 |
| Haa | 1,241 | 3,176 | 39 |
| Lhuentse | 3,051 | 6,425 | 47 |
| Monggar | 5,892 | 13,515 | 44 |
| Paro | 527 | 7,115 | 7% |
| Pema Gatshel | 7,570 | 10,907 | 69 |
| Punakha | 771 | 9,039 | 9 |
| Samdrup Jongkhar | 4,820 | 12,179 | 40 |
| Samtse | 4,965 | 21,334 | 23 |
| Sarpang | 2,424 | 11,139 | 22 |
| Thimphu | 185 | 1,396 | 13 |
| Trashigang | 7,270 | 15,784 | 46 |
| Trashigang | 2,433 | 6,339 | 38 |
| Trongsa | 2,942 | 6,216 | 47 |
| Tsirang | 1,211 | 9,999 | 12 |
| Wangdue | 1,612 | 9,617 | 17 |
| Zhemgang | 3,425 | 7,793 | 44 |
| Bhutan | 57,681 | 182,091 | 32 |

Source: Agricultural Statistical Yearbook 2016.

presented later in Chapter 3, which indicates that negative growth in the agricultural area has reduced long-term growth in agricultural productivity, and that growth in the area devoted to producing most crops has declined.

The substantial area of land that is under the usufruct rights of rural households but is not used for agriculture can inhibit productivity growth and structural transformation in agriculture. The under-use of this land represents a considerable opportunity cost for the country. It prevents land from being consolidated for use by the households remaining in agriculture as others leave, thereby depressing the growth of labor productivity in agriculture. (Note that land consolidation in the context of structural transformation expands the average farm size, in contrast with collective action to internalize economies of scale—such as “pooling” land to mechanize production.) This phenomenon is consistent with the low and stagnant labor productivity in agriculture shown previously in Figure 3. There are a few plausible broad explanations for the under-use of agricultural land. First, on the demand side, household labor availability is constrained—in general or for peak periods—so the current land endowment is the maximum area that a single household can cultivate. Second, on the supply side, households migrating out of agriculture are reluctant to allow others to use their land, either by selling or leasing plots. This tendency is seen in countries at similar stages of transition with limited land markets and distorted tenure security (especially in countries where temporary leaseholds are difficult to revoke).⁵ Third, it may be that land is made available only in locations disconnected from markets, where the remaining farm households produce for themselves, are meeting their immediate needs, and have no incentive to increase agricultural production.

Owing to economic and agricultural growth, household food security and diets have improved. Bhutan is largely a food-secure country, where almost all households have enough to eat throughout the year. In 2007 an average household had enough food for 11.6 months of the year, and in 2017 it had enough for 11.9 months, according to the BLSS. The proportion of households reporting difficulty in having enough food in the past year declined from 10.8 percent in 2010 to 2.2 percent in 2015 (Nutrition Program 2015). Not only do households have enough to eat, but most are also eating diverse diets. Based on the World Food Programme Food Consumption Score, which measures the frequency of consumption of different food items, in 2015 only 7.1 percent of households had borderline inadequate food consumption, and only 0.6 percent had poor food consumption.

Overall nutrition outcomes have improved with the widespread sufficiency of food and diversity of diets, but the gap in nutrition outcomes between rich and poor is widening. Sustained nutrition is crucial for cognitive development in children and is the foundation for improved skills and associated labor productivity over the long term. The prevalence of stunting, a measure of chronic undernutrition among children under age five, declined from 34 percent in 2010 to 21 percent in 2015. The prevalence of wasting, a measure of acute undernutrition, has remained low, at 5.9 percent in 2010 and 4.3 percent in 2016 (Unicef Bhutan 2016). One concern, however, is that while overall nutrition has improved, the gap between the rich and the poor has widened. In 2010 the

⁵ Vietnam, for example.

prevalence of stunting in the poorest quintile was two times of that in the wealthiest quintile, whereas in 2015 the difference is now six times wider. The implication is that the overall progress in diets and nutrition has bypassed certain groups. Stunting is now a more localized phenomenon—both spatially and among particular segments of Bhutanese society.

The encouraging achievements in agricultural development as a pillar of Bhutan’s structural transformation are tempered by indications that they were not based on broad productivity growth and therefore may not be sustained. A decomposition of the sources of long-term growth in agricultural production for 2005–14 reveals that growth was driven largely by greater intensity in input use. Figure 6 illustrates the components of productivity conceptually (panel a) and empirically (panel b) for Bhutan compared to Afghanistan, India, and Nepal. Annex 2 explains the decomposition of productivity growth in detail, but essentially productivity growth is positive when each element of yield growth—itsself an aggregation of input intensification and total factor productivity (TFP) growth—and area growth is positive (that is, “above the line” in the figure, as in the case of Nepal).

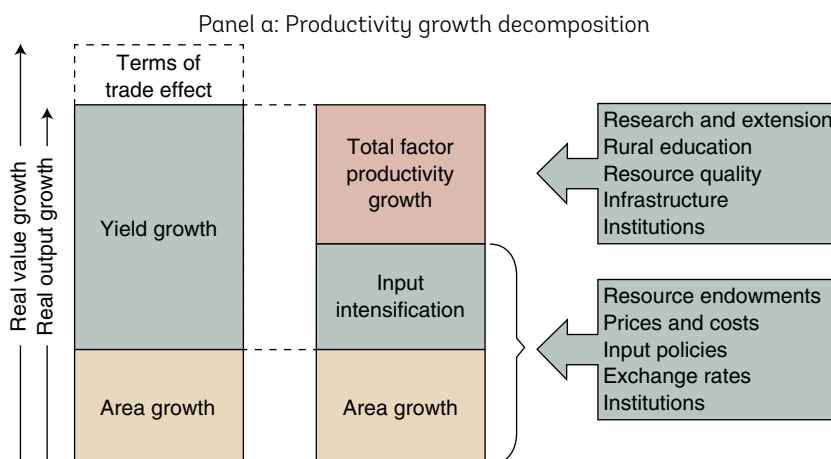
A concern in the case of Bhutan is that the data suggests a reduction in land under production and a decline in TFP over the period, contributing to an overall drop in output. These circumstances contrast markedly with those of neighboring countries (and with the general trends observed during sustained periods of successful agricultural growth), which demonstrate a positive, if modest, expansion of cultivated land and increases in TFP. While the increased use of inputs is a positive development in Bhutan—the BLSS indicates that spending by farm households on purchased inputs rose from around US\$23 per year in 2007 to US\$36 in 2017—increases in input use are typically subject to diminishing marginal returns and therefore unlikely to be a sustained driver of physical productivity growth.

Low aggregate growth in agricultural productivity within Bhutan has led to a sharp rise in food imports. Import data⁶ for Bhutan are not available after 2012, yet on average around four-fifths of Bhutan’s food imports are sourced from India, so export data from India can serve as an approximation. Food exports to Bhutan from India increased from just under US\$2 million at the turn of the century to almost 10 times that amount in 2017 (Table 2). Over the decade from 2007 to 2017, exports of food products from India to Bhutan increased at an average annual rate of 17 percent.

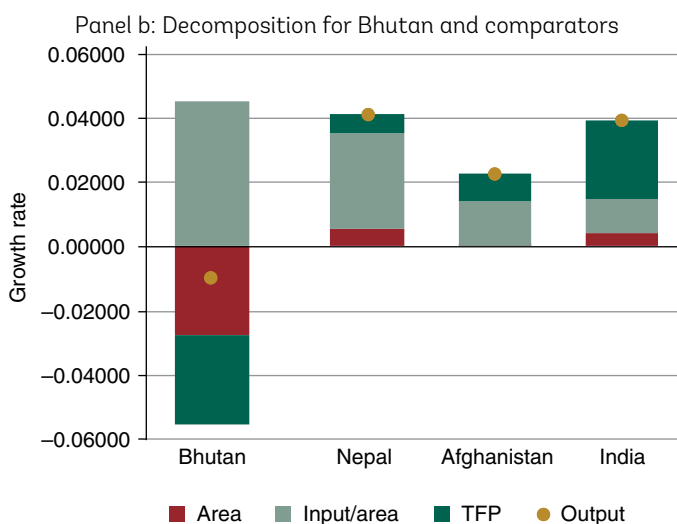
This chapter has outlined broad trends in Bhutanese agriculture, but the agriculture sector is far from homogeneous. Variations in production systems, livelihoods, opportunities for commercial farming, diversification, value addition, and agroprocessing all reflect the heterogeneity of Bhutan’s agroecological environment. This Policy Note is an initial step in exploring the recent performance of the agriculture sector based on a more detailed picture of differences in the spatial setting for agriculture and shifts in crop production over time.

6 World Integrated Trade Solution database.

FIGURE 6 Decomposition of growth in agricultural productivity in general (panel a) and in Bhutan and comparators over 2005–14 (panel b)



Source: Fuglie and Rada (2013).



Source: USDA ERS, TFP decompositions.

TABLE 2 Exports of food products from India to Bhutan, 2002–17

| Year | Exports (US\$ 000s) |
|------|---------------------|
| 2002 | 1,861.96 |
| 2007 | 3,269.20 |
| 2012 | 13,081.50 |
| 2017 | 18,525.88 |

Source: World Integrated Trade Solution database.

Crop-Level Trends and Spatial Patterns in Agriculture

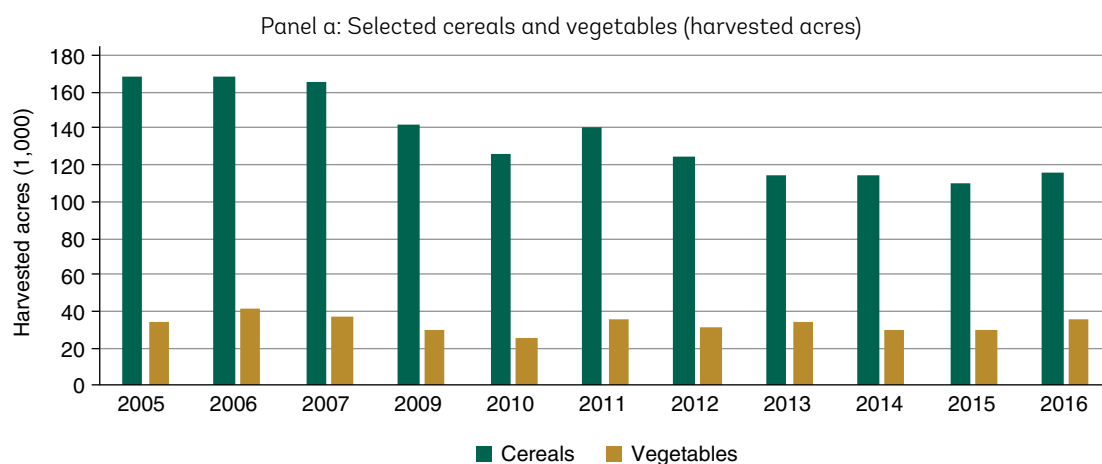


This chapter delves more deeply into how trends at the crop level intersect with spatial patterns in production. Analysis at this more granular level demonstrates that the agriculture sector is responding to market incentives by transitioning to higher-value crops and concentrating production in specific strategic areas. The first part of the analysis focuses on individual crops, and the second focuses on spatial differences in production.

Crop-level Productivity Drivers

Land availability is limited and declining. Only 14 percent of land is used for agriculture, of which 2.3 percent is cultivated with permanent crops, 19 percent is classified as arable land, and 79 percent is used for meadows and permanent pastures (Glaeser 2018).⁷ Land productivity can be increased through improvements in physical yields (or reductions in post-harvest physical losses), or through diversifying into higher-value crops on the same land. According to the ASYs, land under major cereal crops and numbers of trees for major fruit and nut crops have all been declining substantially over the last decade (Figure 7).⁸ In contrast, the land allocated to vegetables has remained constant. Figure 8 presents average long-run annual growth rates (2005–16) of harvested land for specific crops and trees for specific fruits and nuts. The decline in land allocated to cereals has largely affected wheat and barley production and, to a lesser extent, the two main cereal

FIGURE 7 Land allocated to various crops, 2005–16

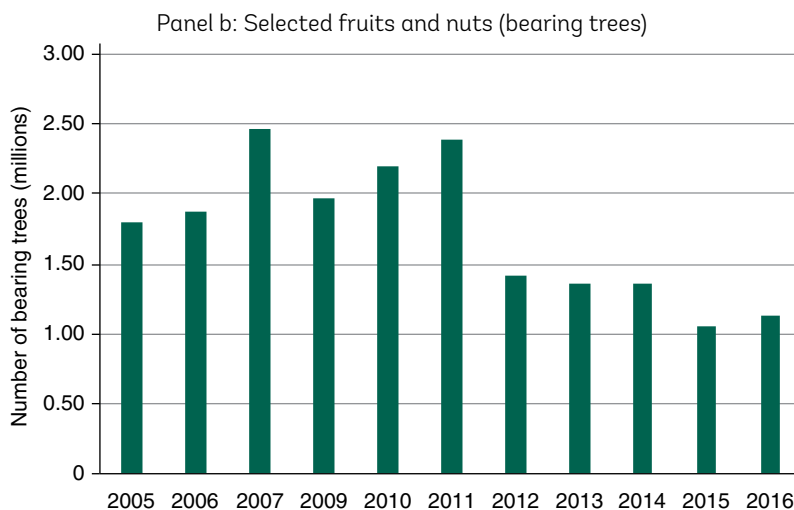


Source: Agricultural Statistical Yearbooks for 21 major products.

7 According to some studies (UNDP 2016), “per capita availability of agricultural land in Bhutan is one of the lowest in the world, constrained by the lack of arable land (5.4 percent of total land area in the country is fit for cultivation). . . . It has also been reported by the recent Land Cover Mapping Project (LCMP, 2015) that only 2.93 percent of the area is fit for agriculture cultivation.”

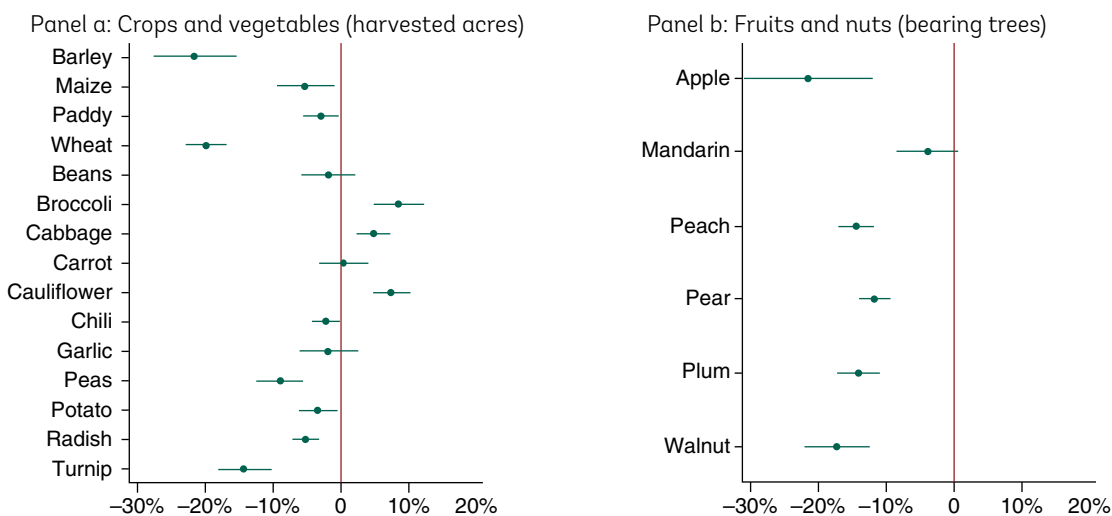
8 Note that because no data are available on land used for fruit and nut production, trees are included as a proxy for land. Strictly speaking, however, the number of trees is an imperfect approximation for area under production, since tree density differs across tree crops and can change with improved agricultural practices.

FIGURE 7 Continued



Source: Agricultural Statistical Yearbooks for 21 major products.

FIGURE 8 District annual growth rates in harvested land and trees, 2005–16

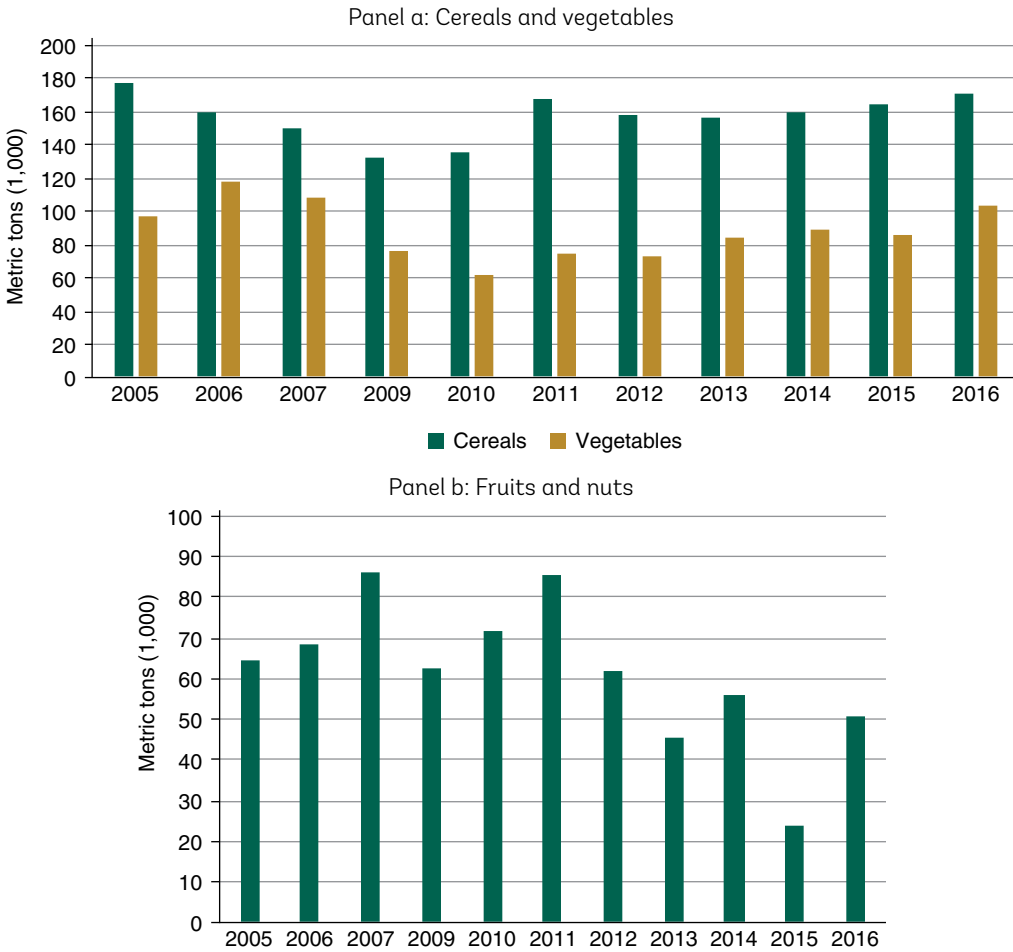


Source: Agricultural Statistical Yearbooks for 21 major products.

crops: maize and rice. A similar trend is observed in fruits and nuts. The number of trees under production has declined for all six types of fruits and nuts. In contrast, the area planted to 4 of the 11 vegetable crops has expanded, driving the overall stability in land under vegetable production.

Nevertheless, aggregate production (by volume) has remained stable, indicating a positive trend in (physical) land productivity among a range of key crops. As shown in Figure 9, physical production of cereals and vegetables has been essentially constant. In contrast, aggregate production of fruits and nuts has declined, which would be expected,

FIGURE 9 Production of various crops (thousands of metric tons), 2005–16

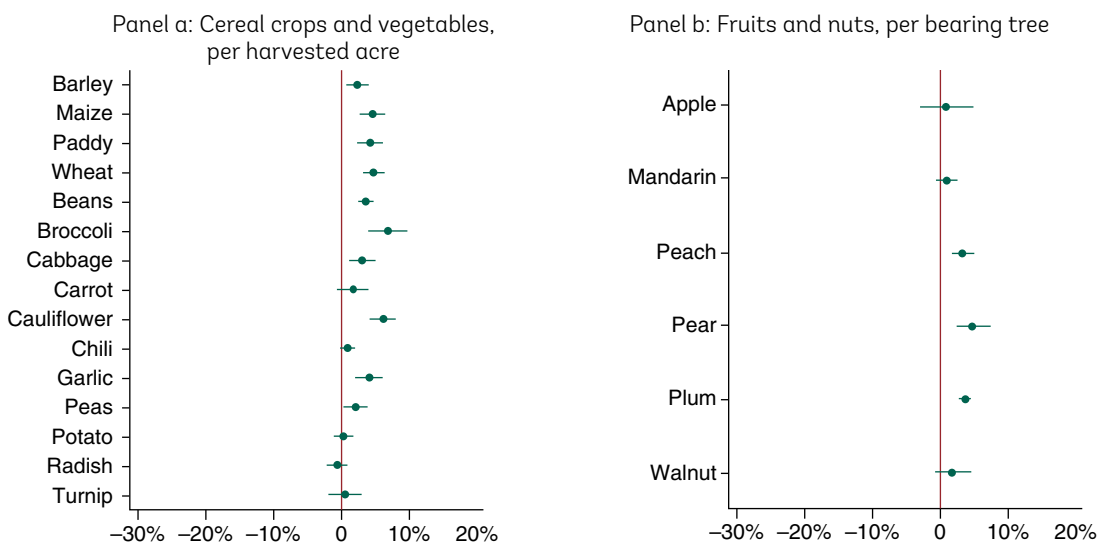


Source: Agricultural Statistical Yearbooks for 21 major products.

given the large decline in trees (a proxy for land) under production shown in Figure 7. However, there is evidence of sustained improvements in productivity for many crops (as measured by land yields) and for fruits and nuts (as measured by yields in bearing trees) (Figure 10).

The opposing trends of declining land area with increasing physical yields, combined with price movements, changed the aggregate value of different crops across the sector. A comparison of data for two more recent years, 2012 and 2016, shows that the aggregate value of production for the same 21 agricultural products doubled from 7.35 to 14.91 billion Bhutanese ngultrum (Nu.). This aggregate increase in revenue is largely driven by growth in the value (revenue) of cereals, which increased by 124 percent. Vegetables increased by 106 percent, and fruits and nuts by 32 percent.

FIGURE 10 Annual growth rates in physical yields (metric tons per acre or bearing tree), by district, 2005–16



Source: Agricultural Statistical Yearbooks.

Dynamic diversification is occurring at the local level as farmers increasingly allocate land to crops with a higher value per acre, produced for the market, and shift cereal crop production to the more profitable cereals. Production has declined for barley and wheat, while it has increased for maize and paddy (Table 3). From 2012 to 2016, the largest increases in value per acre came from maize, in the form of a slight increase in physical yields and a much larger increase in the maize price. During this period, the price of maize increased over three times more than the increase in the price of barley, paddy, or wheat (Figure 11).

Allocated land and production also increased for most vegetables, especially those with higher growth in value per acre, such as cauliflower and broccoli, implying a reallocation at least in large part from lower- to higher-value vegetables and from low-value cereals to higher-value horticulture. Relative to cereals, vegetables are produced much more for the market (Figure 11, Panel b). The greatest increases in value per acre for vegetable crops over 2012–16 occurred in cabbage, beans, broccoli, carrots, cauliflower, and chili (Table 3). For most of these crops, such as cabbage, beans, broccoli, and carrots, the increase is driven by a combination of growth in physical yields and in the price of the crop. In contrast, the growth in value per acre for cauliflower is largely driven by an increase in price, whereas for chili it is largely driven by growth in physical yields. In contrast to vegetables, production and numbers of bearing trees declined for all fruits and nuts from 2012 to 2016. Across fruits and nuts, growth in physical yields (of trees) has been either negligible or negative (unlike results shown in Figure 10, which present long-run annual growth rates in physical yields, as opposed to the comparison here of two years). Fruits and nuts are marketed domestically or sold for export, and the

TABLE 3 Decomposition of change in value per acre from 2012 to 2016

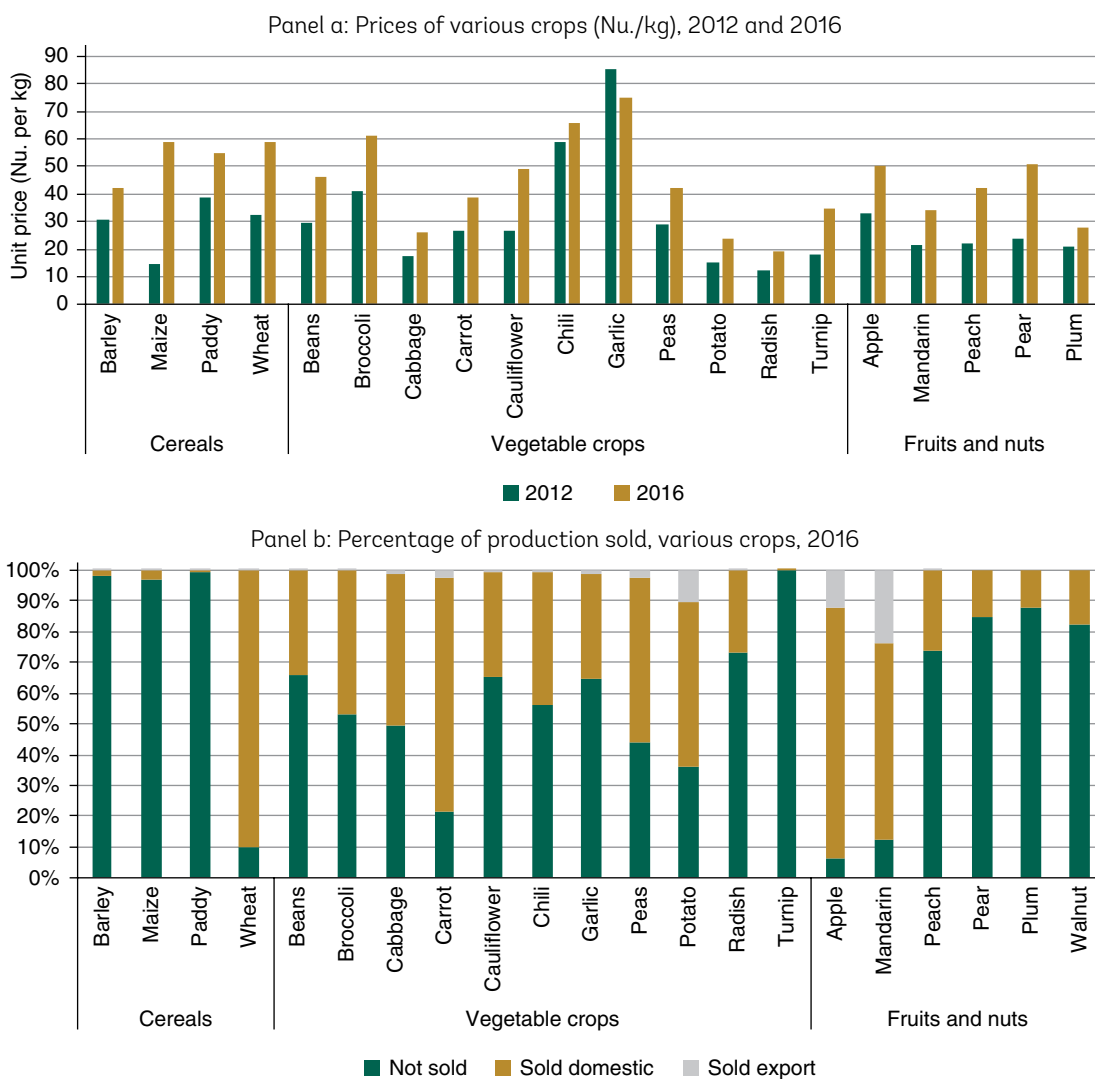
| Crop | Production | Price | Land or trees | Physical yields | Value per acre or tree |
|------------------------|------------|-------|---------------|-----------------|------------------------|
| Cereals | | | | | |
| Barley | -28% | 37% | -25% | -4% | 32% |
| Maize | 12% | 306% | -11% | 26% | 412% |
| Paddy | 9% | 41% | 2% | 7% | 52% |
| Wheat | -50% | 81% | -33% | -25% | 35% |
| Vegetables | | | | | |
| Beans | 78% | 56% | 19% | 49% | 133% |
| Broccoli | 177% | 49% | 83% | 51% | 125% |
| Cabbage | 96% | 50% | 2% | 92% | 187% |
| Carrot | 118% | 45% | 44% | 51% | 120% |
| Cauliflower | 151% | 83% | 107% | 21% | 122% |
| Chili | 28% | 12% | -29% | 80% | 102% |
| Garlic | 83% | -12% | 11% | 65% | 45% |
| Peas | 30% | 46% | -3% | 34% | 95% |
| Potato | 37% | 57% | 17% | 17% | 84% |
| Radish | 24% | 55% | 26% | -2% | 52% |
| Turnip | 31% | 96% | 340% | -70% | -42% |
| Fruits and nuts | | | | | |
| Apple | -14% | 52% | -19% | 7% | 62% |
| Mandarin | -15% | 60% | -20% | 6% | 70% |
| Peach | -40% | 89% | -43% | 6% | 100% |
| Pear | -55% | 114% | -16% | -47% | 13% |
| Plum | -46% | 35% | -18% | -34% | -11% |
| Walnut | -56% | 234% | -40% | -28% | 142% |

Source: Agricultural Statistical Yearbooks, 2012 and 2016.

increase in their prices has sustained growth in value per tree between 2012 and 2016, particularly for mandarins, peaches, and walnuts.

Agricultural growth has been driven by input intensification rather than land extensification. The role of input intensification is demonstrated by the steady increase in farm household expenditures on purchased inputs. Figure 12 provides a breakdown of the average input expenditure per acre by farm households, which clearly shows an increase in input intensity in Paro, Thimphu, and Bumthang and an increase over time. As noted, the average annual spending on inputs per farm household increased from only US\$23

FIGURE 11 Prices and sales of various crops, 2012 and 2016



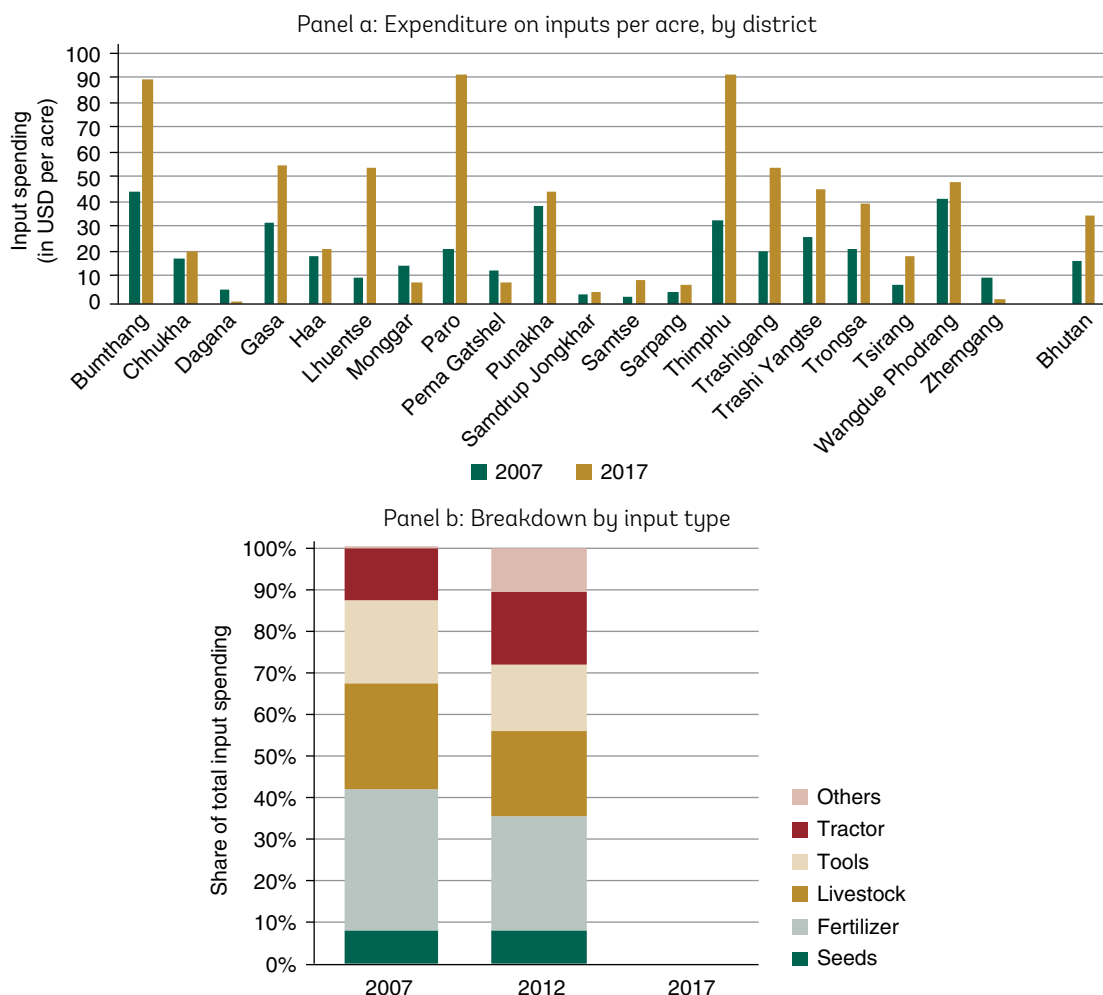
Source: Agricultural Statistical Yearbooks, 2012 and 2016.

in 2007 to US\$36 in 2017, a 57 percent increase over 11 years.⁹ Expenditures on seed and fertilizer have increased as well, in contrast to declining land and labor expenditures. Spending on machinery remains low, however.

The fact that mechanization and irrigation are at suboptimal levels compounds the emerging issues of land and labor scarcity. Bhutan has 1,200 community-managed irrigation systems, of which 1,000 are functional, irrigating about 64,428 acres—well below the 200,000 acres or 50 percent of Bhutan’s cultivable land considered irrigable. The government has set a target to increase irrigated acres to 91,000 by 2032

9 The exchange rates used were 41.349 BTN = 1 USD in 2007, 53.437 BTN = 1 USD in 2012, and 65 BTN = 1 USD in 2017.

FIGURE 12 Farm household expenditure on purchased inputs (US\$/acre) by district and input type, 2007–17



Source: BLSS for various years.
 Note: For panel b, data for 2017 not available.

(AED 2018). While the lack of irrigation facilities is one constraint, the efficiency and functionality of existing irrigation facilities is another; 20 percent of the dysfunctional irrigation systems were out of service because of technical issues, 18 percent because of social issues, 8 percent because of water source issues, and the large remainder was out of service for reasons that could not even be identified. The failure to identify the source of dysfunction is largely due to inappropriate understanding and limited experience of engineers in irrigation planning, design, construction, and maintenance (JICA 2017). Like irrigation, mechanization is also low: in 2015, only 2 percent of agricultural land was considered mechanized, defined as the proportion of land preparation achieved using power tillers. The target for Agriculture Machinery Centres is to achieve mechanization rates of 20 percent (Dorji 2015).

The low number and dysfunctionality of irrigation systems and low mechanization are driven to a large extent by Bhutan's geography and exposure to climate risks.

Irrigation infrastructure in Bhutan is poor and vulnerable, with leaking earthen canals, increasing competition over water use, and high susceptibility to climate change effects such as floods and landslides (AED 2018). Fields are fragmented in small pockets far from water sources, which makes irrigation expensive and difficult. In response, the RGoB has improved irrigation efficiency through sprinkler and drip irrigation schemes (Palden 2017). Bhutan's landscape also inhibits farm mechanization. As with irrigation, small and fragmented plots limit the potential for aggregation and economies of scale in mechanization, undermining competitiveness. A serious consideration is that agricultural land is located at 2,400 meters above sea level on average, mostly on steep slopes with narrow terraces that restrict options for mechanization. Technology developed elsewhere, such as the lowlands of India, is generally ill-suited to Bhutan's steep slopes. Because opportunities for using four-wheeled tractors are limited, two-wheeled tractors and power tillers are better technical alternatives. Nevertheless, even these are infrequently used (Keturakis et al. 2017), in part because their utilization rates are below those required to be cost-effective investments (Dorji 2015). While mechanization has been successfully deployed in areas across the region, including in Nepal and India, even in such places mechanization rates remain low. In Nepal, only 23 percent of farmers adopted tractors during 2010–16 (Takeshima 2017).

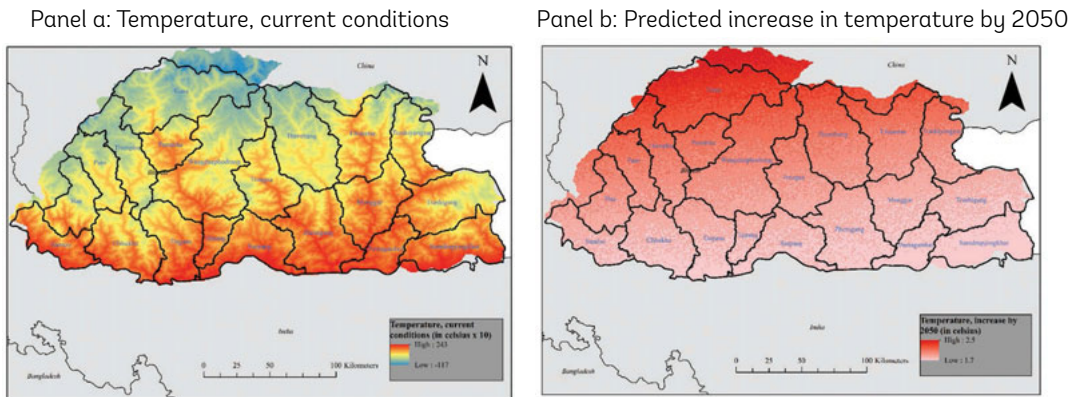
Climate change and variability are affecting agricultural production, and accurate and reliable weather information is unavailable to many farmers.

Because most agricultural production is rain-fed, it is vulnerable to climate variability and climate extremes, yet weather information is largely unavailable for many farmers. The only climate information provided to the public is a 24-hour weather forecast issued by the National Center for Hydrology and Meteorology, distributed through the local TV stations, and a three-day forecast on their website. A survey conducted in 2015 as part of the Hydrometeorological Services and Disaster Resilience Regional Project of the World Bank identified demand for seasonal rainfall outlooks, forecasts of the onset of the monsoon, and weather forecasts (daily and seven-day rainfall and temperature forecasts).

Climate change is expected to further impact production and productivity in the future.

Modelling projections show rising temperatures across Bhutan, which will increase the threat of glacier lake outburst floods. Rising temperatures are also expected to reduce water availability (which increases fallow land) and increase erratic and excessive rainfall patterns (which decreases arable land). In other places in the region, such as in northern India, changes in agroclimatic suitability for tree crops are already observed as a result of climate change (one example is apples in Himachal Pradesh). Many factors drive these effects, including disease vectors. The climate change impacts on agriculture are mixed but mostly positive at the macro level—largely because of an expansion in viable land for production—although a negative impact is projected for maize yields, and poultry numbers for egg production. At present, there is a lack of institutional, infrastructure, human, and technical capacity in dealing with climate change and its effects on agriculture and biological diversity, food security, and water resources. The understanding and awareness of the impacts of climate change are deemed low at all levels, from the central level down to the extension units at the gewog (subdistrict)

FIGURE 13 Current and predicted temperature for Bhutan



Source: CIAT climate change predictions.

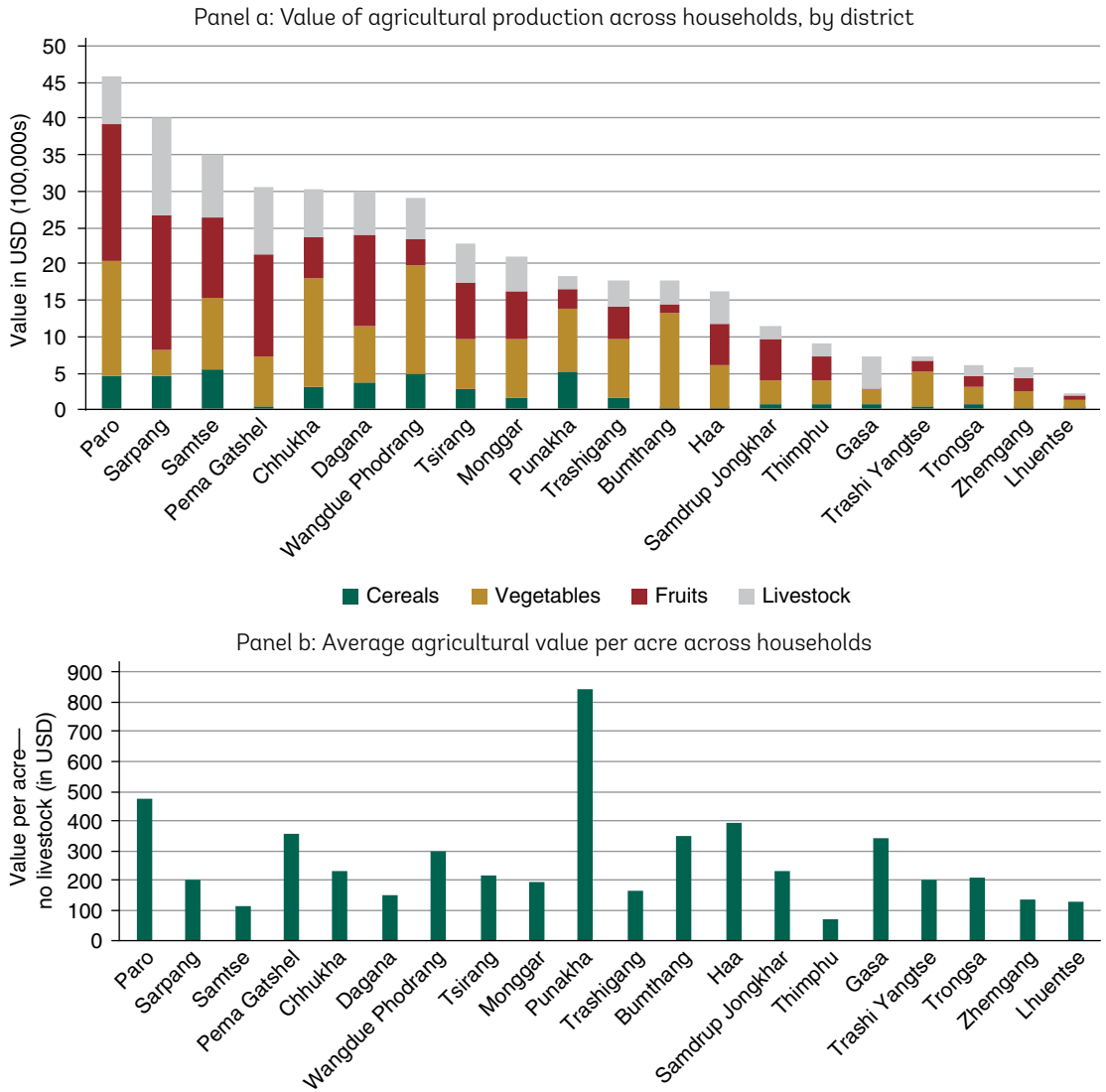
level. Farmers' awareness of climate-smart agriculture practices is also limited (CIAT and World Bank 2017). The effects of climate change are likely to vary across districts, with temperatures rising much faster in the northern areas (Figure 13).

Spatial Differences in Agricultural Production

Reflecting the topographical diversity of the country and differing levels of population density, aggregate production varies considerably across the 20 districts (*dzongkhag*). Paro District, close to Thimphu and the location of the main airport, dominates aggregate production by value, with the other southern border districts of Sarpang, Samtse, Pema Gatshel, Chhuka, and Dagana each accounting for US\$3 million or more in household agricultural production (crops and livestock) in 2012 (Figure 14). These border districts are spurring the kind of agricultural development that is the goal for the entire nation. Value per acre among farming households (excluding livestock) also varies largely across districts. Some districts with high aggregate production such as Paro and Pema Gatshel also exhibit high value per acre. Others do not: for example, in Sarpang, a district with high aggregate production, the value per acre of agricultural production is as low as in Lhuentse, the district with the lowest aggregate production.

Districts with a higher level of market participation tend to have higher levels of aggregate production value. The top 10 districts in terms of aggregate production value all show higher levels of commercialization. More specifically, in these top 10 districts over 75 percent of households sell at least 10 percent of the value of their agricultural produce (Figure 15, panel a). The constraints and opportunities for commercialization vary across districts owing to their different degrees of connectivity, population density, and composition of agricultural production. Commercialization is high in the districts around Thimphu in the west and along the southern parts of the country, while it is lowest in the northern and eastern parts of the country (Figure 15, panel b). Interestingly, patterns of commercialization are similar for households that sell at least 10 percent

FIGURE 14 Agricultural production and productivity by district, 2012

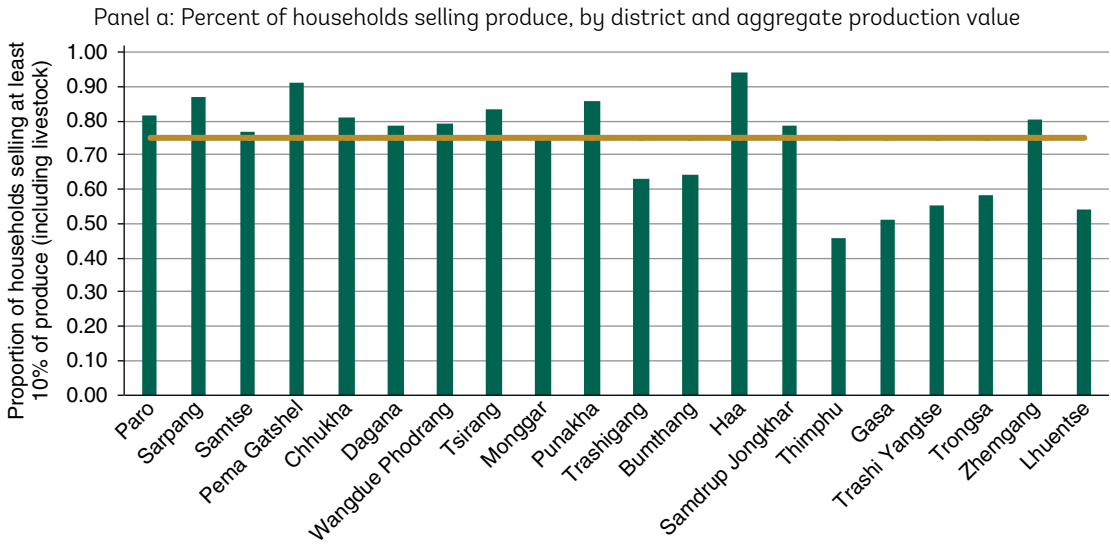


Source: BLSS 2012.

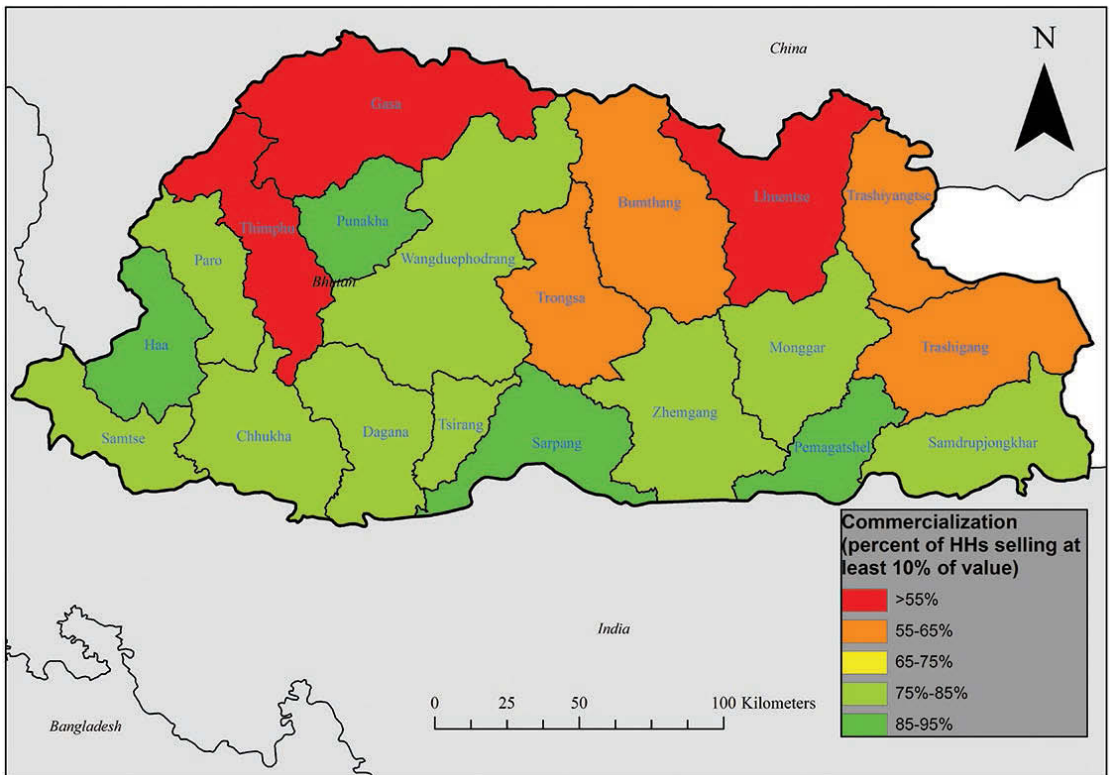
of their production and those that sell at least 50 percent, suggesting that households engage with the market substantially or not at all.

The southern urbanizing border districts of Chhuka and Sarpang have high aggregate production value, demonstrating the scale achievable in districts where trade is established (Chhuka) and emerging (Sarpang). Agricultural production in these districts is concentrated in higher-value crops: vegetables in Chhuka and fruits in Sarpang (Figure 14). These two districts are relatively more urbanized and industrialized. Phuentsholing in Chhuka and Gelephu in Sarpang are two of the five main urban centers in

FIGURE 15 Percent of households selling produce in each district, 2012



Panel b: Level of commercial agriculture, by district



Source: BLSS 2012.

Bhutan (Figure 16, panel a).¹⁰ Pasakha in Chhuka is already an industrial center, whereas Gelephu, with one of the four airports in the country, is emerging as a future industrial center. Phuentsholing and Gelephu are two of the four major overland customs stations in Bhutan along the Indian border, making them key conduits to trade with India, but Phuentsholing is much more of a conduit than Gelephu. The Phuentsholing Gate border point accounted for 64 percent of exports to India and a similar share of exports to third countries, as well as 80 percent of imports from India and 82 percent of imports from third countries. Fifty-five percent of trucks transit through the Phuentsholing border crossing every day. In contrast, Gelephu Gate in Chhuka accounted for 3 percent of exports to India and 5 percent of exports to third countries. Geographically closer to Phuentsholing in Sarpang District, the other border district of Samtse accounts for 21 percent of exports to India and 18 percent of exports to third countries (KPMG 2017). After Thimphu, Chhuka and Samtse are also the most populated districts (Figure 17, panel b), as well as more densely populated (Figure 16, panel b).

Further from the Indian border but closer to Thimphu, the districts of Paro and Punakha exhibit the highest levels of value per acre of agricultural production, benefiting from proximity to large domestic food markets. While the aggregate value of production is much larger in Paro than in Punakha, both districts have diversified agricultural production, growing cereals alongside higher-value crops. For Punakha in particular, cereal production is a large share of aggregate production. Although both districts are relatively close to markets, farm households in Paro have much better access to roads and food markets than Punakha (Figure 17, panel a). Access to roads might be less of a constraint to cereal production in Punakha, however, as cereals are less perishable and easier to transport to markets. Moreover, Punakha itself has a larger population in urban areas than Paro, suggesting that Punakha has access to even more localized urban centers than Paro. Although Paro might gain access to export markets because it has the only international airport, less than 1 percent of the value of Bhutan's total exports is transported through the Paro airport. In contrast, Paro airport accounts for 16 percent of the value of imports.

Haa is uniquely surrounded by the main border districts of Samtse and Sarpang to the south and Paro to the north, with close proximity to the main urban center, Thimphu. Despite the district's low population and the extreme distance of farm households from roads, the average farm household in Haa is still relatively close to food markets, possibly owing to its relatively urbanized population (Figure 17, panel b). As a result, Haa has a large share of commercialized farm households. Agricultural production in Haa, like production in Samtse and Sarpang, focuses on higher-value produce, such as fruits and vegetables, and also livestock.

¹⁰ Bhutan has five main urban centers: Thimphu, Phuentsholing, Gelephu, Samdrup Jongkhar, and Monggar. The number is expected to grow due to spillover from Thimphu (affecting Punakha and Wangdue), expanded tourism (Gelephosing, Bumthang, Trongsa, Trashigang, and Paro), and growing trade hubs on the border with India (Nganglam, Samtse, and Gomtu) (KPMG 2017).

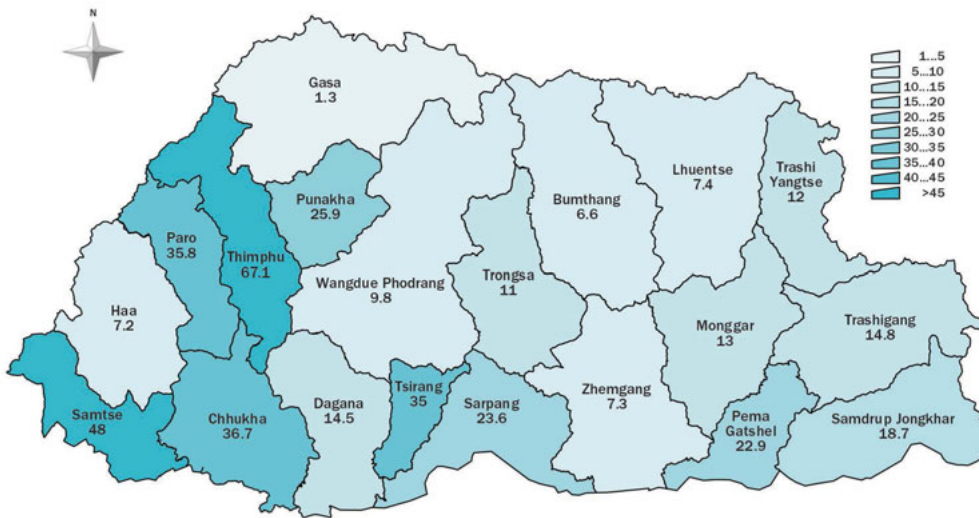
FIGURE 16 Urban centers and population density

Panel a: Urban centers at present and emerging by 2040



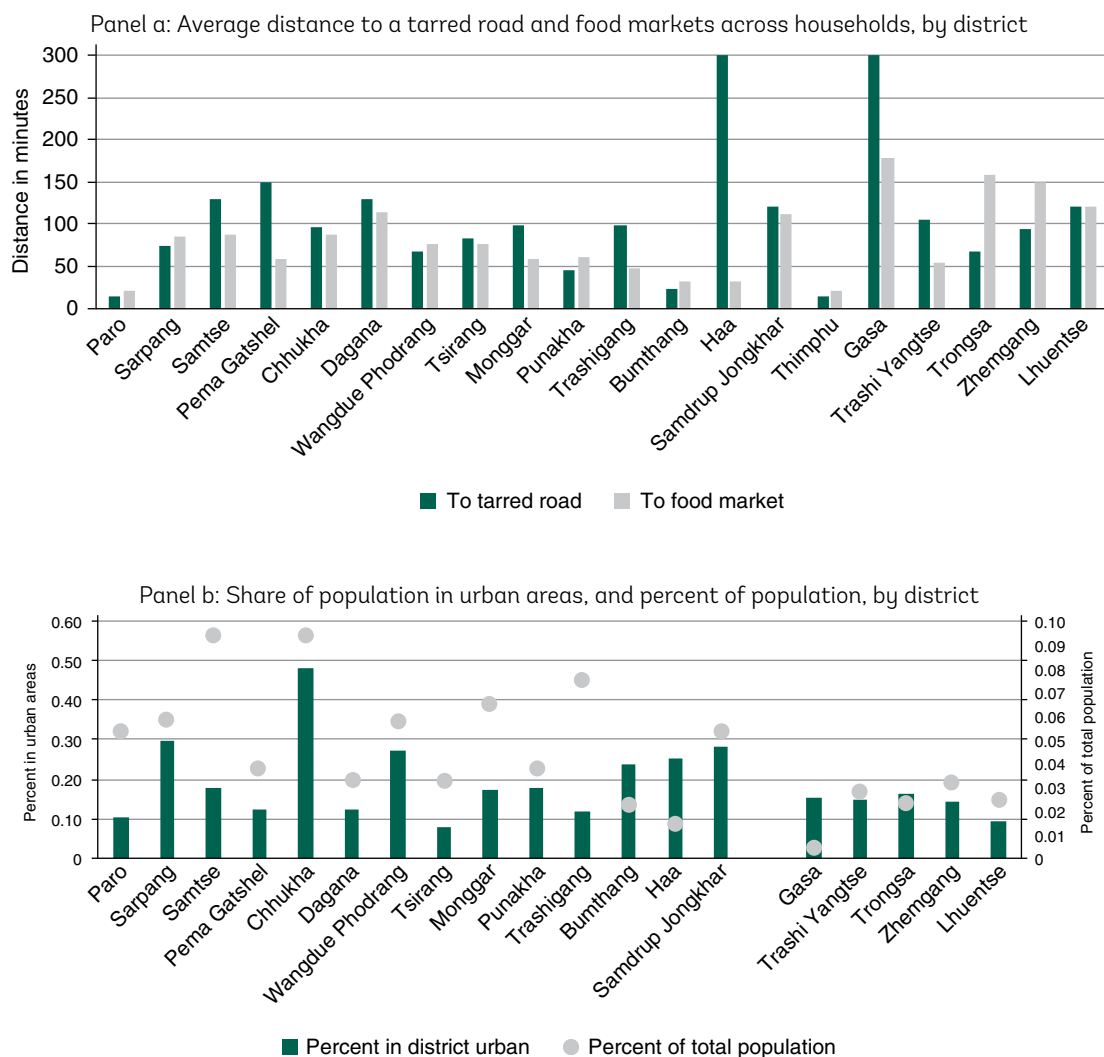
Source: KPMG 2017.

Panel b: Population density, by district



Source: NSB 2018.

FIGURE 17 Market connectivity and concentration of population in urban areas, by district, 2012



Source: BLSS 2012.

Although they are both far from the border towns and the larger urban centers, Gasa in the northwest and Bumthang in the northeast are quite distinct from one other.

Considered an emerging urban center, Bumthang has more than double the aggregate production value of Gasa (Figure 14). Farm households in Bumthang are relatively well connected to roads and food markets (Figure 17, panel a), and the district currently has one of the country’s four airports. Vegetable production is a large share of aggregate agricultural production value. In contrast, farm households in Gasa District are the least connected to roads and food markets. This district is also the least densely populated (Figure 16, panel b). Aggregate production value in Gasa is under US\$1 million, and its households focus heavily on livestock production.

Expanding Market Potential



This chapter examines how market opportunities are evolving and emerging and identifies key constraints that inhibit the agriculture sector from harnessing them.

The trends in crop production highlighted in the previous chapter indicate that farm households are transitioning to higher-value agriculture, and spatial production patterns indicate that farm households are leveraging their market opportunities. Those opportunities are expanding and evolving. The first part of this chapter discusses the market opportunities provided by urbanization as it grows and changes the domestic food market. The second part explains the essential roles of agroprocessing and agribusinesses in seizing market opportunities. It also looks at the constraints that could hinder growth in agroprocessing and agribusiness, which require strong, integrated value chains that link agribusinesses back to the rural farm sector and forward to domestic markets. The third part explores opportunities in export markets, and the fourth part discusses competition with India.

At the core of this discussion is the idea that connecting rural agricultural producers to local and export markets will enable the transition into commercial higher-value agriculture. Regardless of whether producers connect to local markets in more densely populated areas, or to distant urban centers, or to international markets, their connection to markets increases the value of their agricultural production. The increasing spatial concentration of people and economic activity in urban areas is an opportunity for agricultural production, because it creates new and more profitable markets. Yet in this context of increasing urbanization, key investments to link the rural economy to urban areas are lacking, which prevents spatial concentration from translating into opportunities in the agri-food system.

Changing Food Consumption Patterns in Bhutan

Rapid urbanization is driving change in Bhutan's food markets, presenting both an opportunity and a challenge to ensure that rural areas gain from and contribute to Bhutan's spatial development. The national population has grown steadily (although less rapidly than before);¹¹ currently at 760,000, it is projected to reach 890,000 by 2030. Urban population growth averaged almost 6 percent over the decade from 2000 (Ellis and Roberts 2015). Although urban areas constitute only 1 percent of the land area, the majority of the population is projected to reside in urban areas by 2033. Within Bhutan, the eastern areas have been characterized by net outmigration as people move westward toward the larger urban centers. By linking the primary agriculture sector to industry, rural-urban migration can be a positive stimulus for agricultural development and can be instrumental in raising the cash incomes of farmers (Gosai and Sulewski 2014). An added consideration is that when agricultural value chains are strong, they help to reduce the pressure on urban centers, not only by increasing the value of production in rural areas but by generating jobs in urban centers themselves. New sources of urban employment are particularly important, given that youth unemployment in urban areas is high and increasing. Youth unemployment grew from 21 percent in 2010

¹¹ Aggregate population growth rates fell from 1.7 percent in 2005 to 1.3 percent a decade later (Ellis and Roberts 2015).

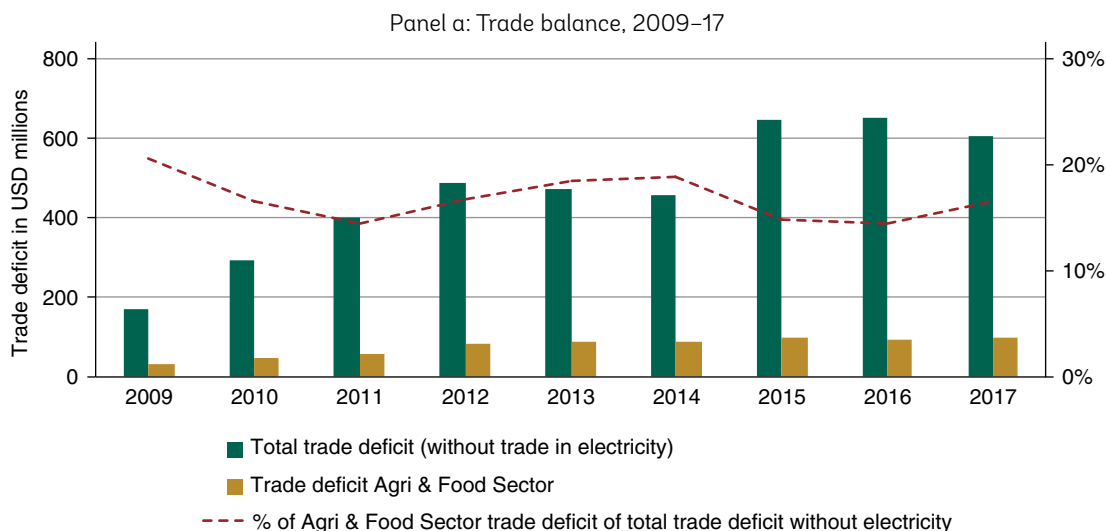
to 28 percent in 2015, in part because support systems to facilitate young people's transition to productive employment, such as microcredit, skills training, and urban safety nets, are lacking (Department of Employment and Human Resources 2016; BTI 2018). In sum, anchoring the development of agricultural value chains around urban hubs presents a set of key opportunities that should not be overlooked. The opportunities and accompanying challenges are described next.

The opportunities unleashed when farm production is successfully linked to urban areas are nothing new and have been consistently demonstrated across developing countries. A report had reported that a “significant share of farm production takes place within a 60-kilometer ring of cities. This includes a large share of high-value row crop production, significant dairy production, and a large share of specialty products.” (OECD 2006) In Ethiopia, farmers located closer to the capital, Addis Ababa, where transport costs are lower, are reported to have adopted modern inputs more frequently. Fertilizer use is more prevalent in areas closer to the city, and most agricultural intensification—as measured through the increasing use of chemical fertilizers—is occurring in these well-connected areas. Increasing fertilizer use seems to be driven by better availability of fertilizers, improved incentives closer to cities (output prices are higher in relation to fertilizer prices), and better knowledge of best practices disseminated by extension agents. Improved seed has spread quickly as well. Ten years prior to the survey in 2012, few farmers indicated that they used improved seed, but by the time of the survey, almost 80 percent of farmers living close to Addis Ababa used improved seed. People in more remote areas did not adopt improved seed.

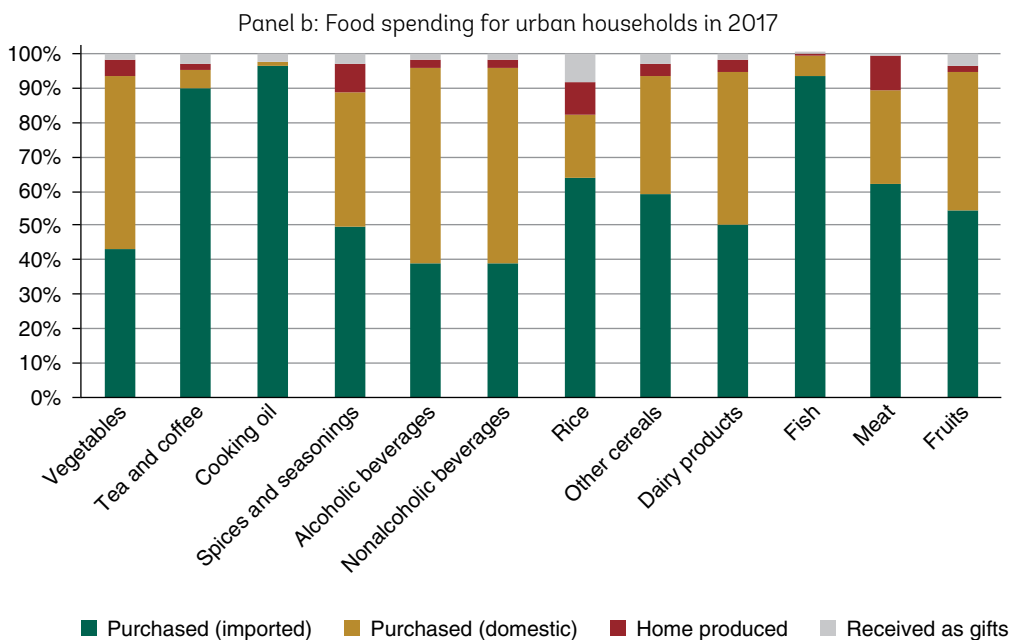
Rapidly rising incomes and rates of urbanization are leading domestic food demand to grow and shift toward more perishable and processed foods. A study using the 2007 BLSS predicts that overall food demand will increase by 46 percent by 2025 (PPD, MoAF, and IFPRI 2010a). Income elasticities, which measure the sensitivity of demand to income, were lowest for cereals and pulses and cooking oil, and even negative for maize, whereas demand for dairy, fish, and meat products was the most sensitive to increases in income. Using estimated price and income elasticities for various food items and official population projections, the study predicts that demand will increase fastest for the following food categories between 2007 and 2025: other foods (which includes food taken outside the home, noodles, confectionery, and biscuits) will grow by 66 percent, followed by dairy products at 47 percent, fish and meat at 44 percent, and fruits at 43 percent. In contrast to food production (done on the farm), demand for food packaging and processing—typically done at the level of agribusiness and small and medium enterprises (SMEs) rather than on the farm—is expected to rise the fastest.

As the agribusiness sector is only beginning to grow, changes in domestic demand are still largely met with imports. This lost opportunity for domestic producers contributes to Bhutan's sizeable trade imbalance (excluding electricity sales to India) of around US\$600 million annually. Over the last five years, Bhutan's food import bill has averaged 15 percent of the aggregate trade deficit (Figure 18, panel a). The majority of food imports—40 percent in 2007—is live animals or animal products; prepared foodstuffs, beverages, and tobacco constitute a further 29 percent. Vegetable products (including cereals and all crops) account for another 16 percent, and animal or vegetable

FIGURE 18 Trade balance and imported food purchases, 2009–17



Source: Glaeser 2018.



Source: BLSS 2017.

fats and oils account for 15 percent. In recent years, rice imports were 3–6 percent of the trade deficit (excluding electricity). Exports of meat and livestock products are almost nonexistent, and meat production cannot keep pace with rising demand for meat and meat products. In 2017, most of the food consumed by urban households consisted of purchased imported products—less so for vegetables but more so for meat, fish, tea, coffee, and oils (Figure 18, panel b) (Glaeser 2018).

Agroprocessing and Agribusiness

Agribusinesses can both alleviate the current constraints to labor productivity in industry and drive improvements in farm production and productivity. As mentioned in Chapter 2, labor productivity in industry has been declining for several reasons, including migration rates that exceed the absorptive capacity of the industrial sector. Growing the agribusiness sector through improved efficiency and competitiveness can help alleviate this pressure by providing additional jobs for migrants. Moreover, by creating and harnessing the demand for the products of commercial agriculture, agribusinesses can drive improvements in agriculture. A strong agribusiness sector is a crucial catalyst in the transformation from a primarily agrarian economy to an industrial society, pulling Bhutanese agriculture into global value chains and attracting private investment—all of which fosters inclusive economic growth (Keturakis et al. 2017).

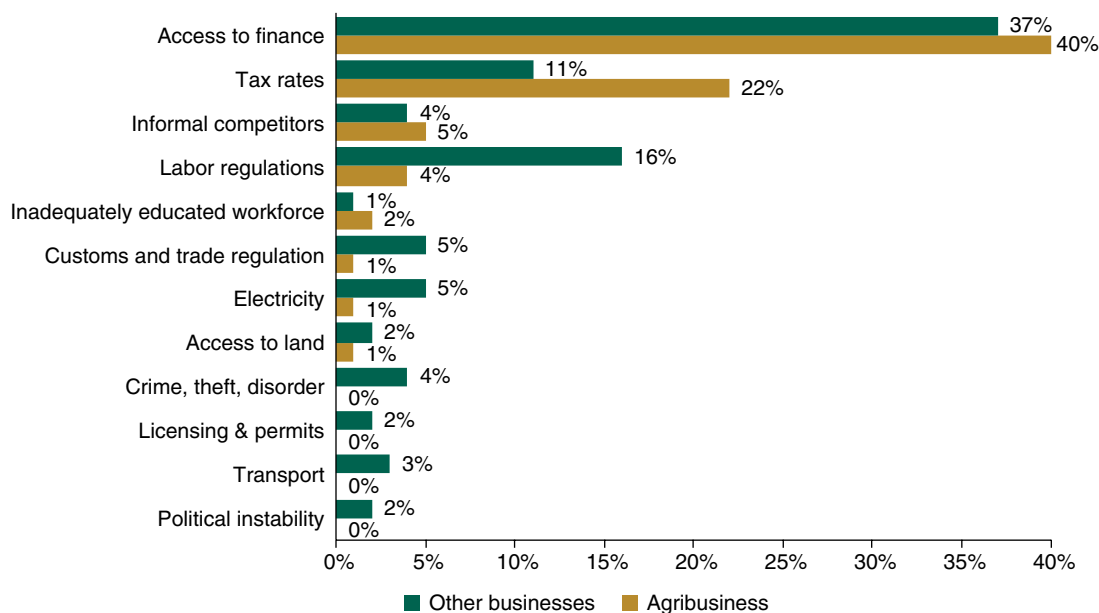
Even at this early stage, agribusiness and agroprocessing are burgeoning, with many firms clustered in established and emerging hubs across the country. Bhutan's manufacturing sector, accounting for 90 percent of nonagricultural employment, specializes in agroprocessing, forest products, and mineral processing. Using data from the recent Enterprise Survey,¹² a recent report highlights that agribusinesses in particular make up about 20 percent of the firms and consist of primarily young, small microenterprises with sole proprietorship (Keturakis et al. 2017). The majority (55 percent) are located in the Thimphu and Paro region (where labor and skills are clustered), and the other agribusiness firms are clustered in trade points along the Indian border: 19 percent in Gelephu (Sarpang), 16 percent in Phuentsholing (Chhuka), and 10 percent in Samdrup Jongkhar, the southeastern-most district. Bhutanese agribusinesses tend to be smaller than businesses in other sectors: 91 percent have fewer than five employees and are therefore classified as microenterprises, and almost all of them (99.7 percent) are sole partnerships. The considerable recent expansion in numbers of agribusinesses has caused the average age of firms to decrease from 21 years in 2009 to 9 years in 2015 (Keturakis et al. 2017).

Compared to firms in other sectors, however, agribusinesses in Bhutan perform at a lower level in terms of sales growth and labor productivity, owing to key deficiencies in the enabling environment and access to markets. Agribusinesses are not disproportionately affected by legal and regulatory burdens, and the RGoB provides generally good support for trade-related procedures, including export permits and sanitary and phytosanitary certification. Instead, agribusinesses perceive their biggest obstacles in the business environment to be limited access to finance, tax rates, and informal competitors (Figure 19).

Agribusinesses are characterized by low access to finance and low innovation. Since 2009 agribusinesses have increased their access to finance, and their perceptions about access to credit have also improved. Still, many agribusinesses report a greater reliance on external financing than firms in other sectors. Current loan products from the Bhutan Development Bank (BDB) are biased toward cooperative ownership, which hinders

¹² <http://www.enterprisesurveys.org/>

FIGURE 19 Constraints to agribusinesses, 2015



Source: Returakis et al. (2017); 2015 Enterprise Survey.

access for many agribusinesses that are owned by private individuals. Another characteristic of agribusinesses in Bhutan is that they are half as likely to innovate as firms in other sectors and make much less use of information and communication technologies (ICTs) than businesses in other sectors. Innovations in food handling, processing, and distribution not only add more value to production but help to reduce food loss and waste. Such innovations are crucial if firms are to engage with the global value chain, especially firms that focus on organizing production to fulfill export marketing contracts.

Bhutan has a legacy of public investments in state-owned enterprises (SOEs) in priority sectors where the private sector is perceived as lagging. For example, the government has invested in areas such as input provision and the processing, marketing, and exporting of agricultural products. The Food Corporation of Bhutan Ltd. (FCB), established in 1974, has both public and private functions. Its activities include procuring and distributing food grains, promoting trade in agricultural and horticultural produce, constructing and operating adequate warehouses, managing and operating auction centers, facilitating the marketing of domestic products, and maintaining, servicing, and distributing food security reserves. The FCB is also responsible for training and staffing Farm Shop managers. Farm Shops were established by the Department of Agriculture Marketing and Cooperatives to provide services to farmers in remote rural areas by selling subsidized staple goods (such as rice, oil, salt, and soap), selling inputs, and purchasing and marketing primary agricultural products. Bhutan Agro Industries Ltd. is a fruit and vegetable processing company, established in 1993. It is mandated to serve as a center of excellence for food processing in Bhutan and to set up demonstrations to improve awareness of the economic feasibility of processing specific fruit and vegetable products. The Bhutan Livestock Development Corporation Ltd. was instituted

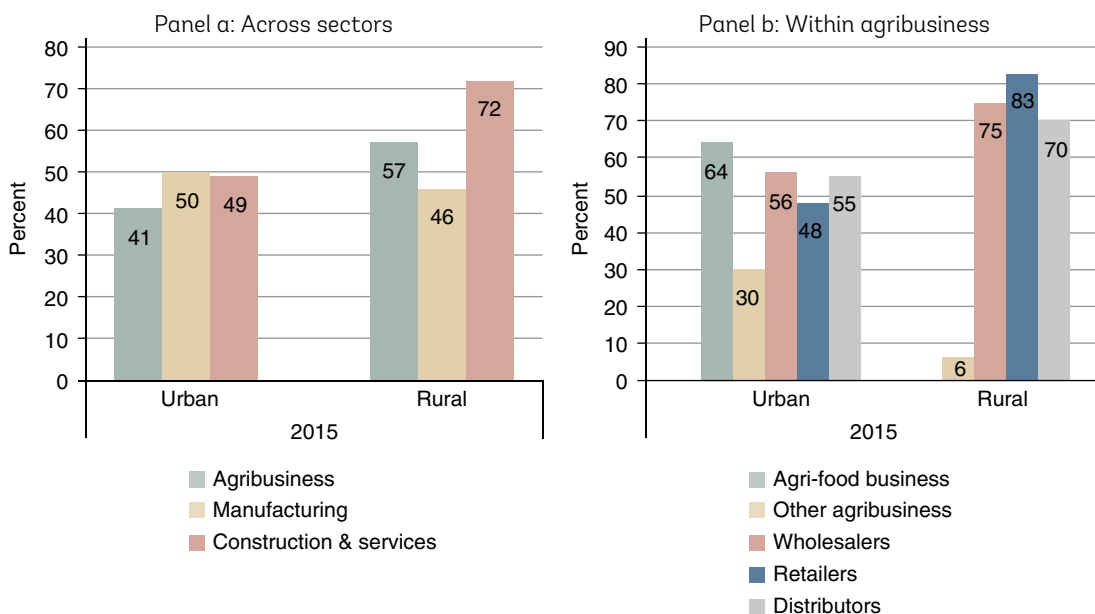
to complement the needs of the country's livestock sector by enhancing livestock production and achieving self-sufficiency in livestock inputs and products. The BDB was given its development bank mandate in 2010. Since then, it has been working to enhance access to financial services for farmers and the rural poor (Keturakis et al. 2017). In addition to the above, Farm Machinery Corporation Ltd. (FMCL), which is mostly engaged providing in farm machinery services; also engages in trading and contract farming; the Druk Seed Corporation provides for seeds; and Druk Holding and Investments owns Kofuku International Limited, a dairy processing plant.

Subsidies to farmers are biased toward production, while public spending focused on downstream value addition is diverted to these SOEs, which crowd out private agribusiness. Spending on agricultural development has declined overall, falling from 9 percent of total expenditures in 1981–86 to 5.5 percent in 2008–13. Many activities in the national budget focus on supporting upstream production rather than on adding value downstream in value chains. For example, in 2014, the Ministry of Agriculture and Forests (MoAF) allocated 65 percent of its main activity budget to road and irrigation construction, while only 2 percent was allocated to market sheds and collection centers. Public subsidies also usually tend to be crop-specific, with the government typically providing a prepackaged set of inputs. These subsidies compromise the drive to diversify, the pursuit of market opportunities, and the readiness to respond to market signals. They further deter private investment in agricultural support services such as seed companies, fertilizer importers, and distributors. Some well-intended government programs may have had unintended consequences. For example, Farm Shops are discouraging the development of rural enterprises, and FMCL may displace private sector providers of farm machinery (Keturakis et al. 2017). The public sector (including SOEs) is the second-largest employer after agriculture. It attracts high-skilled workers, as wages tend to be higher and benefit packages more generous than in the private sector (World Bank 2018a). These circumstances may be limiting the competitiveness of the sector through higher costs in the non-tradeable sector (see page 41).

The broad opportunities in agribusiness are fundamentally linked to better integrated agricultural value chains. Value chains link agricultural primary production to agribusinesses—storing, processing, and marketing. Increasing value throughout the supply chain involves some key challenges, such as linking smallholder primary production to markets and agribusinesses, increasing value for producers who are linked to markets, and increasing value for agribusinesses. There is growing recognition that value chains drive the sector to a higher stage of agricultural transformation. In countries where such approaches have been developed, the result has been growth in productivity, enhanced value added, improved access to markets, enhancement of quality and standards, diversification of products, and specialization. The development of value chains enables the private sector to play its role in supporting agricultural transformation through contractual arrangement or other forms of integration along the value chain.

Agribusinesses that are rural-based and product-based typically have more direct backward linkages. They also depend less on imported inputs compared to other nonagricultural sectors and compared to agribusiness wholesalers, retailers, and

FIGURE 20 Imported inputs, across sectors and within agribusiness, 2015



Source: Enterprise Survey 2015.

distributors. These characteristics imply that developing the agribusiness sector has a potentially much larger impact on inclusive growth compared to other sectors. Urban-based agribusinesses imported 41 percent of the value of their output, compared to the nonagricultural manufacturing sector (which imported 50 percent of its output) and the construction and (nonagricultural) services sector (49 percent) (Figure 20, panel a). Within the agribusiness sector, urban agri-food businesses, wholesalers, retailers, and distributors imported between one-half and two-thirds of inputs. Within the agribusiness sector, urban agri-food businesses, wholesalers, retailers, and distributors imported between one-half and two-thirds of inputs. The import share of non-food agribusiness is lower at one-third (Figure 20, panel b). Although the overall share of imported inputs in rural-based agribusiness is higher at 57 percent (Figure 20, panel a), it is dominated by the nonproducing enterprises of wholesale, retail, and distribution. In rural areas, virtually no agri-food business uses imported inputs, and the non-food agribusinesses use only 6 percent of imported inputs (Figure 20, panel b). This limited reliance on imports is most likely a broad reflection of the costs for exporters to reach Bhutan, which raises the costs of imported inputs. Conversely, however, it also represents a competitiveness opportunity for local inputs, if their quality, consistency, and volume parameters can be met locally through investment in value chains.

Often it is rural-urban migrants who establish semi-processing agribusinesses, especially those involved in production and (usually basic) processing, and they maintain important economic links with their home regions. To an extent this conclusion can be inferred from Enterprise Survey data, which find that those employed in urban agribusinesses share certain comparable (and slow-to-change) characteristics with

rural communities as a whole.¹³ The few rural migrants with higher endowments tend to graduate into higher-paying jobs in manufacturing and construction and services. Notably, the current offerings of educational institutions are reputed to be heavily academic and do not equip young people with the knowledge, skills, and attitudes required by the labor market. Young people reportedly lack confidence to make decisions, take risks, proactively seek income-generating opportunities, and open new businesses (Dorji and Kinga 2005).

The development of integrated value chains is limited by several factors, including poor storage and transport infrastructure, as well as weak input and services markets. The lack of storage and processing facilities results in high post-harvest losses. For example, seed potato production and export is a high-potential value chain for Bhutan that has been undeveloped because there are no cold storage facilities.¹⁴ The lack of grading centers and packing houses are further impediments, especially for value chain operators at the export end of the chain, yet they represent a potentially lucrative business opportunity for emergent SMEs with the right enabling environment. Moreover, Bhutan has one of the highest costs in the world for export freight forwarding (Keturakis et al. 2017). In addition to the high cost (US\$2,577 per container), it takes considerable time to haul goods along mountainous routes and to clear customs, contributing to the incremental cost of delivering to the market. Beyond transport bottlenecks, markets for inputs and services are also weak (Glaeser 2018; Dorji et al. 2006). Quality planting material is in short supply and other farm inputs such as fertilizer and plant protection chemicals are unavailable. As mentioned, several other challenges affect production, including damage from wild animals and birds, disease, difficulty in obtaining technical support for production and licensing, small farm sizes, low coverage of irrigated agriculture, labor shortages, and higher labor costs.

The development of closer links between agribusiness and the export trade is similarly limited by high transport costs, difficulty in accessing markets, and the lack of foreign investment. Agribusinesses export less than firms in other sectors, and firms that do not export their products are likely sacrificing the gains in labor productivity experienced by exporting firms. Limited access to markets is exacerbated by information barriers inherent in international trade. The RGoB has maintained excellent trade and diplomatic relations with India and Bangladesh, but most cross-border trade with India and Bangladesh occurs within Bhutan at border markets rather than at the end market in the destination countries. The rural road network has somewhat improved, but Bhutan's remote location significantly adds to international transport costs, which erode its export competitiveness. At the same time, high transport costs indicate that local production of some commodities might be more competitive than imports.

13 For instance, average years of education and highest level of education—both key determinants of employability and productivity.

14 The post-farmgate segments of the value chain—after the product leaves the farm—are often thought to be stagnant and dominated by small traditional processors and traders. Yet in India and Bangladesh, large-scale operations, notably large cold storage operations run by private companies, are playing an important role in potato value chains, and are widely used by traders and small- and large-scale farmers. These cold storage operations are increasingly involved in markets for inputs (such as providing improved seed), outputs (such as linking farmers with traders), and credit (Minten, Reardon, and Chen 2017).

BOX 3 Mountain Hazelnut Venture in Monggar

The private social enterprise Mountain Hazelnut Venture (MHV), which connects Bhutanese smallholders to distant, high-value markets, is located in Monggar District, and is 100 percent funded through FDI. Monggar District, one of five main urban centers in Bhutan, is a future industrial center that is near the airport in Bumthang. MHV processes and exports hazelnuts to a Chinese processor. The enterprise has a triple-bottom line—on top of making a profit, it provides positive social and environmental impacts for communities.

MHV was considered Bhutan's single largest private sector employer in 2015. It currently employs 800 people, and an estimated 1,200 people earn their income by providing goods and services to MHV. Ten million trees are being planted over 25,000 acres; in full maturity, they will produce 40,000 metric tons. The company employs various innovations: an Android-based Remote Monitoring and Traceability system that tracks hazelnuts from cultivation through final shipment of the product; the use of tissue culture for plant replication to optimize quality and productivity; an optimized logistics system that determines ideal distribution points and routes, and optimizes routes under dynamic constraints such as landslides; and the world's largest hazelnut nursery, which has a flexible configuration to make the best use of the limited area of flat land and accommodate seismic activity.

Notwithstanding these considerations, Bhutan lacks some characteristics that would make it more attractive as a foreign investment destination. Virtually all agribusinesses were fully domestically owned in 2015. The country lacks all three types of foreign direct investment (FDI): natural resource seeking, domestic market seeking, and efficiency seeking. FDI can offer local producers access to global value chains and provide a platform for transfers of technology and knowledge. In 2018, Bhutan ranked 75 of 190 countries in the ease of doing business. Paying taxes, trading across borders, and contract enforcement were much easier for firms, whereas the country had a low ranking for resolving insolvency and protecting minority investors. Particularly important for agribusinesses, long delays in property registration were cited as a key constraint (Keturakis et al. 2017). An exception, the Mountain Hazelnuts Venture (Box 3) is fully funded through FDI. Other investment groups also demonstrate the possibilities for private investment, such as the Tashi group which owns a fruit processing plant and the Zimdra group which is engaged in the dairy business.

High-value Export Production

A small number of high-value crops dominate agricultural exports. The production and value differences among field crops, livestock, fruits, and vegetables are further reflected in trade balances. Spices and fruits contribute to a positive trade balance, while livestock and many major vegetables contribute to a negative one. In trade terms, crops such as ginger, potatoes, mandarins, and apples have been export success stories.¹⁵ As

¹⁵ The largest positive contribution to the trade balance comes from spices (principally cardamom and ginger) at Nu.1,399 million, followed by fruits (primarily mandarins and apples) at Nu.522.9 million, and potatoes at Nu.407.9 million, all in 2017. Although these commodities are the most prominent export earners, their contribution has stagnated (for instance, cardamom and ginger) or declined (in the case of mandarins and potatoes) during the last three years (Glaeser 2018).

far as vegetables are concerned, Bhutan runs a trade deficit with respect to many major vegetables, with the exception of cabbage, carrots, and more recently cauliflower. The following commodities were the most export-oriented in 2016: cardamom (with 20 percent of total sales directed to export markets), ginger (14 percent), potatoes (17 percent), and a few fruits such as mandarins (27 percent) and apples (13 percent) (Figure 11) as well as hazelnuts (Box 3).

Most of these high-value exports are grown in a small number of locations around Thimphu and Paro and the southern border districts. Apples are almost entirely produced around the main urban centers, Paro and Thimphu, together accounting for 91 percent of production in 2016. Mandarin production is focused in the southern districts, with equally large production volumes for the districts of Dagana, Pema Gatshel, Samdrup Jongkhar, Sarpang, and Tsirang. Cardamom is mostly grown in the southwestern-most border district Samtse, with 42 percent of production, as well as in the districts surrounding Samtse, such as Chhuka, Dagana, and Haa. Ginger is mostly grown in Sarpang (30 percent) and Samdrup Jongkhar (25 percent), as well as in Samtse. Potatoes differ from the other export commodities in that potato production is spread more widely across districts. Potatoes are largely grown in Wangdue (23 percent), which neighbors Thimphu, as well as in Chhuka near the southern border and Trashigang in the east.

Beyond the crops with proven export success, Bhutan also has the potential to compete in export markets for other crops such as asparagus, lemons, mushrooms, and walnuts. Commodities for which producer prices in Bhutan are much lower than comparator countries (in other words, which have a positive producer price differential) have untapped export potential; examples include asparagus, lemons, mushrooms, and walnuts. The large price differentials for these commodities can potentially offset higher trade costs. The persistence of positive producer price differentials in the absence of positive export volumes suggests the presence of market barriers, however, such as information and coordination barriers, trade and logistics barriers, and quality standard barriers. Nevertheless, the production of low-volume, high-value products could grow considerably—with potential for processing hazelnuts and ginger, as well as venturing farther into seed potato production.

Competing with India

Bhutan is in a free trade area with India, affording duty-free access to imports from and exports to India. With a population of 1.3 billion, India presents a considerable opportunity for Bhutan to access a market many times greater than its own productivity potential, and Bhutan has benefited from proximity to this market: by far the largest share of Bhutan's trade is with its southerly neighbor. Conversely, the absence of tariff barriers exposes domestic producers to competition from Indian producers, many of whom are already highly competitive because they have been established for a longer time and benefit from economies of scale from supplying the (much larger) local Indian market. Rather than seeking to protect domestic industry, Bhutan has the opportunity to benefit from this learning-by-doing and leapfrog ahead of Indian competitors through the application of ICT and other innovations.

Bhutan's currency is pegged to the Indian rupee. As a result, any increase in costs of production within Bhutan impacts export prices in India, since there is no prospect of an offsetting depreciation in the exchange rate. A loss of competitiveness from cost inflation can be discerned from an appreciating real effective exchange rate (REER). Bhutan seems to have inflated levels of the effective compensation rate (wage plus benefits) for civil servants, and as noted, total public/government employment is a considerable share of formal sector employment (Keturakis et al. 2017). There is some evidence of REER appreciation during 2016 and early 2017, although the REER has depreciated recently (through mid-2018) (IMF 2018).

The recent change in India's tax regime affects the relative and overall competitiveness of Bhutan's agriculture sector. India's introduction of the goods and services tax (GST) in place of levies and other duties has impacted Bhutan in three ways. First, the removal of excise duties will improve the competitiveness of Indian exports to Bhutan against locally produced alternatives. Second, the application of GST in India will reduce the competitiveness of Bhutanese exports, especially in intermediate inputs to Indian processors.¹⁶ Third, the fiscal loss is substantial, given that the export duty refund constituted revenues for Bhutan of around 2 percent of GDP (IMF 2018). This last impact can be negated by the adoption of Bhutan's own GST-equivalent, although since this is a universal tax, it cannot compensate for the relative loss of competitiveness.¹⁷

¹⁶ Strictly speaking, this is not a loss of relative competitiveness, since alternatives produced locally by Indian competitors are also subject to the GST. However, differential impacts can be expected in the extent to which suppliers can absorb this tax burden without passing it on in retail prices.

¹⁷ The imposition of trade taxes by Bhutan is not permissible under the free trade agreement enacted with India under the South Asian Association for Regional Cooperation.

Subsistence Agriculture in Lagging Regions



To this point, the discussion has focused largely on the more competitive producers in Bhutan, but a considerable share of the population consists of subsistence producers who are largely removed from the dynamism and opportunities emerging elsewhere in the economy. Their remoteness limits their ability to benefit from new and expanding markets elsewhere, and their limited purchasing power constrains their ability to become local drivers of growth. In 2008, the rate of commercialization (the share of crop value that was marketed) was 23 percent (PPD, MoAF, and IFPRI 2010b). More recent 2012 BLSS data indicate that roughly 25 percent of farm households marketed less than 10 percent of the value of their production. Consistent with the data from 2008, the least commercialized households were in the northwestern district of Gasa, the northeastern districts of Lhuentse and Trashy Yangtse, and in the center of the country in Trongsa District (Figure 15, panel b). The population in these four districts is so low that together they constitute just one-fifth of the number of least commercialized households. Gasa and Lhuentse are two of the most sparsely populated districts in the country.

The challenges to service delivery are substantial in these lagging and sparsely populated districts, which are so far from emerging urban centers. Bhutan's mountainous terrain presents a major obstacle for connectivity. Though farm roads now connect many villages, in 2013 more than 30 percent of households were more than one hour away from a motorable road, and 8 percent were more than six hours away (Togbay 2006; RGoB 2015). Bhutan is already the least densely populated country in South Asia, and as urbanization increases, rural areas will become even more sparsely populated and challenging for service delivery (NSB and World Bank 2014). Not all lagging districts are without opportunities for future agglomeration, however. For example, Trongsa District is considered an emerging urban center due to growth in tourism (KPMG 2017).

Food insecurity and poor nutrition outcomes are pressing issues in the least agriculturally commercialized areas. Poverty rates in Gasa (12.6 percent), Trashy Yangtse (11.9 percent), and Trongsa (14 percent) exceed the national rate of 8.2 percent (NSB and World Bank 2017).¹⁸ These three districts also have a substantial share of Bhutan's food-insecure population: in Gasa, 78 percent of households did not produce enough food for themselves; in Trongsa, 36 percent; and in Trashy Yangtse, 29 percent (*Agriculture Statistics Yearbook* 2016). Households in the eastern region, which includes Trashy Yangtse, have poorer diets and worse nutrition outcomes: 8.9 percent of households have borderline inadequate food consumption, compared to 7.1 percent nationally, and the stunting rate in the eastern region was 29.1 percent, compared to 21.2 percent nationally (Nutrition Program 2015).

While food self-sufficiency is not tantamount to food security, there are benefits to ensuring sufficient production in some disconnected areas. In contrast to Gasa, Trashy Yangtse, and Trongsa, where food insecurity is high, Lhuentse is relatively food secure; only 8 percent of households do not produce enough food for themselves. With a poverty rate of 6.7 percent, households in Lhuentse are also comparatively less poor. These

¹⁸ These districts are doing relatively better than Dagana, which has both the highest poverty rate and largest number of poor, as well as Zhemgang, which has a high poverty rate, and Samtse, which has a high number of poor.

contrasting conditions suggest a continuum of household agricultural production. On one end are districts like Gasa, Trashy Yangtse, and Trongsa, which produce too little to meet dietary and nutrition needs. On the other end are districts around Thimphu and in the south, which are shifting into commercialization. In between are districts like Lhuentse, which generally succeed in producing just enough for subsistence. A previous study using data from the 2000 agricultural census suggests a similar geographic picture of sufficient food production (PPD MoAF, and IFPRI 2010c). Around Thimphu and in some of the eastern districts, households are typically able to produce enough food. Maize production is concentrated in the eastern part of the country (except in the eastern-most areas), while rice production is concentrated in the northeast and around Thimphu.

Conclusions and Recommendations



The role of the agriculture sector is changing fundamentally with structural transformation, and now the imperative for agriculture is to adapt to the constraints and harness the potential of Bhutan's rich yet challenging geography. While agriculture is still the largest employer, it is declining in importance, as indeed it should be, with successful structural transformation. Yet sectoral and spatial migration are placing stress on the industrial sector in existing and emerging urban centers, and agriculture must continue to play an active role as a driver of growth and further development. Harnessing the potential of agriculture is primarily the responsibility of the private sector—of agribusiness as well as of the small-scale producers who are by far the largest constituents of Bhutan's entrepreneurial class. But this responsibility does not imply that the public sector has no role: the key to success is for the public sector to create a sound enabling environment, combined with targeted interventions in core public goods, to leverage private investment. Not all of Bhutan's small-scale producers will be able to take advantage of emerging opportunities, however, and regions that are lagging substantially will continue to require more direct public sector support to maintain incomes, food security, and nutritional status.

Agricultural development is occurring against a backdrop of broader spatial development patterns. Urbanization is creating growth clusters across the country. High-value agricultural production is occurring precisely in these clusters: in and around the capital with higher agglomeration economies, as well as along the southern border with lower transport costs for trade with India. Urbanization will continue to foster changes in the scale and nature of demand for food, an opportunity which is largely untapped by the agriculture sector. Local demand for processed and packaged foods and for perishable products (such as meat) will continue to increase. To meet rising domestic demand, growth in agribusiness and agroprocessing is crucial and will require strengthened linkages with agricultural production in rural areas. In parallel, Bhutan's demonstrated export success for certain high-value commodities presents an opportunity to seize new export markets for low-volume, high-value niche commodities. Alongside the sector's broad shift toward high-value commercialized agriculture, a few lagging areas remain too far from markets to participate, and addressing food insecurity and poor nutrition outcomes in those areas is a paramount and urgent concern.

For the government, these circumstances imply the need for a more tailored approach that seeks to leverage all sources of finance and solutions—from the public and private sectors—to support sustainable growth. Globally, current investment levels in agricultural value chains are insufficient to end poverty and hunger and to boost shared prosperity. The public sector has a fundamental role in ensuring that a combination of private and public sector resources are channeled efficiently and effectively toward these key development goals. Where the private sector is already investing, the role of the government is to promote responsible investments to increase the development impact of those investments, for example by mitigating negative environmental and social impacts. Where the private sector can invest, the government should promote an enabling policy environment and identify and address underlying market failures to crowd in private sector investment. Investment can be crowded in by improving incentives, reducing transaction costs, and reducing investment risks. Finally, the public sector should focus its scarce resources in areas where private sector investment is not

feasible. In the World Bank, such as an approach falls under the rubric of *maximizing finance for development* (MFD).

A one-size-fits-all approach does not reflect the heterogeneity of Bhutanese agriculture, and the analysis in this report makes it clear that a partition in production orientation exists in agriculture. One part consists of a commercially oriented subsector in which production decisions are dynamically and strategically responding to market incentives, while the second part consists of a more subsistence-oriented subsector focused on food production for own consumption. Public sector finance will be crucial for ensuring food security in lagging regions through interventions to boost production and productivity, as well as possible social safety net programs, as these areas will remain outside the reach of markets, at least in the medium term. In contrast, private sector finance and solutions are needed in the increasingly commercializing agriculture and agribusiness domains to meet growing and evolving domestic food demand in urban centers, and to seize the opportunities in high-value export markets. A competitive private sector can bring in innovation and efficiency in production, processing, retailing, and marketing.

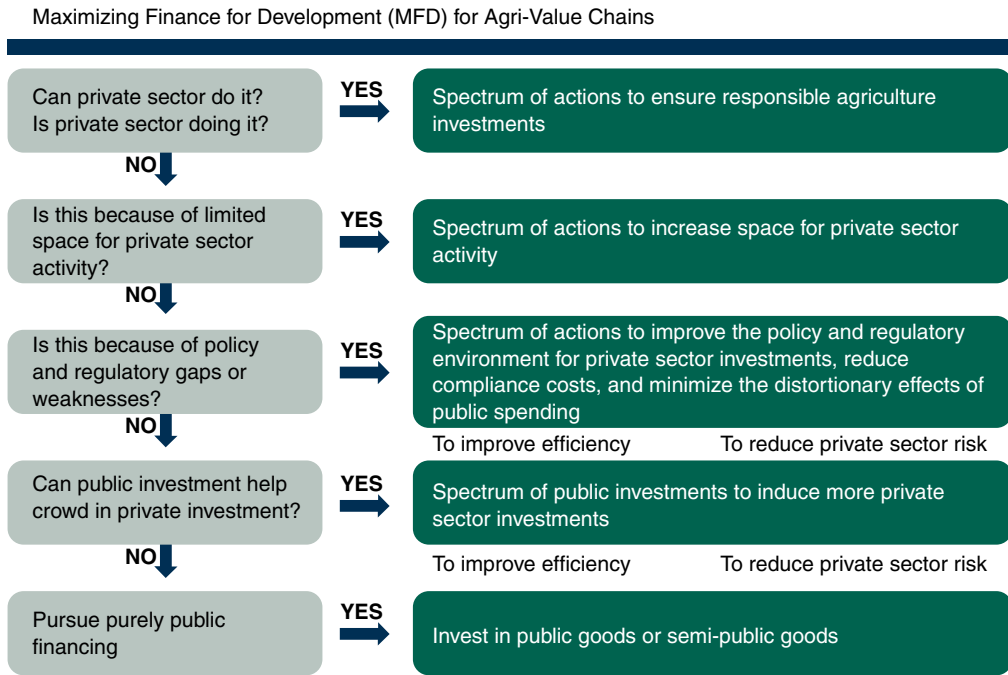
Two actions are recommended to support a more competitive private sector. First, give greater emphasis to the enabling and policy environment to support broad-based competitive agriculture. Second, focus public sector programs and the role of SOEs on promotion and demonstration activities rather than on the direct purchasing and marketing of primary agricultural products. For example, separation of the public and private functions of the FCB and a restructured role for Farm Shops could expand the space for private sector growth. At a minimum, the public and private functions of FCB should have separate accounting, reporting, and management systems. Similarly, the role of FMCL should be revisited to avoid displacing private providers of farm machinery. Rightly so under the government are the RNR research centers that conduct the necessary agriculture-related research activities. The decision tree laid out in Figure 21 summarizes the key issues to consider in seeking to maximize the leverage of private sector investment in agriculture and agribusiness without neglecting core public good functions.

This Policy Note also recommends that to maximize the opportunities presented by the spatial evolution of agriculture, the government should adopt a “hub” or “cluster” approach to support the transforming commercially oriented agriculture sector. Based on the analysis presented here, clear opportunities exist to support the development of emerging hubs, with high potential for value addition and job creation in agriculture and agribusiness. Specific investments are best targeted toward these hubs or clusters, because a targeted approach ensures more efficient use of limited finance.

The types of investments needed will depend on the different underlying spatial patterns which have led a variety of hubs to emerge. The analysis highlights four types of emerging hubs:

- Hubs centered on or located close to areas with high domestic demand will continue to benefit from concentrated populations and better connectivity. These hubs should prioritize the processing of commodities for which domestic demand is likely to

FIGURE 21 Decision tree for maximizing finance for development



increase, such as dairy and meat products. Such highly perishable food commodities will require investments in processing and storage, as well as laboratories to ensure food safety. While livestock production is typically low-value and practiced mostly by transhumant populations, shifting patterns in domestic demand suggest a growing market.

- Hubs in key trade points around the border benefit from relatively lower transport costs, largely to export markets. Districts in the southwest have demonstrated the potential for agricultural growth. Opportunities to invest in expanding border crossings in the southern belt of the country can reduce congestion at existing border crossings and promote the development of other trade centers.
- Hubs focused on the production of a few high-value, niche agricultural commodities continue to benefit from increased specialization and economies of scale. These locations have the potential for value addition through more and better innovation. Investments in research and exposure to international best practices are likely to spur innovation and value addition in these areas. Encouraging FDI in these areas in particular can be crucial for building global competitiveness. This approach resembles the “pocket and package” approach adopted in Nepal.
- Hubs focused on efficient and large-scale cereal production benefit from appropriate agroecological conditions and local demand for cereals at a national scale. Transport and connectivity are less a concern in transporting cereal crops throughout the country, which possibly explains why cereals are produced on a large scale in the eastern part of the country. Instead, improved extension services and investments in

mechanization and irrigation are needed to further lower the cost of cereal production and improve productivity.

Before making specific investments in each of these hubs, a richer and deeper understanding of agricultural production, food demand, competitiveness and comparative advantage, value chain development, and climate change impacts is needed.

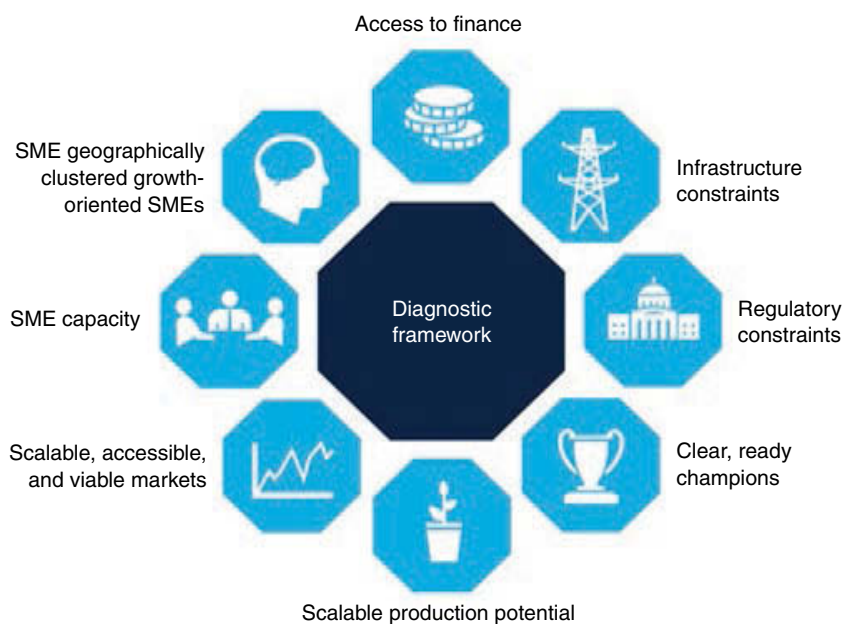
First, while this analysis was able to discern spatial patterns in production using BLSS 2012 data, the same exercise cannot be done using BLSS 2017, as the survey did not obtain information on the value of agricultural production. Second, an updated and more granular analysis of spatial patterns in the evolving demand for food will elucidate the opportunities for specific hubs to meet local food demand. This exercise can make use of the food consumption data from the most recent BLSS in 2017. Second, import parity and export parity calculations will concretely characterize competitiveness and comparative advantage for specific agricultural commodities, allowing the sector to continue on the path toward higher-value agriculture. That analysis will require more comprehensive data on import and export costs for various commodities. Third, an analysis of what drives and constrains the value chains of commodities for which Bhutan can and should compete can spur development in the sector and across the value chains. The rapid value chain analysis recently conducted for this Policy Note is an initial step, but more detailed data collection and analysis of the constraints will be needed. Care must be taken to avoid the temptation to “pick winners” and focus instead on strategic public interventions to leverage private entrepreneurship. Finally, a more detailed assessment of the vulnerabilities of the agricultural sector to both climate variability and climate change is needed, particularly to evaluate the exposure of different crops and different areas to climate change and assist in developing the sector’s capacity to adapt. Providing agro-meteorological services to farmers will support weather-related decisions at the farm level and can form part of an overall strategy to improve early warning systems for disasters.¹⁹

Hub-specific investments are enabled through hub-common solutions, such as farmer linkages, skill development, and SME clustering, as well as through cross-cutting policy actions.

The role that rural and urban linkages play within hub districts is central to hub development. Farmers at the periphery should be linked to hubs to become an integral part of their growth, to help increase incomes in rural areas, and to ensure a consistent supply of high-quality raw materials in urban and peri-urban processing hubs. Because hubs will require an educated labor force equipped with specific skills, concurrent investments are needed to better train youth with skills that appropriately match demand from agribusinesses. These agribusiness firms, primarily consisting of young SMEs, require an ecosystem to spur their growth (Figure 22). For example, geographic clustering of SMEs leads to agglomeration economies with knowledge spillovers and enhanced competition.

¹⁹ The Hydromet Services and Disaster Resilience Project is beginning its pilot to develop agro-advisories, with a small geographic coverage (two *dzongkhags*). There is a need to identify a pathway to mainstream this activity for scaling up and enhancing the quality of product development and service delivery.

FIGURE 22 Small and medium enterprise ecosystem diagnostic



To unleash the growth of private agribusinesses, the RGoB can enact several policy reforms that cut across hub-specific investments. As the recent report on increasing agribusiness growth²⁰ points out, such reforms include recasting public sector programs, subsidies, and incentives to better support the private sector; fostering a favorable business environment by simplifying and streamlining regulations (for example, through increased efficiency of the Bhutan Agriculture and Food Regulatory Authority); strengthening access to finance by allowing BDB to develop a loan product to increase farm mechanization, and to crowd-in private sector finance; and encouraging innovation and investment through more aggressive actions to attract investment, possibly through the establishment of an investment promotion agency and the development of an investment promotion strategy with close involvement of the Bhutan Chamber of Commerce and Industry. However, prior to setting up an investment promotion agency and conducting outreach activities, the FDI division is encouraged to work closely with other ministries to identify high-potential sectors and to craft an investment promotion strategy. Such a strategy is less likely to succeed if it focuses on resource or location opportunities. Rather it should focus on Bhutan's unique value proposition: its cultural uniqueness, environmental protection, and peace and stability. The development of the Brand Bhutan label is an excellent initiative, and a legal and regulatory framework to manage the label will help maximize its potential.

An important element of this strategy is to reorient SOEs toward a focus on core public good roles, liberate their commercial potential, and create space for competition. First, where SOEs perform both commercial and public roles, consider developing their

²⁰ Keturakis et al. (2017).

focus on public roles. Examples include parastatal marketing companies that also serve as de facto value chain platforms. For such firms, their public roles should be highlighted instead, such as its role as a standard-setting agency where standards are important for functioning, efficient, and inclusive agricultural value chains to expand. Second, some SOEs may have commercial prospects and the potential to leverage additional private investments in place of (scarce) public funding. The government could maintain an equity stake in these businesses—best practice is for that stake to be a minority share—and any reform could nevertheless retain a limited social function, such as a presence in remote areas, or a business model that incorporates a smallholder supply base. There are examples of such divestitures through public-private partnerships that foster inclusive value chains while allowing space for competing private sector agribusinesses.

Applying MFD principles does not imply the neglect of core public interventions where private investment is unlikely, and this Policy Note recommends that the RGoB continue to strengthen investments to improve food security and human capital in lagging regions. Some areas inherently lack the connectivity, concentration, or agroecological endowments that permit emerging hubs across the country to seize the opportunities that accompany these spatial trends. Although in the long term more can be done to allow lagging regions to access markets, in the medium term, food insecurity and the lack of access to basic services loom large. Lagging regions will require social safety nets to address food security, with a particular focus on enhancing dietary diversity and nutrition. As elaborated in the upcoming *Bhutan Urban Policy Notes*, investments in basic infrastructure to expand access to health clinics and schools are needed to enhance human capital. While overall these regions are less connected and less concentrated, some are even more remote and dispersed than others. In those areas, the cost per unit of such social safety net programs will be unusually high, necessitating more streamlined and focused public spending.

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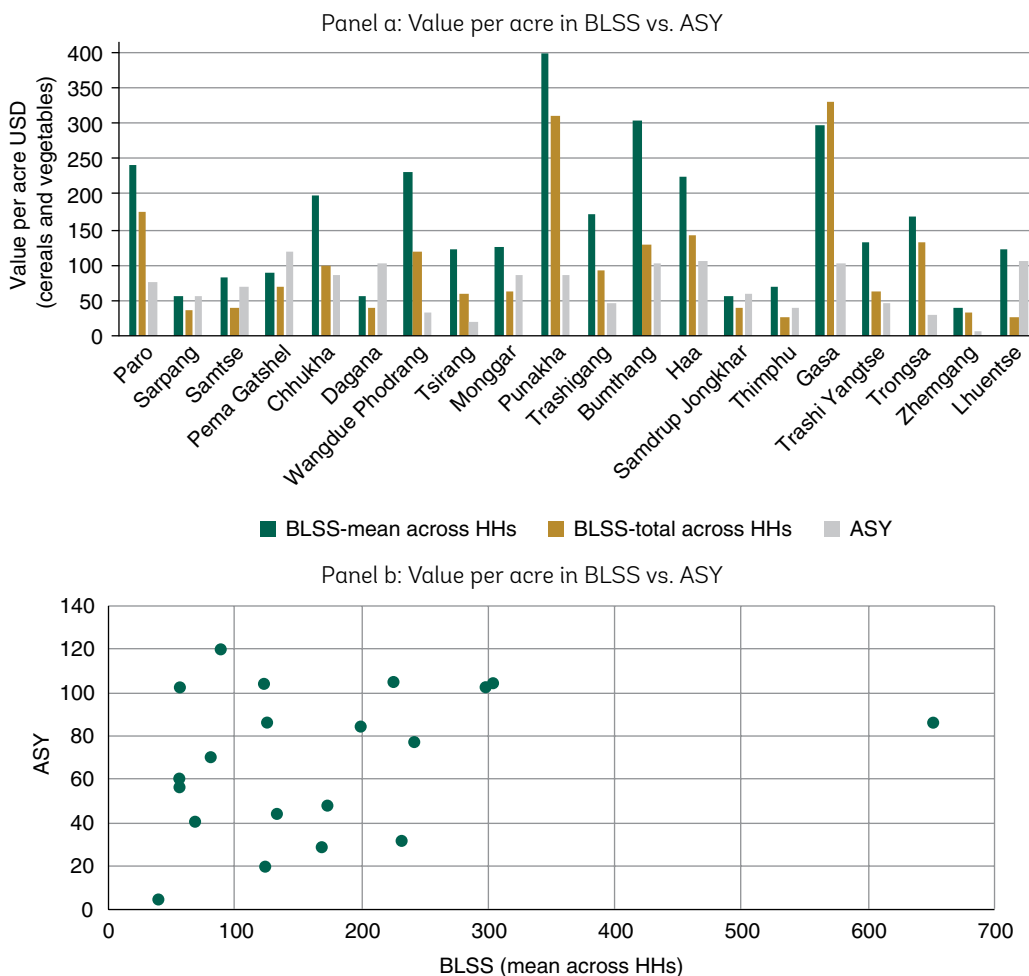
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BLSS versus ASY

As an adjunct to the main analysis, district-wise agricultural value and yields were compared for the BLSS and ASY 2012 datasets. These datasets are different for many reasons, not the least of which is the prices used to convert physical production into value. In the BLSS, prices are based on the household's valuation of its own sales. These prices could be farmgate prices and represent spatial variation in prices across Bhutan. In the ASY, physical production is instead multiplied by a national average price for a crop or commodity. This national price is likely higher than the valuation (and hence implicit prices) reported by farm households. As such, when using BLSS data, the estimated aggregate value of production (for cereals, vegetables, and fruits) among farm households is estimated at US\$40 million, whereas when using ASY data, the estimated value is over three times larger, at US\$130 million. Note that the BLSS data include a separate livestock value, which is not available in the ASY data.

Yields of cereals and vegetables combined can be compared across the two datasets. While the ASY includes data on land used for cereals and vegetables separately, the BLSS only includes land used for cereal and vegetable production combined. For fruit production, while the BLSS includes orchard acres in the data separately, the ASY only includes the number of trees. There are two ways to calculate district-level value per acre using the BLSS. First, one can take the mean of value per acre across households. Second, one can sum up the value and land across households in a district and then calculate the value per acre. These two methods should largely coincide, and in fact the correlation between the two is 0.86. On the other hand, there is a very weak correlation between the BLSS and the ASY calculation of value per acre across districts. In the BLSS, while the top five districts in terms of value per acre were Punakha, Bumthang, Gasa, Paro, and Wangdue, in the ASY the top five were Pema Gatshel, Haa, Lhuentse, Bumthang, and Dagana.

FIGURE A1.1 Comparison of value per acre in BLSS and ASY



Source: Authors' calculations using BLSS and Agricultural Statistics Yearbooks.

TFP and Decomposition of Sources of Agricultural Output Growth

The most widely used measures of agricultural productivity are output per worker and output per unit of land, or yield. A limitation of these partial factor productivity measures is that they assign all productivity gains to one input, ignoring the effects of intensification in use of other inputs (such as more capital per worker or more fertilizer per hectare) with technological change. However, total factor productivity (or TFP), defined as the ratio of total output to total inputs (land, labor, capital, and materials), reflects the effectiveness of using a given set of inputs and is a measure of the rate of technological progress or improved efficiency as the source of economic or sector growth. It captures the substitution of knowledge capital (based on research and development) for physical inputs, including the effects of improved efficiency and scale. Improvement in TFP is closely associated with lowering the unit cost of production and competitiveness.

This Policy Note applies a method for approximating TFP indexes. An advantage of this method is that it provides a means of Solow-type growth accounting for agriculture in a consistent and comparable way across countries and over time. The method decomposes sources of growth in agriculture into growth in TFP and growth due to changes in the use of physical inputs—which can be further decomposed into growth due to expanding agricultural land and input intensification per unit of land. The growth in agricultural output is decomposed into three parts (illustrated in Figure 6 in the main text):

1. Growth due to productivity (TFP), including technical and efficiency improvements that raise the overall productivity of agricultural factors of production.
2. Growth due to the expansion of (quality-adjusted) agricultural area, which can be further decomposed into how much of this expansion is due to new land and how much to extending irrigation (raising the quality) to existing land.
3. Growth due to intensification of other inputs per unit of agricultural area. The impact on growth from the increase (or decrease) of labor, capital, and material inputs per hectare of land is summarized in this term.

This Policy Note makes use of an index of agricultural TFP for many countries constructed by the Economic Research Service of the United States Department of Agriculture (USDA-ERS 2015) based primarily on FAO output and input data. Growth rate in TFP is estimated as the difference between the growth rates in aggregate output and aggregate inputs of the sector. Aggregate agricultural output is based on FAO's measure of Gross Agricultural Output, which is a Laspeyres index of 190 crop and livestock commodities aggregated using a fixed set of international agricultural prices.

Aggregate agricultural input use is based on the FAO series for land (measured as total crop area harvested), labor (the number of economically active adults in agriculture), livestock capital (total animals, in cattle-equivalents), machinery (the number of tractors in use), and material inputs (the quantity of fertilizer nutrients applied). Inputs are aggregated using cost-shares derived from dozens of national and regional studies. For many countries, however, cost shares are unavailable and have to be imputed. Imputation measures include econometric estimation of production elasticities (which should approximate cost shares in competitive equilibrium) or the application of cost shares observed in countries with similar agricultural sectors. The growth rate of aggregate input is the weighted average of the growth rate of each factor of production.

