4

Ghana's Agricultural Transformation

Past Patterns and Sources of Change

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Ghana's agriculture has performed reasonably well by African standards since the 1980s in terms of its growth, labor productivity, farm incomes, and the decline in rural poverty. Yet it has not exploited its potential to become a more important source of export earnings beyond cocoa, or to reduce the country's growing dependence on many imported foods. As noted in Chapter 2, agriculture needs to become a more powerful engine of growth in the future if Ghana is to sustain its economic transformation and continue to grow its national per capita income. There are also concerns about the sustainability of the recent pattern of agricultural growth with its heavy dependence on expanding the cropped area rather than shifting to more intensive farming practices that can increase land productivity. Given the importance of agriculture in the Ghanaian economy, this chapter and Chapters 5–9 aim to provide a comprehensive review of the agricultural transformation that has occurred, the underlying reasons for why it has evolved the way it has, and to identify options for future growth.

This chapter is structured as follows. Section 4.1 describes the main features of the agricultural transformation that has occurred since the policy reforms of the 1980s, focusing on changes in: a) production (area, yield, output, crop mix); b) technology (fertilizer, seeds, pesticides, mechanization); c) land and labor (employment, wages, productivity, farm size distribution); and d) rural incomes (farm income, nonfarm income diversification, total income, expenditure). We provide regional as well as national insights. Then in Section 4.2 we examine important factors that may have driven this pattern of transformation: the policy environment; growing population pressure on the land base; and rapid urbanization. Section 4.3 contains our conclusions.

4.1 Patterns of Agricultural Growth

4.1.1 Production

From a production perspective, Ghana's agriculture has been a success story. Agricultural gross output in real terms grew by 4.5 percent per annum on average between 1994 and 2013 (Table 4.1). Cocoa grew by 5.6 percent, but the noncocoa crop sector also grew well, particularly roots and tubers and other crops (4.9 percent and 5.6 percent, respectively).

The overall performance of the noncocoa sector, and particularly of food staple crops, is favorable by African standards. Food staple crops have successfully grown to keep pace with population growth (about 2.5 percent per annum) and rising per capita incomes (about 2.9 percent), and apart from some modest imports of wheat (which cannot be grown domestically) and growing imports of rice, the country has remained largely self-sufficient in food staple crops. However, livestock production has grown more modestly (3.2 percent) and imports of poultry, other meats, and skimmed milk have grown rapidly.

Although cocoa accounts for the largest share of the crop area (22.8 percent) and for most of Ghana's agricultural exports, it only accounts for about 12 percent of the total value of agricultural production (Table 4.2). Cassava and yams are twice as important in terms of the value of their output, and bananas and plantains together are equally as important as cocoa. On the other hand, livestock (not shown in Table 4.2) accounts for only about 12 percent of the total value of agricultural production.

Table 4.1. Annualized growth rates of value of output by commodity groups, 1994–2013

	Annual growth rate (%)
Cereals	2.9
Roots and tubers	4.9
Cocoa	5.6
Other crops	5.6
Livestock	3.2
Agriculture total	4.5

Note: According to MOFA, staples include the following crops: maize, rice, cassava, yam, cocoyam, plantain, cowpea, and groundnut. In the table, we included plantain in roots and tubers, while cowpea and groundnut in other crops.

Source: Author's calculations using gross production value at constant 2004–6 US$ (FAO 2016).

Table 4.2. Composition of crop agriculture, 2012

Crop	Land area (ha)	Share of crop land (%)	VOP (10^3)	Share of VOP (%)
Cassava	875,185	12.5	1,519,652	23.6
Cocoa, beans	1,600,300	22.8	913,192	12.3
Groundnuts	328,940	4.7	202,446	2.4
Maize	1,023,459	14.6	147,642	1.9
Yams	421,558	6.0	1,693,203	25.5
Other tree crops	645,514	9.2	194,307	2.8
Pulses	430,000	6.1	145,959	1.9
Rice, paddy	215,905	3.1	130,764	2.2
Taro (cocoyam)	193,998	2.8	269,407	3.8
Banana+plantain	346,860	4.9	756,803	11.1
Vegetables	64,466	0.9	378,508	5.6
Sorghum+millet	386,556	5.5	75,027	0.9
Fruits	408,427	5.8	378,183	5.7
Others	86,050	1.2	21,680	0.3
Total	7,027,218	100.0	6,826,775	100.0

Source: Authors' calculation using FAO data.

For most food crops, increases in the area harvested since 1995 have been a more important source of production growth than increases in yields (Table 4.3). Also, yield growth rates for many crops have slowed since the early 1990s. For example, yield growth rates for cocoa, maize, rice, and yams in 1995–2012 were about one quarter the growth rates achieved in 1980–94 (Table 4.3). The higher growth rates achieved during 1980–94 may simply reflect a period of yield catch-up after the disastrous pre-reform period, while the more recent growth rates are in line with the Africa-wide average for the same period (ReSAKSS.org, accessed in 2018).

Changes in the crop mix have also contributed to agricultural growth. The crops whose area expanded faster than average during 1995–2013 typically either already had high value of output per hectare (VOP/ha) or experienced more rapid growth than average in VOP/ha over that period (Table 4.4). These crops included groundnuts, yams, pulses, and vegetables.

4.1.1.1 Regional Diversity

Ghana spans several agroclimatic zones, and this leads to clear geographic patterns in crop production. MoFA identifies three main agroecological zones defined on the basis of climate, natural vegetation, and soils. These are the forest zone (which includes the rain and deciduous forests), the savanna zone (including the coastal and northern savannas), and the transitional zone (Map 4.1).

Table 4.3. Growth in crop area, output, and yield, by period (%/year)

	1980–94			1995–2012		
	Area harvested	Production	Yield	Area harvested	Production	Yield
Cassava	7.9	9.8	1.8	2.6	4.7	2.0
Cocoa, beans	–3.4	2.4	6.1	2.6	5.1	2.5
Groundnuts	2.9	0.0	–2.8	4.6	7.0	2.3
Maize	3.1	8.3	5.0	2.6	3.8	1.2
Yams	3.4	10.0	6.3	5.0	6.5	1.5
Other tree crops	3.0	0.1	–2.9	3.4	4.6	1.2
Pulses	0.3	0.1	–0.2	8.1	21.5	12.4
Rice, paddy	–0.1	7.6	7.8	3.5	5.4	1.9
Taro (cocoyam	1.0	5.3	4.2	–0.4	–0.9	–0.5
Plantain	1.1	3.4	2.3	2.6	5.2	2.5
Vegetables	1.2	2.9	1.6	4.4	4.5	0.1
Sorghum & millet	2.0	5.3	3.2	–1.6	–0.7	0.9
Fruits	0.5	2.6	2.1	2.0	5.9	3.8
Others	1.7	1.2	–0.5	5.0	2.5	–2.4
Total	1.1	5.8	4.1	2.7	5.1	2.4

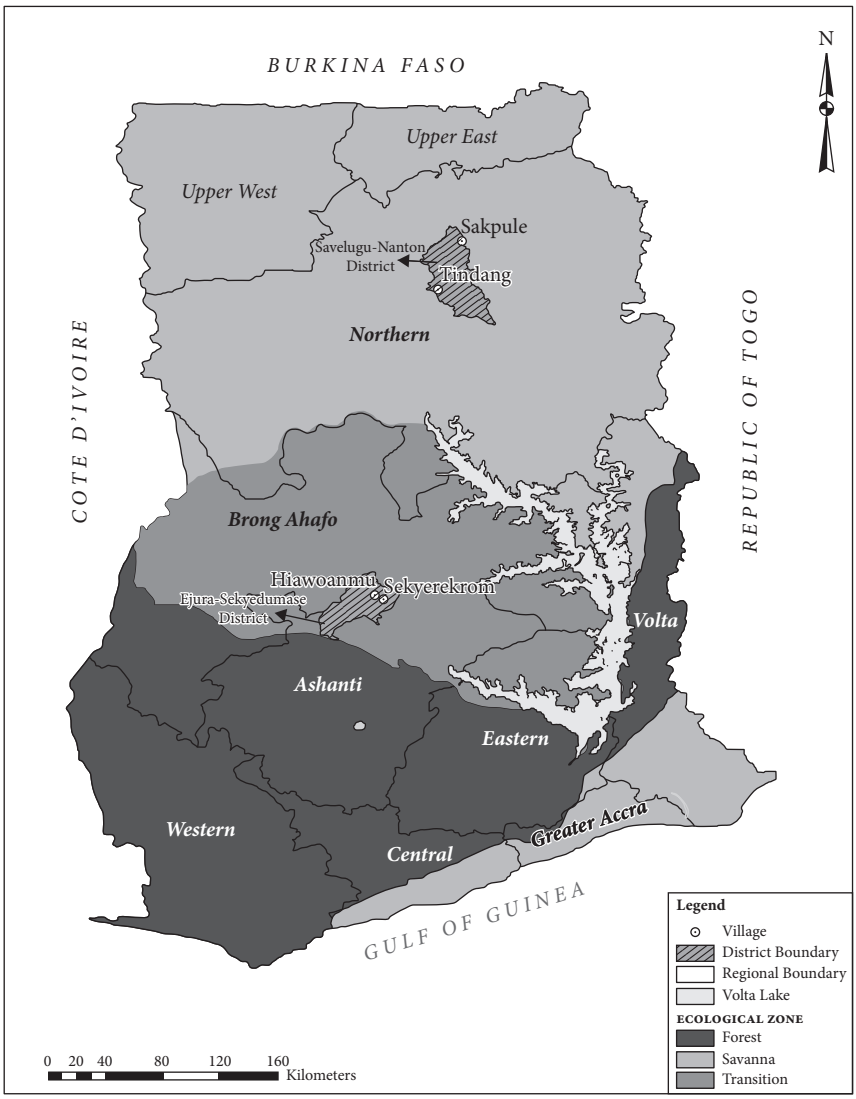
Source: Authors' calculation using FAO data.

Table 4.4. Growth in value added/ha and crop area, by commodity, 1995–2013 (%/year)

	VOP/ha in 2012	Growth in VOP/ha 1995–2013	Growth in crop area 1995–2013
Cassava	1.7	2.0	2.6
Cocoa, beans	0.6	2.7	2.6
Groundnuts	0.6	3.2	4.6
Maize	0.1	1.0	2.6
Yams	4.0	1.8	5.0
Other tree crops	0.3	–1.5	3.4
Pulses	0.3	15.3	8.1
Rice, paddy	0.6	1.6	3.5
Taro (cocoyam	1.4	0.4	–0.4
Banana+plantain	2.2	2.7	2.6
Vegetables	5.9	–4.1	4.4
Sorghum+millets	0.2	1.2	–1.6
Fruits	0.9	7.4	2.0
Others	0.3	–0.1	5.0
Total	1.0	2.1	2.7

Note: The aggregation of agricultural production takes into consideration the weight for each crop, which is in 2004–6 international constant prices.

Source: Authors' calculation using FAO data.



Map 4.1. Ecological zones of Ghana

Source: Compiled from Harvest Choice and GADM data (2015). Map reprinted with permission from Springer.

The distribution of major food crops by agroecological zone is shown in Table 4.5, using average production data for 2010–12. Maize and yams are the only major crops that are grown widely throughout the country, while millet, sorghum, groundnut, and cowpea are grown almost exclusively in the savannah zone, and cassava, plantain, and cocoyam are grown mostly in the transition and forest zones. Rice is most important in the savannah and forest

Table 4.5. Production of major food crops by agroecological zone, 2010–12 averages

	Savannah %	Transition %	Forest %	National 1000s mt
Cassava	9.0	20.8	70.2	14,098
Yam	35.7	36.9	27.4	6,152
Plantain	0	28.0	72.0	3,571
Cocoyam	0	36.2	63.8	926
Maize	20.3	27.8	51.9	1,835
Rice	63.2	4.8	32.0	479
Millet	100.0	0	0	194
Sorghum	98.2	0	1.8	297
Groundnut	88.1	7.1	4.8	290
Cowpea	94.3	3.3	2.4	226
Total				
1000 mt	5,303	7,083	16,263	28,649
%	18.5	24.7	56.8	100

Source: Authors' calculation using MoFA SRID data (accessed in 2015).

zones, and cocoa is grown almost exclusively in the forest zone. In aggregate, the forest zone produces 57 percent of the total tonnage of food crops, the transition zone produces 25 percent, and the savannah produces 18 percent.

MoFA reports cultivated area and production for eight major food crops (maize, rice, cassava, yam, cocoyam, plantain, cowpea, and groundnut) at the regional level and data is available for 1992–2012. During that period, the cultivated areas of these eight major food crops increased from 2.4 million ha in 1992 to almost 4 million ha by 2012. The land expansion predominantly occurred in the transition zone and part of the savannah zone, particularly in the Brong-Ahafo and Northern regions, which became the two largest food-producing regions. More than 40 percent of the increase in the food crop area occurred in these two regions, with annual growth rates of 6.0 percent and 2.6 percent, respectively (Figure 4.1), while the national annual growth rate was 2.9 percent.

4.1.2 Technology

Fertilizer use has grown rapidly in Ghana, from a meagre average of 3.7 kg NPK/ha arable land in 2002 to 35.8 kg/ha in 2013 (Table 4.6), and the share of rural agricultural households using fertilizer increased from 22.4 percent to 33.4 percent between 2005/6 and 2012/13 (Table 4.7). About half the larger-sized farms used fertilizer in 2012/13, while only a quarter of small farms (< 2 ha) used it (Table 4.7). It is surprising that yields have not increased more with fertilizer use. However, as discussed in Chapter 6, fertilizer is used not so

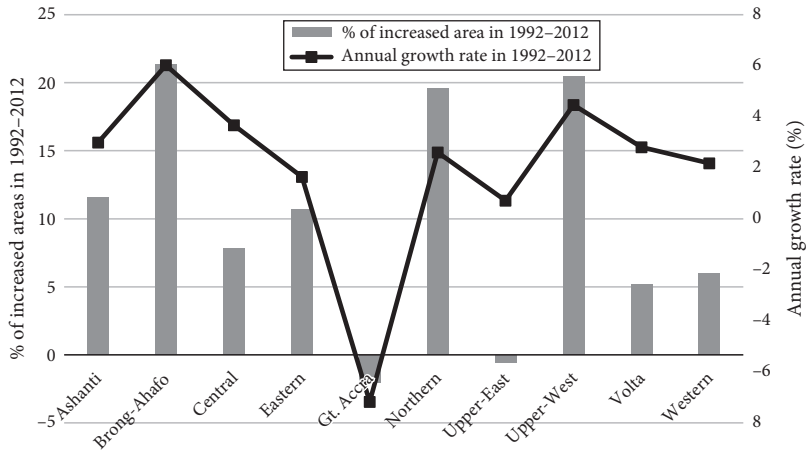


Figure 4.1. Distribution of increases in food crop areas and annual growth rates by region

Source: Authors' calculation using MoFA SRID data (accessed in 2016).

Table 4.6. Fertilizer use (tons of nutrients)

	N	P	K	Total NPK	Application rate kg NPK/ha of arable land
2002	4,330	120	11,120	15,570	3.7
2013	61,922	55,628	50,823	168,373	35.8

Source: FAOSTAT.

much to increase yields as to offset declining yields due to loss of soil fertility as fallow periods have been shortened. The adoption of improved seed varieties that might have enhanced the yield response to fertilizer has also been modest. For example, based on a recent farm survey, Ragasa et al. (2013) found that there has been very little increase in the adoption of improved varieties of maize since a 1997 survey, and although 61 percent of the maize area was planted with modern varieties, only 15 percent was planted with certified seed.

In recent years, many farmers have also adopted herbicides and insecticides, and shifted to tractors for land preparation (Table 4.7). As shown in Chapter 6, these labor-saving technologies have enabled many farmers in the savannah and transition zones to expand their cropped area, while substantially reducing hired labor use per hectare, which has become more expensive with rapid urbanization. However, the increased labor needs associated with larger cropped areas has more than offset reductions in labor use per ha, and the share of farm households using hired labor about doubled between 2005/6 and 2012/13 (Table 4.7).

Table 4.7. Share of rural households using modern inputs and hired labor (%)

Input	Farm size				Total
	< 2 ha	2–5 ha	5–20 ha	> 20 ha	
Fertilizer:					
2005/6	17.0	26.4	30.8	49.3	22.4
2012/13	24.6	40.6	44.8	52.5	33.4
Pesticides:					
2005/6	26.2	36.3	46.3	37.7	32.2
2012/13	59.6	79.3	86.3	83.7	70.6
Mechanization:					
2005/6	12.9	20.3	27.0	34.4	17.5
2012/13	22.0	37.8	53.6	72.8	32.5
Hired labor:					
2005/6	19.2	34.6	40.3	28.8	27.7
2012/13	43.1	53.2	64.6	74.1	50.0

Source: Authors' calculation using GLSS5 and GLSS6.

4.1.3 Land and Labor

The total cropped area grew by 2.7 percent per year over 1999–2014 (Table 4.4) as farmers brought virgin land into production and shortened fallow periods. FAO estimates that the agricultural labor force also grew at about the same rate over a similar period (Table 4.8). However, this estimate may be high; GGDC (Timmer et al. 2016) estimates that agricultural employment grew by only 0.7 percent per year during 2000–10, and this estimate is consistent with our own estimates based on the Ghana Living Standard Survey data. Census data also show that the rural population has peaked in size, in which case the pressure on the land base should be easing.[1]

Labor also became more expensive as real wage rates were pulled up by competition from rural nonfarm jobs (Chapters 2 and 5), growing by nearly 7 percent per year on average over 1991 to 2012 at both national and regional levels (Table 4.9). However, the value of agricultural production has grown faster than land and labor (4.5 percent per year), leading to increases in both land and labor productivity. Figure 4.2 plots the changes in land and labor productivity since 1991, and shows that while both have increased, labor productivity has grown considerably faster than land productivity, a reflection

[1] The land pressure on the rural population will also have been affected by loss of land to urban-based entrepreneurs who are reportedly venturing into farming (Jayne et al. 2016), but there has also been an offsetting pattern with some rural households giving up their land to focus on nonfarm occupations (see Chapter 5).

Table 4.8. Growth in national and agricultural labor forces

	Millions				Annual growth rate %		
	1999	2004	2009	2014	1999–2004	2004–9	2009–14
National population	18.38	20.84	23.69	26.44	2.54	2.60	2.22
Rural population	10.44	11.05	11.71	12.20	1.01	1.01	1.00
National labor force	8.07	9.20	10.75	12.43	2.66	3.16	2.95
Agricultural labor force	4.62	5.15	5.87	6.63	2.20	2.65	2.50

Source: FAOSTAT.

Table 4.9. Agricultural wages in Ghana, 1991–2012, by type of work (new cedis, deflated by CPI)

Year	Men clearing	Women harvesting	Men harvesting
1991	1.18	0.94	1.11
1998	1.39	1.03	1.35
2005	2.30	1.84	2.38
2012	4.55	3.60	4.24
Growth rate	6.70	6.78	6.78

Note: Annualized growth rates over 1991–2012.

Source: Authors' calculation using GLSS3 to GLSS6.

of a switch to labor-saving technologies and crops. This is consistent with Chapter 2 where it is shown that labor productivity growth within agriculture was an important source of growth in national labor productivity.

4.1.3.1 Land distribution

Ghanaian agriculture is still dominated by small farms of less 2 ha in size, but one consequence of the changes in land area and population has been a shift in the farm size distribution (Table 4.10). Nationally, about three quarters of all rural households had land in 2012/13, and of these about half farmed 2 ha or less (i.e., about 4.5 million small farms). The share of rural households with no cultivated land increased from 16.8 percent in 2005/6 to 23.2 percent in 2012/13, while amongst those households who do have land, there has been an increase in the share of middle-sized farms at the expense of small (< 2 ha) and large (> 20 ha) farms. This change masks important differences at regional levels. In the northern regions (comprising most of the savannah and part of transition zones), the changes are similar to but more modest than the changes

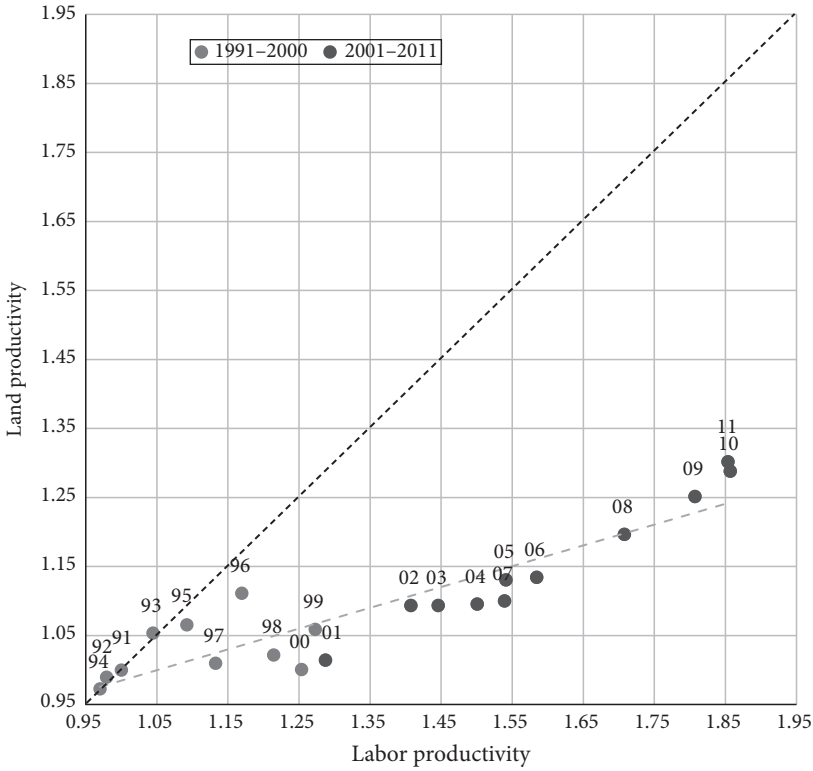


Figure 4.2. Trends in land and labor productivity, 1991–2011

Note: Each dot in the chart represents an individual year.

Source: Authors' calculation using data from GGDC (2016) for agricultural value added and agricultural employment, and from FAO (2016) for cultivated agricultural land.

Table 4.10. Changes in the size distribution of farms amongst rural households (%)

	No land	< 2 ha	2–5 ha	5–20 ha	> 20 ha	Some land
National						
2005/6	16.8	53.3	31.8	12.9	1.9	83.2
2012/13	23.2	49.3	35.6	14.2	0.9	76.8
Northern regions (savannah and transition zones)						
2005/6	12.8	44.3	36.6	15.9	3.2	87.2
2012/13	14.9	38.6	41.2	18.8	1.4	85.1
Southern regions (forest and coastal zones)						
2005/6	16.8	53.3	31.8	12.9	1.9	83.2
2012/13	29.1	58.4	30.8	10.3	0.5	70.9

Source: Authors' calculations using GLSS5 and GLSS6 data. Land is defined as cultivated land.

in national aggregates. In the southern regions (comprising the forest and coastal zones), there has been a much sharper increase in no-land households, and the share of small farms (< 2 ha) has actually increased by 10 percent at the expense of all the other size groups.

The GLSS data can also be used to calculate the share of the total operated land farmed by different farm size groups. Jayne et al. (2016) provide the estimates in Table 4.11. According to their estimates, small farms of less 5 ha accounted for 84.5 percent of all farms in 2012 (down from 92.1 percent in 1992), and for 48.9 percent of the total operated area (down from 60.7 percent in 1992). On the other hand, the share of farms in the 5–100 ha range about doubled between 1992 and 2012 (up 97 percent) while their share of the operated land area increased by 45.5 percent. This confirms the growing importance of middle-sized farms. Further confirmation is to be found from village studies in the savannah zone (in Chapter 6). In the 1980s there were very few farms greater 5 acres in the four study villages, but by 2015 half or more of the farms in all the villages were larger than 5 acres.

A problem with representative household surveys like the GLSS is that, because they are sampled to represent households and not agricultural area, they can seriously understate the importance of large farms, and hence distort estimated land shares (Lowder et al. 2016). Jayne et al. (2016) used census and other area based data to estimate a more accurate picture for Ghana, and found that while there were very few farms greater then 100 ha in the GLSS surveys, nevertheless they account for about 22 percent of the total farmed area. This group is missing in estimates like those in Table 4.10, which are based only on GLSS data.

Table 4.11. Distribution of farms and operated area by farm size groups, 1992 and 2012

Farm size	Percent of farms			Percent of operated land area		
	1992	2012	% change	1992	2012	% change
0–5 ha	92.1	84.5	–8.3	60.7	48.9	–19.4
5–10 ha	5.3	9.2	73.6	17.2	19.5	13.4
10–20 ha	1.7	4.0	135.3	11.0	16.0	45.5
20–100 ha	0.9	2.4	166.7	11.1	15.6	40.5
5–100	7.9	15.6	97.4	39.3	51.1	30.0

Source: Jayne et al. (2016) based on GLSS data.

4.1.4 Rural Livelihoods, Incomes, and Poverty

Rural households have benefited directly from the changes in the agricultural sector, but they have also benefited from new opportunities in the rural nonfarm economy. Nonfarm opportunities have grown rapidly in urbanizing areas, especially in districts with medium and small-sized towns, leading to considerable diversification of farm household livelihoods into nonfarm sources of income and employment (see Chapter 5). Table 4.12 summarizes some of the main changes in terms of incomes sources by farm size groups. About half of all farm households (51.3 percent) received less than one third of their total income from nonfarm sources in 2012/13 and can be considered to have been primarily dependent on farming. This share was down from 55.8 percent in 2005/6. Moreover, the share of farm households receiving two thirds or more of their total income from nonfarm sources was 41.4 percent in 2012/13, up from 32.1 percent in 2005/6. Proportionally, more small farms ($\leq$ 2 ha) obtain two thirds or more of their income from nonfarm sources than medium and large farms; 42.7 percent versus 35.7 percent.

The combined impact of changes in the agricultural sector plus diversification into nonfarm sources of income has led to substantial increases in rural incomes, which, because of data problems, we proxy here by household expenditures (Table 4.13). For rural households as a group, per household and per capita real expenditures increased by 2.4 percent and 2.2 percent annually between 2005/6 and 2102/13. These increases compare favorably

Table 4.12. Composition of farm household by type of livelihood strategy

Nonfarm income as share total income	Farm size		
	Small ($\leq$ 4 ha)	Medium and large (> 4 ha)	Total
2012/13 (n = 9,111)			
Low ($\leq$ ⅓)	41.0	10.3	51.3
Medium (⅓–⅔)	5.8	1.5	7.3
High (> ⅔)	35.0	6.5	41.4
Total	81.8	18.2	100.0
2005/6 (n= 5,200)			
Low ($\leq$ ⅓)	41.5	14.3	55.8
Medium (⅓–⅔)	9.7	2.4	12.1
High (> ⅔)	27.2	4.9	32.1
Total	78.4	21.6	100.0

Note: Includes rural and urban households that have some operated farm land.

Source: Calculations by Melanie Bacou using GLSS data.

Table 4.13. Changes in household and per capita expenditure, 2005/6 and 2012/13

	Type household				
	National	**Rural**	**Rural agriculture**	**Rural nonagriculture**	**Rural mixed**
Per household (2012/13 cedi)					
2005/6	7,511	6,015	5,648	6,658	7,641
2012/13	9,014	7,078	6,435	7,762	8,939
Ratio	1.20	1.18	1.14	1.17	1.17
Per capita (2012/13 cedi)					
2005/6	1,872	1,376	1,251	1,929	1,299
2012/13	2,259	1,586	1,389	2,260	1,504
Ratio	1.21	1.16	1.11	1.17	1.16

Source: Authors' calculation using GLSS5 and GLSS6 data.

with the national average increases in household and per capita expenditure of 2.6 percent and 2.7 percent per annum, respectively. Although the differences in rates of increase are small, they are sufficient to prevent any convergence in household expenditures (or incomes) between rural and urban households, and between agricultural and nonagricultural households in rural areas. In 2012/13, rural households still had average per capita expenditures that were 70 percent of the national average, and agricultural households had per capita expenditures that were only 61 percent as large as the rural average.

Along with income growth, rural poverty has declined. The national poverty rate fell from 52 percent in 1991/2 to 32 percent by 2005/6, and to 24 percent by 2012/13. The rural poverty rate has remained higher than the national rate, but it also fell sharply—from about 65 percent in 1991/2 to 44 percent in 2005/6, and to 38 percent in 2012/13. As shown in Chapter 5, there is a clear relationship between poverty and rural livelihood opportunities, particularly the participation in rural nonfarm activities, and which varies with the level of urbanization.

4.2 Explaining the Trends

Ghana's agricultural performance has been better than in most other African countries, but it has not been outstanding, nor has it exploited its potential to become a more important source of export earnings beyond cocoa, or to reduce the country's growing dependence on many imported foods. Moreover, despite continuing rural population growth, agricultural growth has depended

mainly on expanding the cropped area, and there has been little agricultural intensification of the Green Revolution type. In this section we attempt to explain why agriculture has developed the way it has, and to assess the implications for the future.

The observed patterns of change reflect the summation of the decisions of some 6 million farmers, who have responded over time to a changing political and economic environment. Key drivers of change to explore are:

- Government policy, including the political and economic environment, public investment, and pro-active state interventions to further the development of particular value chains, regions, or groups of farmers.
- Population pressure and land expansion
- Rapid urbanization, which can impact on agriculture through changes in market access, infrastructure, population pressure, rural nonfarm opportunities, and higher wages.

4.2.1 Policy

4.2.1.1 An enabling economic environment

As discussed in Chapter 3, apart from cocoa, the value chain for which the government has intervened actively through Cocobod (a parastatal), and trade and tax policies, the government has generally shown benign neglect of the agricultural sector since the SAP reforms of the 1980s, relying more on creating a stable and enabling economic environment than on direct interventions that favored particular commodities. As discussed in Chapter 2, this improvement in what Rodrik calls "fundamentals" led to significant growth in labor productivity in agriculture after the SAP, to the point where it has been a major factor in the growth of national per capita income since the 1980s.

The improvement in the enabling economic environment for agriculture is reflected in a sustained shift in the sector's domestic terms of trade. Real farm gate prices increased modestly over 1998–2012 (Table 4.14), while farm input prices, including fertilizer, declined substantially (Table 4.15). Against this, agricultural wage rates grew by nearly 7 percent per year on average over 1991 to 2012 (Table 4.9), and labor costs are now a major production cost for most farmers (Diao et al. 2014). There was also a general decline in the level of taxation of agriculture, as reflected by changes in average nominal rates of assistance for agriculture (see Chapter 3).

Table 4.14. Annualized growth rates in crop prices, 1998–2012 (%)

Crop	Current Prices	Constant 2005 prices
Cassava	18.49	–0.41
Yam	16.77	–1.86
Plantain	21.84	2.41
Cocoyam	19.25	0.23
Maize	21.06	1.75
Sorghum	21.29	1.94
Groundnut	22.98	3.37
Millet	19.65	0.57
Rice	20.94	1.65
Tomato	23.15	3.51

Source: Authors using data from the Ministry of Agriculture of Ghana.

Table 4.15. Annualized growth rates in input prices, 1998–2012 (%)

Input	Current prices	Constant 2005 prices
NPK 15–15–15	7.80	–7.17
Sulphate of Ammonia	7.37	–7.54
Urea	5.15	–9.45
Round Up	3.99	–10.45
Karate	–0.20	–14.06
Actellic	–2.67	–16.18
Hoe	18.52	2.06
Cutlass	14.38	–1.50
Jute Sac	25.61	8.17

Source: Authors using data from the Ministry of Agriculture of Ghana.

4.2.1.2 Direct government interventions

The lack of direct support for agriculture is reflected in low levels of public spending on agriculture and limited and often ineffective interventions for promoting value chain development for commodities other than cocoa.

The government has underinvested in agriculture by the norms of other African countries, and by its own commitment under the Maputo Declaration to spend at least 10 percent of its total budget on agriculture. As shown in Chapter 7, public spending on agriculture averaged only 2.1 percent of total government spending during 2001–8, and 2.8 percent during 2009–12. Furthermore, about two thirds of this spending went to the cocoa subsector, leaving the noncocoa subsector even more neglected. When expenditures of

the Ghana Cocoa Board are included as part of public expenditures on agriculture, and expenditures of other public corporations are included as part of total public expenditure, then, as shown in Chapter 7, the budget share is about 3.8–5.3 percent, which still falls far short of the 10 percent Maputo Declaration target.[2] Ghana also spends relatively little on rural roads and other infrastructure important to agriculture (Chapter 7), and spending on agricultural R&D has averaged 0.6–0.7 percent of agricultural GDP since 2000, which is barely above the Africa-wide average, and well below the African Union (AU) target of 1 percent (Stads 2016).

Apart from cocoa, whose value chain is tightly controlled by Cocobod, and which generally does a good job (see Chapter 8), the government has made few direct interventions along the value chains of other commodities since the economic reforms, and the few attempts that have been made were mostly unsuccessful (Chapters 3 and 8). For example, the public sector attempts to promote domestic cocoa processing, palm oil production, and the export of pineapples (Chapter 3). This lack of effective value chain interventions may not have adversely affected many of the markets for nontradable agricultural products, but Ghana has not done well in developing additional exports crops like pineapple, in competing with imports like rice and tomatoes, or in developing agroprocessing industries, despite strong demand. Weak public sector support has contributed to the poor availability of appropriate technologies, especially improved seeds, weak rural infrastructure like roads, transport systems, and cold storage, lack of grading systems for quality control, and limited export promotion (Chapter 8). However, as discussed in Chapter 3, for government to play more proactive roles along value chains requires overcoming inherently weak public sector capacities, and a greater willingness to engage with the domestic as well as the international private sectors.

In 2007, the government started paying more attention to the noncocoa subsector with some proactive interventions. These included the reintroduction of a fertilizer subsidy, the establishment of subsidized Agricultural Mechanization Service Centers (AMSECs), the setting up of Block Farms that benefit from a range of subsidized inputs and extension, and the stabilization of output prices via the establishment of the National Food Buffer Stock Company (NAFCO). The cost of these programs was initially modest at GHS7.5 million per year in 2007 and 2008, but had escalated to 25 percent

[2] Offsetting to some extent this neglect in public spending has been some off-budget spending by a number of donors that is channeled directly to partners in the private and NGO sectors.

of MoFA's budget in 2010, and were on track to increase to about half MoFA's total budget by 2020 (Chapter 7).

A key question is whether these public sector interventions will be any more effective than past attempts, or whether public sector capabilities are still too weak and disengaged from the private sector. While there is some preliminary evidence that these programs are leading to higher yields for some farmers, still growth in average land productivity for the noncocoa subsector was only marginally higher during 2009–12 (3.6 percent per annum) than during 2001–8 (3.2 percent per annum) (see Chapter 7). There is also little evidence that the AMSECs are effective in promoting agricultural mechanization and may if anything be distorting more efficient private sector initiatives (Chapter 9). Recent turmoil in the government's fertilizer subsidy policy also raises doubts about the effectiveness of its interventions. Rather than staying with a well-defined objective for the subsidy, the government's objectives and the program's design have changed almost yearly in response to changing political and financial pressures. There have also been serious problems in containing the total cost of the subsidy (see Chapter 7), and problems implementing the program in ways that ensure dealers are able to import required amounts of fertilizer each year and that farmers receive their fertilizer in time for each crop season (Resnick and Mather 2016).

In short, there is little evidence to suggest that proactive government policies and investments in agriculture and along value chains have been a major driver of agricultural growth in Ghana since the economic reforms, other than in the cocoa subsector. However, by creating and sustaining a favorable enabling environment and improved terms of trade for agriculture, the government has encouraged farmers and other private sector players to invest in agriculture and along value chains, leading to sustained agricultural growth and gains in labor productivity.

4.2.2 Population Pressure on the Land Base

The rural population has grown steadily over the years, adding to the population pressure on the land base, and an 18 percent decline over 1981–2013 in the available agricultural land area per rural person (Table 4.16). However, because more land has been brought into crop production by clearing virgin land and reducing the length of fallow periods, the arable land area grew fast enough to enable the arable land area per rural person to increase by 52 percent over 1981–2013 (Table 4.16). Nearly all this increase occurred

Table 4.16. Changes in rural population density, 1991–2013

	Agricultural area (m ha)	Arable area (m ha)	Rural population (m)	Agricultural land/rural person (ha)	Arable land/rural person (ha)
1981	12.00	1.90	7.628	1.57	0.25
1991	12.72	2.84	9.452	1.34	0.30
1999	14.18	3.85	10.445	1.36	0.37
2013	15.70	4.70	12.244	1.28	0.38
Percent change					
1981–1999	18.17	102.63	36.93	–13.38	48.00
1999–2013	10.72	22.08	17.22	–5.89	2.70
1981–2013	30.83	147.37	60.51	–18.47	52.00

Source: FAOSTAT.

before 1999, with only a 2.7 percent increase since 1999. The most recent census data suggests that the rural population size has now peaked. As shown in Chapter 5, there has been considerable spatial variation in these patterns, with much of the rural population growth occurring in the more urbanized and population dense areas, and much of the arable land expansion occurring in the more sparsely settled rural areas, particularly in the savannah and transition zones.

Early advocates of induced innovation (Boserup 1965; Ruthenberg 1980) argued that as rural population densities increase, there ought to be increasing farmer demand for yield-enhancing technologies to raise land productivity. A complication for this theory in Ghana is that it ignores the elastic nature of the land constraint, which has contributed to an increase in the cropped area per rural person even as the agricultural land area per rural person has declined (Table 4.16). However, as noted above, these national figures mask important regional variations, so there could still be pockets of induced innovation, especially in some of the more urbanized areas. There have, for example, been cases of rice intensification in some irrigated areas, but one study suggests these are driven more by market opportunity and new technology than population pressure (Takeshima et al. 2013; Otsuka and Larson 2013).

Nin-Pratt and McBride (2014) analyzed the relationship between population density and the purchase of modern inputs and the value of output/ha in different ecological zones in Ghana, using GLSS5 data. They focused on the 30 percent most efficient farmers in the sample as measured through a data envelop analysis (DEA), on the grounds that the more efficient farmers are the most likely ones to be adopting modern inputs in response to any changes in factor prices. They found no consistent relationships in the coastal, forest, and

savannah zones to support the induced innovation theory, except for some increase in hired labor costs and value of output/ha in the top two population density deciles of the forest zone (which may reflect an emerging land constraint). This analysis has now been updated using GLSS6 data, and the results for the forest and savannah zones are shown in Figures 4.3a and 4.3b.[3] We report results for the full GLSS6 sample as well as the 25 percent most efficient and inefficient farmers using the DEA approach. Again, there are few systematic relationships between input use and population density, and whereas the induced innovation theory would predict that the value of production/ha should increase as the population density increases, the reality is the reverse. Limiting the analysis to the more efficient farmers does not make much difference.

4.2.3 Urbanization

If proactive government policies and increasing population density do not adequately explain past patterns of agricultural growth in Ghana, then what does? We explore a third hypothesis that attributes an important part of Ghana's agricultural success to the impact of rapid urbanization. Chapter 5 examines this hypothesis in detail for Ghana, and finds that urbanization has led many rural households to move into nonfarm occupations as their primary jobs, with a corresponding decline in the share of households that depend primarily on agriculture. Not surprisingly, this shift into nonfarm occupations is positively correlated with the degree of urbanization of a district and the proximity to large urban centers. Chapter 5 also finds that farming in the most urbanized districts is increasingly undertaken by small-scale units, often on a part-time basis. On the other hand, in the agriculturally important north where there are less nonfarm job opportunities, there has been a more pronounced trend towards a larger share of medium-sized farms. Finally, Chapter 5 finds that there is little evidence that urbanization has led to more intensive farming practices in terms of the use of modern inputs or choice of technology in the more urbanized areas.

Although Chapter 5 finds that there has been substantial uptake of fertilizers, herbicides, and mechanization in Ghana in recent years, this does not seem to have been driven by urbanization. In fact, the use of fertilizer is greater in the north of the country than the more urbanized south, and higher

[3] The authors are grateful to Alejandro Nin-Pratt for his help in updating this analysis.

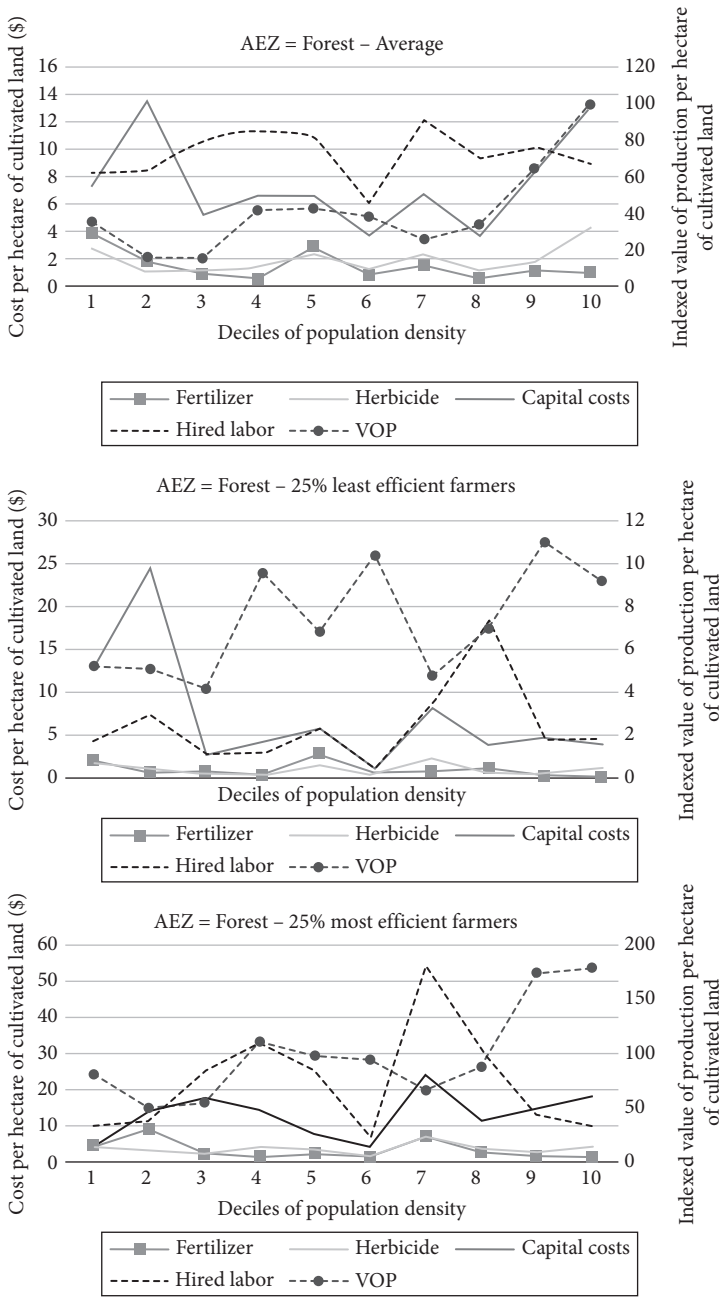


Figure 4.3a. Patterns of intensification against population density in the forest zone comparing full sample with least and most cost-efficient farmers

Source: Calculations by Alejandro Nin-Pratt and authors, using GLSS6 data.

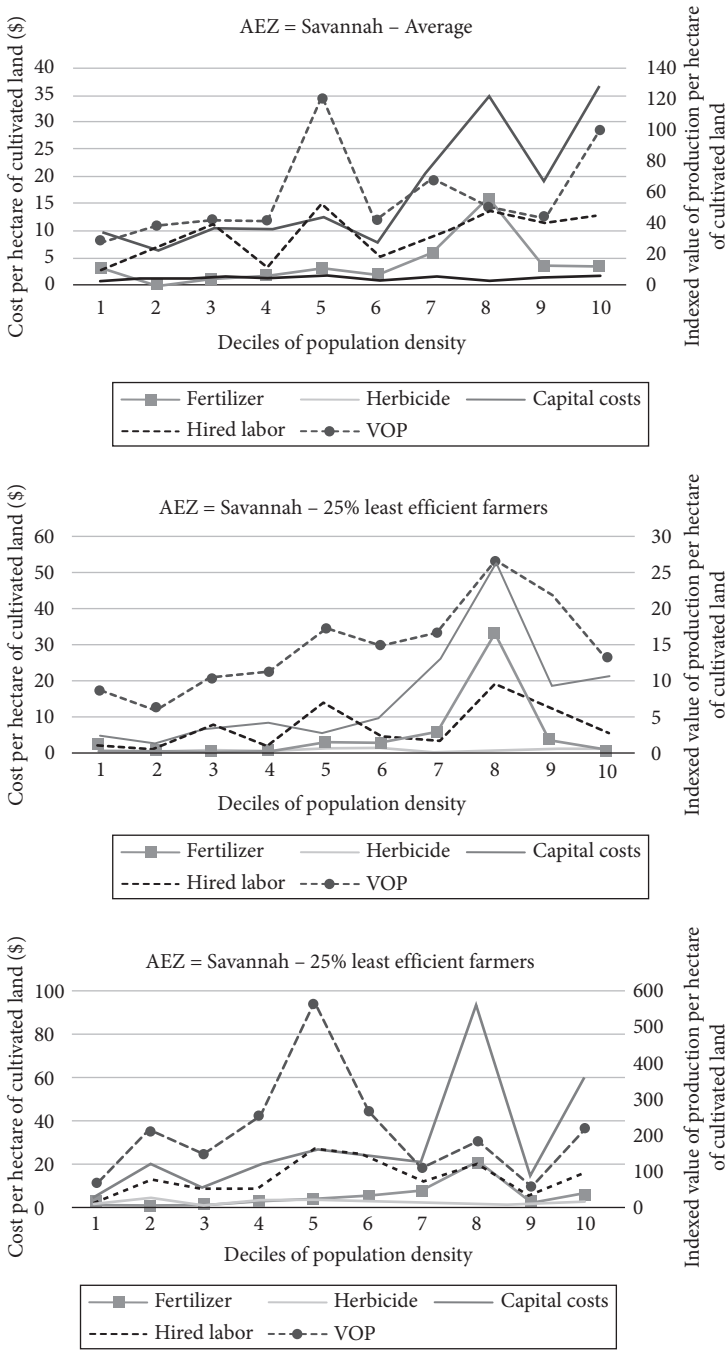


Figure 4.3b. Patterns of intensification against population density in the savannah zone comparing full sample with least and most cost-efficient farmers

Source: Calculations by Alejandro Nin-Pratt and authors, using GLSS6 data.

amongst medium- and large-sized farms than small farms. These patterns are consistent with the finding from the village narratives in Chapter 6 that fertilizer is used mainly for offsetting declining soil fertility rather than intensification. Overall, the evidence suggests that intensification is only taking place to a limited extent even in areas near urban centers. Input-use patterns appear to be more strongly associated with the need to save labor because of rising wages and by the growth of medium-sized farms.

4.3 Conclusions

Past patterns of agricultural growth have been associated with an elastic land frontier that has enabled agricultural production to grow by expanding the cropped area. This was initially achieved by bringing more virgin land into production, but as the land frontier tightened farmers increased their cropped area by shortening fallow periods, and using fertilizer to compensate for the soil fertility problems that followed. At the same time, farmers in the transition and savannah regions have responded to rising labor costs, urbanization, and new market opportunities, by increasing their farm sizes with the aid of mechanization and herbicides, and changing their crop mixes to better meet market demand. The result has been substantial increases in farm production and incomes, but more from increases in the cropped area and crop mix than from increased yields. Land productivity has increased only modestly, but labor productivity has increased substantially in line with wages.

The pattern of transformation has been different in the southern parts of the country that have been more affected by rapid urbanization. Here many farm households have taken advantage of urban-rural linkages to diversify into nonagricultural sources of income, and farms have become smaller at the expense of larger farms. Despite having greater access to urban markets, services, infrastructure and an increasing population pressure on the land base, there is little evidence of any agricultural intensification leading to higher yields and land productivity in these areas. As in the northern parts of the country, the transition has been towards labor-saving farming practices and increased labor productivity. These livelihood patterns seem likely to be sustained into the future as long as the nonagricultural economy, especially in middle- and small-sized cities, continues to flourish. There must be pockets of agricultural intensification, e.g., high-value agriculture near urban centers, but if so they are still at too small a scale to be captured in the level of household aggregation used in Chapter 5, or indeed in the GLSS household surveys.

Although the agricultural sector has benefited from an enabling policy environment that has encouraged farmers to invest in expanding their production, still the sector has been constrained by low levels of public investment and a lack of proactive public sector interventions to develop the value chains for important export crops (other than cocoa) or import-substituting crops like rice and tomatoes. Had the government done more to help farmers access improved seeds, irrigation, roads, credit, markets, etc., then perhaps there would have been a greater shift by now to agricultural intensification in Ghana, and even faster rates of agricultural growth. Induced innovation is hypothesized to happen as an endogenous response to increasing population pressure and urbanization, but it can only work if there are intensification technologies available to farmers that are profitable to use, and markets to absorb their additional production.

The future sustainability of the current patterns of agricultural growth is constrained by the availability of remaining virgin and fallow land for future expansion of the cropped area. As the land frontier runs out, farmers will need to shift towards more intensive modes of production, and options will need to include higher-yielding technologies and a greater focus on high-value products. The economic viability of these options will depend on government policies towards agricultural R&D, infrastructure, and value chain interventions that condition access to modern inputs and urban markets and their costs, and trade policies that condition the level of competition farmers must face in their domestic markets. These policies will need to be cognizant of the needs of the changing nature of Ghanaian agriculture. As more small farm households are attracted into nonfarm activities, farms become more consolidated, rural wages rise, and rural youth become better educated, more emphasis will be needed on the development of technologies and commercial farming practices that raise land as well as labor productivity, are attractive to young farmers, and meet the needs of Ghana's increasingly urbanized food system. We return to these issues in Chapter 10.

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