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The Role of Agriculture and the Agro-processing Industry for Development in Egypt

AN OVERVIEW

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ABSTRACT

In order to complement the ongoing macroeconomic and safety net reforms in Egypt, it is important to foster additional sector-specific economic growth, especially in sectors that are good at creating jobs and reducing poverty. One sector that may help foster socioeconomic development in coming years is agriculture and related agro-processing industries. This paper shows that agriculture in Egypt continues to play a relatively important role in the economy compared to other middle income countries. The sector's stable growth performance has proved to be a reliable contributor to economy-wide output growth over the past decades. The underlying productivity gains have prevented the country's food import dependency ratio from rising in spite of rapidly growing food demand.

However, employment in agriculture (expected) and agro-processing sectors (unexpected) in Egypt has declined, both in absolute and relative terms, but with differences across governorates. Poorer governorates tend to continue to rely more on agriculture and less on agro-processing, especially in Upper Egypt. At the household level, about one quarter of rural households remain exclusively reliant on agricultural employment, even as about half of all rural households no longer work in agriculture.

Possible avenues for sustained or even accelerated agricultural growth are through further productivity gains (limited), expansion of land (limited), and a structural change within the sector from staple crops to crops with higher value added, like fruits and vegetables (potentially large). The latter shift would not only likely provide farmers with more income per unit of cropped area, but is also likely to employ more people and thus create more of the much needed jobs. More attention should also be given to agro-processing industries, particularly food processing and related services, for both domestic and international markets. Now may be a good time to re-think agriculture in Egypt: The ongoing macroeconomic reforms are likely to help make agriculture and agro-processing more competitive both nationally and internationally. Yet, additional steps will have to be taken to support a flourishing agricultural and agro-processing sector.

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1. INTRODUCTION

Many of the economic challenges that Egypt is facing today have for decades been deeply rooted in the country. To tackle these longstanding issues, such as slow progress in economic diversification and persistently high levels of unemployment and poverty, Egypt recently embarked on a historic economic reform process. The year 2016 witnessed several of these reforms, including the imposition of a value added tax (in August 2016), the floatation of the Egyptian pound (in November 2016), and further reductions in energy subsidies (in November 2016, following the 2014 partial removal of the subsidy). To protect the poor from the expected negative impacts of these reforms, the government since 2014 has been reforming the food subsidy system and in March 2015, to accompany the food subsidy reforms, introduced the Takaful and Karama program, a cash transfer program that is conditional on school attendance and health clinic visits.

To complement such macroeconomic and broad social reforms, it is important to also design and implement sector-specific policies and investments to foster additional economic growth that benefits the people, especially the poor. Economic growth is generally most inclusive if it is driven by labor-intensive sectors. As such, agriculture is one sector that deserves more attention, as it is widely accepted to play a key role for both economic development and poverty reduction (Diao et al. 2007; Burch et al. 2007). As countries become richer and economies transform, the role of agriculture in the economy and in employment generally declines, while the role of industrial and service sectors usually increases (Kuznets 1966; Herrendorf, Rogerson, and Valentinyi 2013).

In middle income countries like Egypt with a long agricultural tradition, agriculture may still play an important role for development, especially for job creation and food security. In addition, related agri-business sectors, such as agro-processing industries and agro-services, are often labor-intensive and are seen to have played an important role for development in Asia and Latin America (IFAD 2016; Breisinger and Diao 2008). Acknowledging this potential, the Egyptian national development strategy – the Sustainable Development Strategy (SDS), Vision 2030 includes plans for leveraging agriculture and agri-businesses for accelerating economic growth and improving the lives of all people, including through reducing poverty and malnutrition (Government of Egypt 2015). Specifically, the Sustainable Agricultural Development Strategy towards 2030 document of the government suggests increasing the role of agriculture in the economy by increasing agricultural productivity (vertical expansion) and the reclamation of new lands (horizontal expansion). In addition to expanding agricultural production, the agricultural strategy also emphasizes the important role of expanding agricultural trade (both imports and exports) by building on Egypt's bilateral and multi-lateral trade agreements. The strategy also emphasizes the importance of focusing on crops for which Egypt has a comparative advantage and that can serve as raw materials to supply Egyptian manufacturing with inputs. In line with this, there is increasing awareness of the importance of agri-industrial development. Egypt's SDS highlights creating strategically located collection and storage facilities and developing agro-industrial parks and clusters (Government of Egypt 2015).

Against this background, this paper reviews the role that agriculture and agri-business[1] has played in economic development both globally and in Egypt in order to learn lessons on their potential for contributing to socio-economic development in Egypt. As such, the paper provides answers to the following questions, among others:

1. What role do agriculture and agro-processing industries play in Egypt's economy and for trade and employment, and how have those roles changed?
2. What is the role of agriculture and agro-processing industries for sub-national development and improving household welfare?
3. Going forward, what are the opportunities and challenges for expanded agriculture and agri-business development?

To answer these and related questions, this paper starts by putting Egypt's economic transformation experience over the past few decades into a global perspective. Section 3 then analyzes Egypt's economic growth and trade performance and changes in employment at subnational and household levels, with a specific focus on agriculture and agro-processing. Section 4 examines the role of agriculture and agro-processing for households and poverty outcomes. The last section concludes with a summary of key messages and proposed areas of further policy research.

[1] The paper mostly focuses on agro-processing, as data for agri-services (services related to agriculture) are generally not available at a sufficiently disaggregated level. The agro-processing industry refers to "the subset of manufacturing that processes raw materials and intermediate products derived from the agricultural sector", including forestry and fisheries (FAO 1997). Agro-processing industries can be classified into upstream and downstream industries. Upstream industries are engaged in the initial processing of agricultural commodities—examples include rice and flour milling, leather tanning, cotton ginning, oil pressing, saw milling, and fish canning. Downstream industries undertake further manufacturing operations on intermediate products made from agricultural materials—examples include bread, biscuit, and noodle making; textile spinning and weaving; paper production; clothing and footwear manufacturing; and rubber manufacturing (FAO 1997).

2. ROLE OF AGRICULTURE IN EGYPT'S ECONOMIC TRANSFORMATION: A GLOBAL PERSPECTIVE

The changing role of agriculture is part of a process of structural change and economic transformation. Structural change is defined as the reallocation of economic activity across the three broad sectors (agriculture, manufacturing, and services) that accompanies the process of modern economic growth (Herrendorf et al. 2013). The countries that manage to pull out of poverty and get richer are those that can diversify away from agriculture. As labor and other resources move from agriculture into more productive activities, overall productivity rises and incomes expand. The speed with which this structural transformation takes place is the key factor that differentiates economically successful countries from unsuccessful ones (McMillan and Rodrik 2012). These changes are usually accompanied by an increasing degree of urbanization, as the economy's center shifts from rural to urban areas, and rural to urban migration rises (Kuznets 1966; Stern et al. 2005).

There are several indicators by which economic development and economic transformation can be measured. The common measures of economic development at the aggregate level are *GDP per capita* and some *measure of productivity* (typically GDP per worker) (Herrendorf et al. 2013). The three most common measures of economic activity at the sectoral level to measure structural transformation are: employment shares, value-added shares, and final consumption expenditure shares (Herrendorf et al. 2013). Usually, the structural transformation process takes place simultaneously with an agricultural transition. Agricultural transition materializes when the structural character of the rural economy undergoes transformation in an integrated way. As the systems that govern the organization and structure of agricultural production develop, changes also occur in farm and nonfarm sectors, as well as in urban and rural demographic patterns, among other factors (Reardon and Timmer 2014; Stupak 2016). Based on some selected indicators, here Egypt is placed into a global perspective on economic structural transformation through an overview of how key structural indicators have changed over time.

The importance of agriculture in GDP and total employment in Egypt seems to be declining more slowly compared to other countries (Figure 1A). In the 1970s, the share of agriculture in Egypt's GDP fell broadly in line with the global trend, whereas the share of agricultural employment in total employment only changed a little. In the following decades, the share of agricultural GDP continued to fall, albeit at slower pace than the global average. In other words, Egypt shows higher shares of agriculture in GDP than other countries at similar levels of per capita incomes. In 1990s, the employment share in agriculture dropped markedly, but has remained broadly constant at relatively high levels since then.

Furthermore, the comparison of Egypt's economic structure with that of other countries indicates that the industrial sector reached its highest share in GDP in 1981.[2] The share of industry value-added rose significantly in Egypt between 1973 and 1981. The 1980s recorded the largest average share for the industry sector of the economy of the past four decades (Figure 1B), even though industry's share as a percent of GDP declined between 1981 and 1986. Since the 1980s, industry in Egypt has continued to play a larger economic role compared to other countries. Employment in Egyptian industry has also been playing a more important role compared to other countries at the same income level in the 1980s, as since then the share of employment in industry fell in the middle of the spectrum of comparable countries.

In contrast to industry overall, the share of manufacturing in GDP declined during the 1970s, but has increased since then (Figure 1C). With around 18 percent of GDP in the 2000s, manufacturing in Egypt played a larger role for the economy compared to other countries with comparable per capita incomes.

Consistent with transformation experiences in other countries, the role of services in the Egyptian economy has on average constantly increased since 1970 (Figure 1D). However, and as expected given the relatively larger roles of agriculture and industry, the share of services in the Egyptian economy is lower than in other countries at comparable per capita income levels. The share of the labor force employed in services has risen broadly in line with the service sector's share of GDP until the early 2000s. However, contrary to the trend observed in other countries, since then the share of services in GDP has stagnated and the share of employment in services in Egypt has even declined.

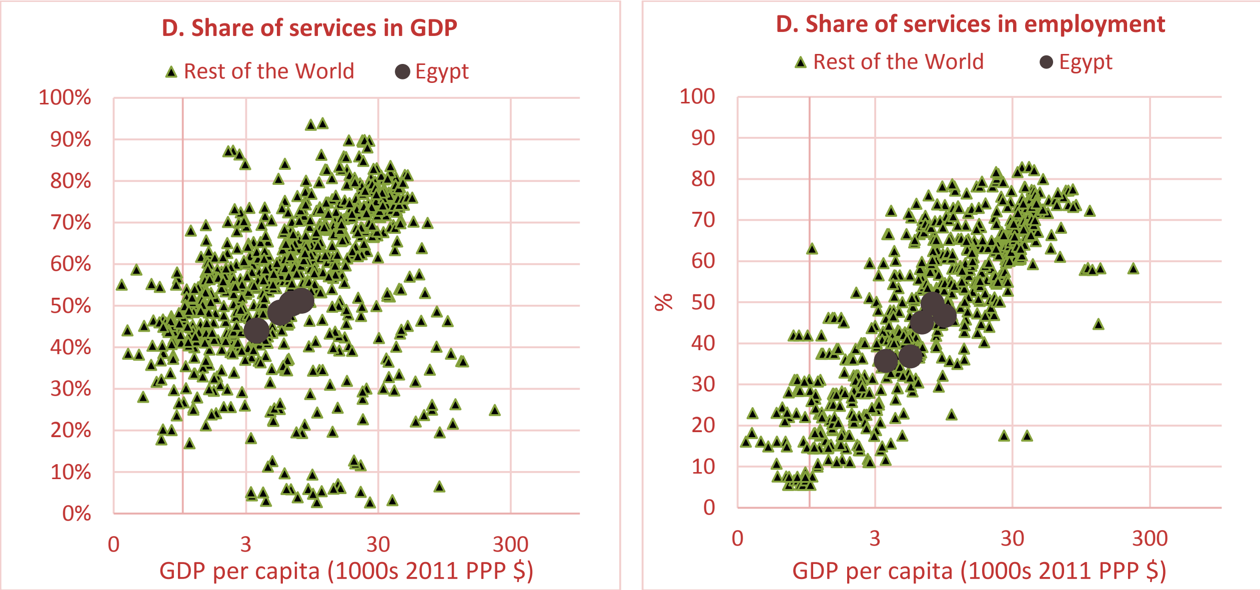
[2] Industry comprises value added from mining, manufacturing, construction, and utilities. The manufacturing sub-sector is a component of the industrial sector.

Figure 1—Sectoral shares of value added and employment in Egypt and rest of the world, 1971 to 2013

Source: Elaborated by Nin Pratt (2016) based on World Bank (2016), ILO (2016) and UNSD (2016).

Note: Figure shows five observations per country, each representing averages for the following five periods when data is available: 1971-1980, 1981-1990, 1991-2000, 2001-2005, and 2006-2013. For Egypt, GDP per capita growth occurred throughout this period, so the earliest period is represented by the leftmost symbol and the latest period by the rightmost symbol

Figure 1—Sectoral shares of value added and employment in Egypt and rest of the world, 1971 to 2013 (contd.)



Source: Elaborated by Nin Pratt (2016) based on World Bank (2016), ILO (2016) and UNSD (2016).

Note: Figure shows five observations per country each representing averages for the following periods when data available: 1971-1980, 1981-1990, 1991-2000, 2001-2005, and 2006-2013. No data on employment in manufacturing available. For Egypt, GDP per capita growth occurred throughout this period, so the earliest period is represented by the leftmost symbol and the latest period by the rightmost symbol.

Comparing Egypt to its global economic peer group of middle income countries (MICs)[3] further confirms the trends observed regarding the exceptional role of agriculture in Egypt's economy. Looking at the share of agriculture in GDP over time suggests that it has changed differently in Egypt compared to the global group of MICs[4] (Figure 2, left panel). For the two key indicators of structural transformation presented—agricultural value added and the share of employment in agriculture (Figure 2, right panel)—the group of MICs started out with higher shares than Egypt in 1980, but showed much lower shares than Egypt in 2014.

Figure 2—Agricultural value added and employment in Egypt compared to global Middle Income Countries

Source: Authors' illustration based on World Bank (2016).

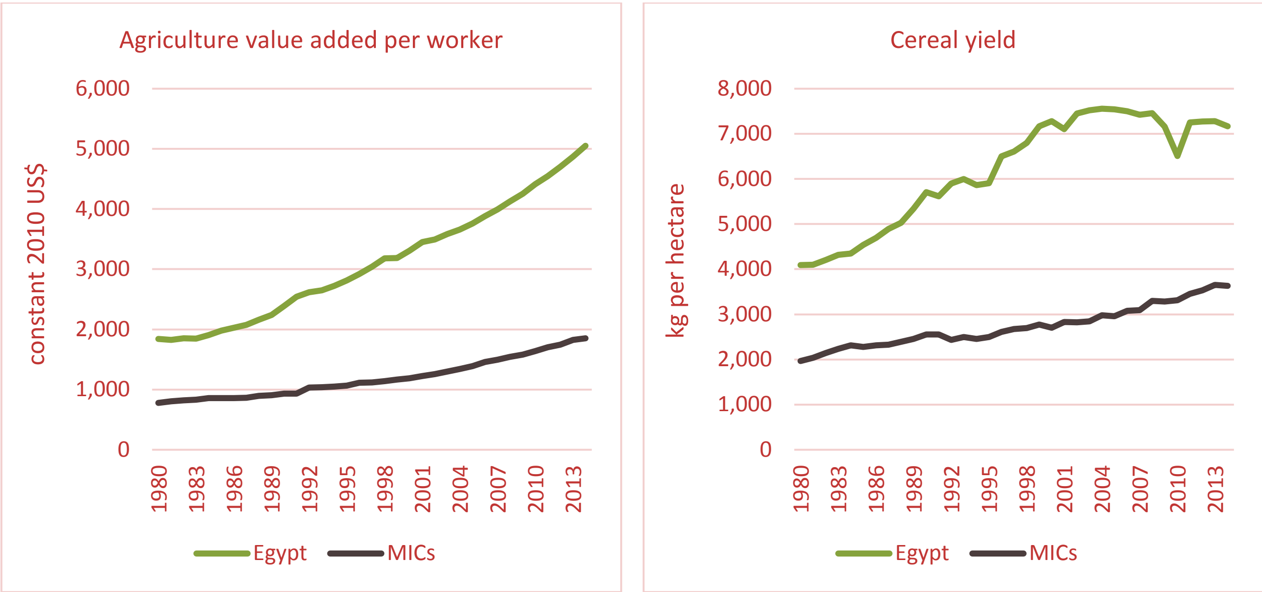
One explanation for the continued relatively important role of agriculture in Egypt's economy is the sector's high productivity growth. Both in terms of labor productivity and in terms of yields, Egypt started out at about double the rate of the group of MIC

[3] The definition of middle income countries (MICs) follows the World Bank definition. The world's MICs are defined as having a per capita gross national income of US$1,026 to $12,475 (2011 PPP $) and are a diverse group by size, population, and income level. Middle income countries are home to five of the world's seven billion people and 73 percent of the world's poor people. At the same time, middle income countries represent about one third of global GDP (http://www.worldbank.org/en/country/mic/overview).

[4] The average annual per capita income of Egypt and MICs is about $10,000 (intl. PPP $).

countries and the gap has continued to widen over time. Agricultural value added per worker was about US$2,560 (at constant 2005 prices) in Egypt compared to US$1,080 in MICs (Figure 3, left panel). Cereal yields in Egypt were also much higher at 7,500 kg until 2007, but stagnated and even declined since. Yet, cereal yields are still much higher in Egypt (Figure 3, right panel). For example wheat, rice, and maize yields more than doubled between 1980 and 2007. Sugar cane yields increased by 44 percent, tomato yields were up by 116 percent, and strawberry yields increased by 673 percent during 1980-2007. However, yields of some major crops—like cotton—remained stagnant (Government of Egypt 2009).

Figure 3—Agricultural productivity in Egypt compared to global Middle Income Countries



Source: Authors' illustration based on World Bank (2016).

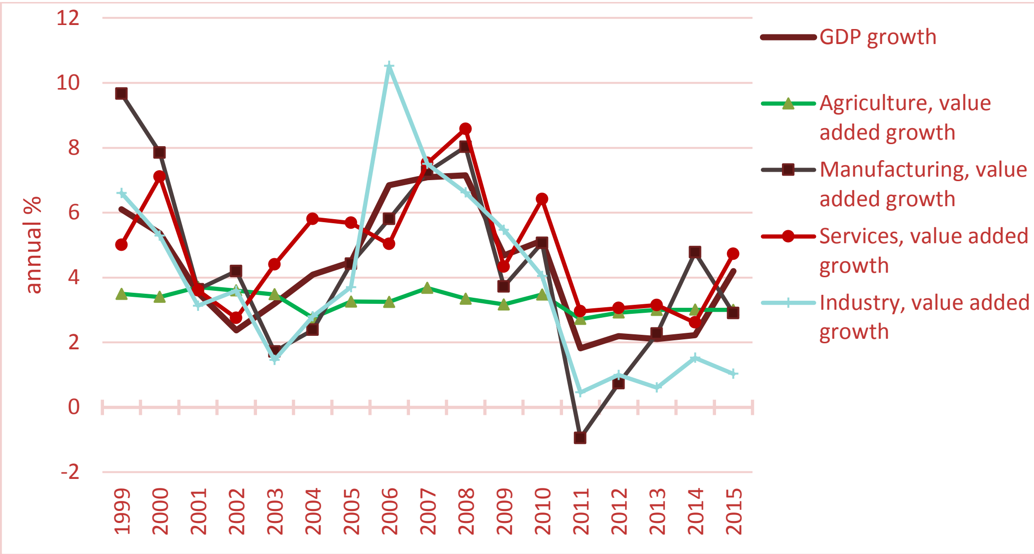
3. THE ROLE OF AGRICULTURE AND AGRO-PROCESSING INDUSTRY FOR ECONOMIC GROWTH, TRADE AND LOCAL DEVELOPMENT IN EGYPT

In this section, the role of agriculture and agro-processing for economic growth, trade and local development in Egypt at national and governorate levels is examined.

Economic growth and employment

In terms of its contribution to economic growth, the agricultural sector in Egypt has been a relatively reliable source of value addition, including during the post-2008 crises years. The sector grew at relatively stable rates of 3.1 percent on average over the past 25 years, compared to slightly higher but much more volatile 3.3 percent in MICs. Compared to the agricultural sector, industrial, manufacturing and service sector growth were much more volatile. Growth in industry, for instance, ranged from +10.5 percent to 0.5 percent average annual growth over the past years. Manufacturing growth was also volatile, going up to +8.0 percent in 2008, before falling sharply to -1.0 percent in 2011 (Figure 5).

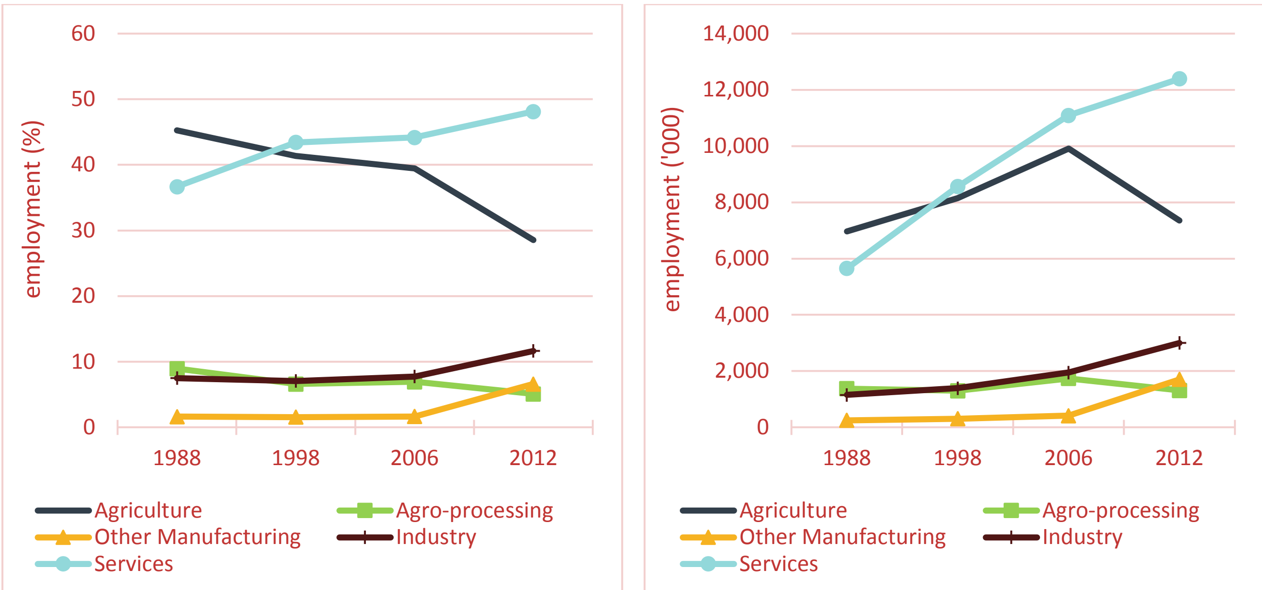
Figure 4—Egypt GDP growth by sector, 1999 to 2015



Source: Authors' calculation based on World Bank (2016).

As expected from other countries' transformation experience and despite the sector's relatively stable growth rates, the role of agriculture in employment in Egypt has declined both in relative *and* absolute terms, using an extended definition of employment.[5] What is more surprising is that the share and number of people employed in the agro-processing sector has also declined[6]. Figure 5 (left panel) shows that the share of agriculture in terms of employment, has declined from 45 percent in 1988 to 29 percent in 2012. Employment is also declining in agro-processing, while services, industry and manufacturing have been employing more of the workforce. In recent years, the absolute number of individuals employed in the agriculture and agro-processing industries have also been declining (Figure 5, right panel), which means that not only did the growth of other sectors decrease the share of employment in agriculture, but also, people have been moving out of agriculture. The same trend is taking place in agro-processing, which was employing the same number and share of people employed in industry, but is now the smallest sector in terms of employment.

Figure 5—Employment in Egypt by economic sector, 1988 to 2012



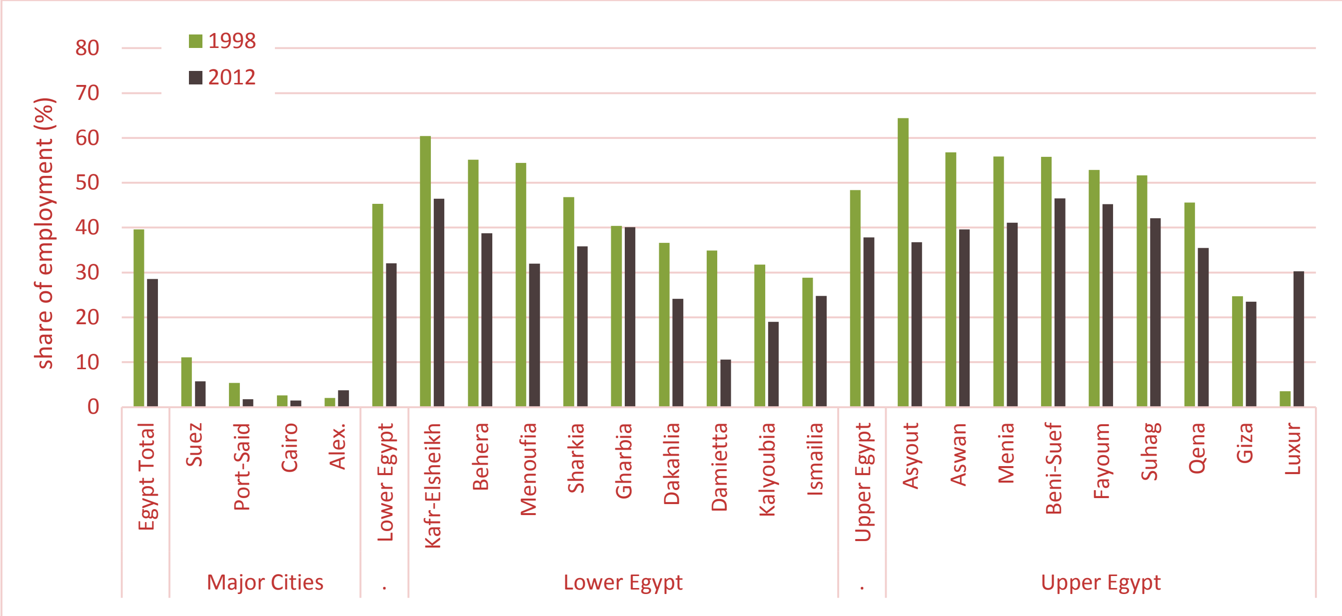
Source: Authors' calculation based on OAMDI (2016).

[5] As Assaad (2002) defines it, extended employment accounts for "the production and processing of primary products, whether for the market, for barter, or for their own consumption; the production of all other goods and services for the market; and the corresponding production for own consumption in the case of households producing such goods and services for the market" (Assaad 2002). In that sense, the shares of employment in agriculture, in particular, would be higher than national estimates, which use a market definition of employment. While acknowledging this difference, we decided that the extended definition of employment would give an extra insight into the movement of people within sectors, even for subsistence work, especially as it is known that a large part of agricultural production is unaccounted for by the market definition.

[6] Agro-processing industries include food production, beverages and tobacco; textiles, clothing, leather and footwear; wood products and furniture; and paper, related products and printing - following FAO (1997) definition, using OAMDI (2016) data.

Consistent with national trends, the share of agriculture in GDP and employment has been declining in most governorates, but with differences among them. As Figure 6 shows, employment in agriculture has declined in all Egyptian governorates with the exception of Luxor[7]. The decline in agricultural employment took place in Upper and Lower Egypt alike, even though agriculture still plays a more important role in employment in Upper Egypt. In 1998, agriculture provided 45 percent of employment in Lower Egypt and 48 percent in Upper Egypt. This share has declined to 32 percent and to around 38 percent in 2012 for Lower and Upper Egypt, respectively. Comparing these shares to previous shares of employment from national figures suggests that a lot of agricultural employment in Upper Egypt is not accounted for by market standards. Within Upper Egypt, the largest decline was witnessed in Asyout, where employment in agriculture declined from 64.4 percent to 36.7 percent. This presents a bigger drop, compared to Kafr El-Sheikh, which is Lower Egypt's governorate with the largest share of employment in agriculture, and where agriculture employment declined from 60.4 percent to 46.4 percent; between 1998 and 2012.

Figure 6—Employment changes in agriculture by governorate between 1998 and 2012

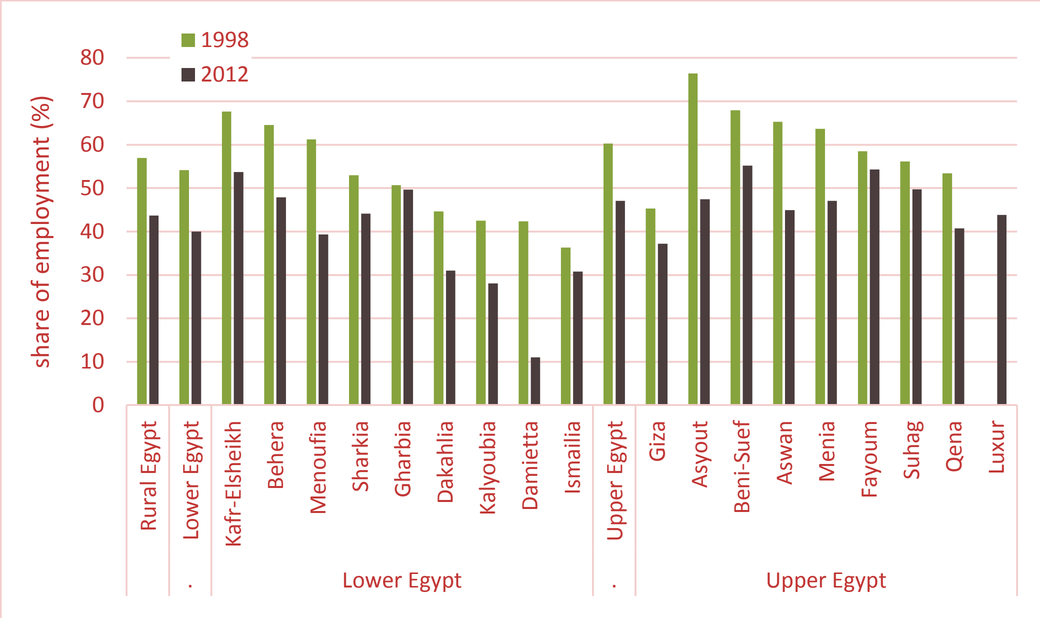


Source: Authors' calculation based on OAMDI (2016).

Because agricultural activities mainly take place in rural areas, Figure 7 explicitly looks at rural areas only. Agriculture in 2012 accounted for a larger share of employment in rural areas; reaching 40 percent in Lower Egypt and 47 percent in Upper Egypt. In some governorates, such as Kafr El-Sheikh (in Lower Egypt), Beni-Suef and Fayoum (in Upper Egypt), agriculture accounted for more than 50 percent of rural employment. However, the shares of agricultural employment have been declining since 1998 in the rural areas of all governorates (Figure 7).

[7] Luxor was part of Qena, but was set as a separate governorate in 2009. Thus, data might not be accurate in terms of household division for this governorate.

Figure 7—Employment changes in agriculture by governorate in rural areas between 1998 and 2012



Source: Authors' calculation based on OAMDI (2016).

In absolute terms as well, people have been moving out of agriculture in almost all governorates, with a few exceptions. Between 1998 and 2012, the largest increases in agricultural employment in absolute terms took place in Ismailia and Alexandria governorates, where increases in the number of workers employed in agriculture were almost 10 and 6 percent, respectively. Increases were more modest in the other six governorates where employment in agriculture in absolute terms did not decline.[8]

One of the reasons why people are moving out of agriculture may be the limited availability of land and very small farm sizes. The vast majority of land in Egypt is farmed by smallholders. Egyptian agriculture is characterized by two types of land, old lands and newly reclaimed lands. Old lands represent 85 percent of the cropped area. The remaining 15 percent is newly reclaimed land, on which parcels are mostly larger in size (exceeding 10 feddans[9]) and on which more capital-intensive agricultural production practices are used than is the case on the old lands (Kheir El-Din and El-Laithy 2008). Based on the Agriculture Farm Income Survey (AFIS), Kheir El-Din and El-Laithy (2008) estimate that landholdings of less than 5 feddans on old lands constitute 73 percent and about 89 percent of the land in Lower Egypt and Upper Egypt, respectively. Using the 2012 Labor Market Panel Survey (ELMPS 2012), it was estimated that about 96.4 percent of land holdings by households are 5 feddans or less, 3.4 percent of land holdings are between 5 and 20 feddans, and only 0.3 percent are larger than 20 feddans.[10] In terms of ownership, the survey showed that among all households in Egypt, 11 percent own land, while 4 percent rent it. The remaining 85 percent neither rent nor own land.

While for this and other reasons a decline in agricultural employment is expected, the following part of the paper explores the current structure of the agricultural sector in Egypt in order to identify potential opportunities to slow down or even reverse the decline in agricultural employment. One possible driver of job creation in agriculture is structural change within the sector, for example through a shift from labor extensive to labor intensive cultivation. About half of agricultural value added is made up of crops, while the other half is made-up of livestock and fishery (Table 1). The single largest component of agricultural GDP in Egypt is cattle, which accounts for near a third of agricultural GDP. In terms of crops, the largest contribution to agricultural output is fruits. Wheat and maize also have a large share in agricultural output, each accounting for nearly 6 percent of agricultural GDP.

[8] 'Employment in agriculture' as used here follows the extended definition of employment use for the 2012 Egyptian Labor Market Panel Survey (ELMPS 2012).

[9] A feddan is a land measurement unit equivalent to 1.038 acres; 0.42 hectares

[10] The number is constructed from the questions on agricultural enterprises in the ELMPS. The survey asks if household members own/rent agricultural enterprises, and if they do, how much land is owned/rented.

Table 1—Egypt's international trade of agriculture and agro-processing products, 2010/11

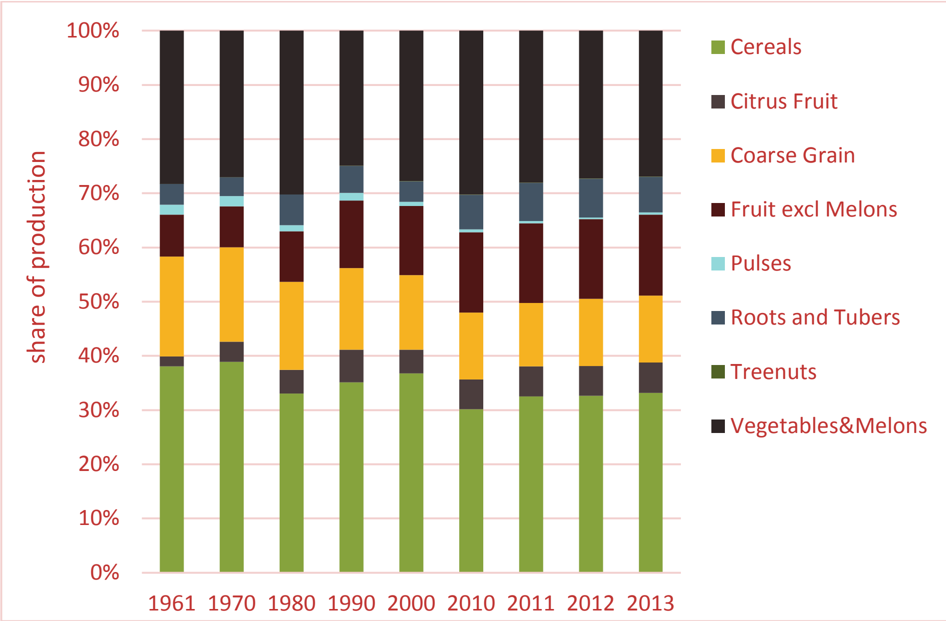
		Exports		Imports	
	Share of total GDP	Share in exports	Export intensity*	Share in imports	Import intensity**
Agriculture	***12.1***	***5.6***	***7.3***	***10.1***	***15.6***
Crops	**6.3**	**5.5**	**13.6**	**9.8**	**26.7**
Wheat	0.8	-	-	4.6	55.9
Maize	0.7	-	0.2	2.2	38.4
Sorghum	0.1	-	2.7	-	3.2
Rice	0.4	-	-	-	0.2
Other cereals	-	-	14.4	-	13.8
Root crops	0.2	0.6	64.7	0.2	41.2
Pulses	-	0.3	113.7	0.3	110.1
Vegetables	0.9	0.9	10.7	-	0.3
Fruits	1.3	2.0	28.9	0.3	8.1
Groundnuts	0.1	0.1	18.9	0.0	4.8
Oilseeds	-	0.1	52.9	1.1	92.3
Sugarcane	0.3	-	-	-	-
Forage crops	-	-	2.7	-	-
Cotton and fibers	0.2	1.2	105.6	0.3	119.1
Other crops	1.2	0.2	3.3	0.8	14.8
Livestock & fisheries	**5.8**	**0.1**	**0.3**	**0.3**	**1.0**
Cattle	3.8	-	0.1	0.2	1.3
Poultry	0.4	-	-	-	-
Other livestock	0.6	0.1	1.5	0.1	2.1
Fish	1.0	-	0.6	-	0.1
Non-agriculture	***87.9***	***94.4***	***12.9***	***89.8***	***15.3***
Agro-processing	**6.1**	**14.2**	**15.9**	**15.8**	**21.3**
Food and beverages	**2.8**	**5.5**	**9.9**	**8.1**	**17.2**
Food	0.8	1.5	10.9	5.7	37.8
Dairy	0.4	1.8	22.6	1.0	17.2
Grains & other food	1.4	2.2	6.7	1.4	5.5
Beverages	0.2	0.1	5.4	0.1	5.9
Non-food	**3.3**	**8.6**	**25.8**	**7.7**	**28.4**
Tobacco	0.2	0.2	9.9	0.4	18.0
Textiles	0.6	3.5	45.8	2.2	41.3
Clothing	0.5	2.9	45.8	0.9	24.8
Leather & footwear	0.3	0.5	18.8	0.3	14.5
Wood & paper	1.7	1.6	10.9	3.9	27.7
Other manufacturing	**9.5**	**31.8**	**1.2**	**61.1**	**38.3**
Construction	**4.8**	**1.2**	**2.7**	**0.4**	**1.2**
Other industry	**15.7**	**10.0**	**9.2**	**4.2**	**5.2**
Services	**51.8**	**37.2**	**11.3**	**8.4**	**3.5**
Total	**100.0**	**100.0**	**12.4**	**100.0**	**15.4**

Source: Al-Riffai et al. (2016).

* Export intensity is the share of exported goods and services to total domestic output. Numbers higher than 100 can be explained by re-exports.
** Import intensity is the share of imported goods and services relative to domestic consumption.
Totals may not add up to 100 due to rounding. Cells with a '-' imply a zero or near-zero value.

Cropping patterns have seen relatively little changes in Egypt over time compared to other countries, with the exception of a (limited) shift from cereals and coarse grains to fruits. The two largest crop categories, cereals and vegetables, have seen relatively little change (Figure 8). The share of fruits from total production almost doubled between 1961 and 2013 from 7.8 to 15 percent. The share of citrus fruits has also increased significantly, accounting for 5.6 percent of total agricultural production in 2013, as opposed to 1.8 percent in 1961. Meanwhile, cereals and coarse grains production shares decreased. However, cereals still account for the largest share of production, making up 33.2 percent of production, but this share is down from 38 percent in 1961. Also, coarse grain production declined from 18.5 to 12.3 percent, in 1961 and 2013, respectively. Vegetables and melons remained the second largest production item, accounting for an average of 27.8 percent of total production throughout the five decades considered.

Figure 8—Changes in shares of total crop production in Egypt, by category of crop, 1961 to 2013



Source: Authors' elaboration based on FAOSTAT (2016).

One possible explanation for the constant and relatively high share of cereals in the agricultural production mix are agricultural policies and incentives that encourage cereal production in Egypt, based on the rationale that at least a certain percent of staple foods should be produced locally. In order to put this concern into perspective, the next section will move beyond production and examine the role of different agricultural and agro-processing subsectors in contributing to international trade as an avenue to assure Egypt's food security.

Agriculture and agro-processing in international trade

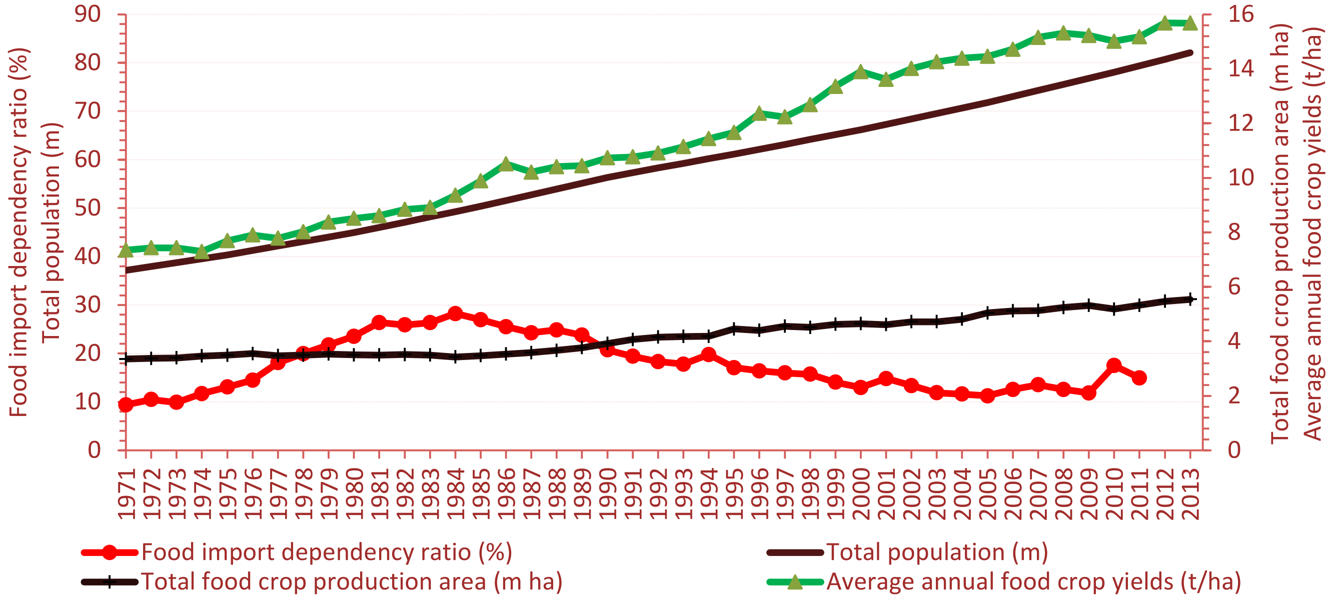
Agricultural commodities and agro-processing make up about 20 percent of Egypt's exports, whereas agricultural commodities and agro-processing constitute about 26 percent of imports (Table 1). The major agricultural exports are fruits, cotton, and vegetables. The main food items among the agro-processing items are grain-based products and dairy products, while the main non-food agro-processed items are textiles and clothing. Main imported agricultural commodities are wheat, maize, and oilseeds, whereas non-food imports make up a slightly higher share of agro-processing products imports compared to imports of processed food. Livestock and fishery products play a relative small role in exports and imports, indicating that the large majority consumed in Egypt are produced domestically.

Export and import intensities give an indication as to the importance of exported goods and services relative to total domestic output and the share of imported goods and services relative to domestic consumption, respectively. For example, about 11 percent of all vegetables produced in Egypt are exported as are 29 percent of all fruits (in value terms). Among agro-processing items, textiles and clothing have the highest export intensities with about 46 percent of production exported, followed by dairy products (23 percent) and leather and footwear (19 percent). On the other hand, more than half of domestic wheat consumption is imported as are 17 percent of food and beverages and 28 percent of non-food related agro-processing.

The analysis above shows that Egypt is a net food importer, however it also shows that agriculture and agro-processing are important contributors to export earnings. What does this means for national food security?

When analyzing a country's national-level food security (or the availability of food), it is important to take domestic food production, food imports, and food exports into account. National level food security can be achieved either by producing food domestically, by importing food, or, as in Egypt like in most countries, through a combination of both. Figure 9 shows food import dependency trends in Egypt over the past 40 years and—contrary to the perception of many people—food import dependency does not seem to have increased despite rapid population growth and limited land expansion. This can be mainly explained by rapid increases in food crop yields, which, in line with the population, almost doubled between the mid-1980s and mid-2000s. As such, agricultural yield growth has made an important contribution to national food security. While crop yields increased rapidly until 2006, this was followed by stagnation in recent years, especially in cereal yields. More research is needed to determine how agriculture has and may in the future contribute to other dimensions of food security, especially on how the sector can be leveraged for improving nutrition.

Figure 9—Role of agriculture in food import dependency



Source: Ecker and Gue (2016).

Note: The food import dependency ratio is calculated from Food Balance Sheets (FBS) data (FAOSTAT 2016). The computation involves three steps: First, annual import dependency ratios are calculated for all foods listed in the FBS database. The ratio is calculated as the quantity imported, minus the quantity exported, and adjusted for the change in quantity stock, over the domestic supply quantity. The domestic supply quantity is defined as the quantity produced, plus the import quantity, minus the export quantity, and the stock adjustment (FAOSTAT 2016). A negative ratio (indicating net export status) was replaced with the negative ratio of export quantity, minus import quantity, and stock adjustment, over production quantity. Second, the food-specific ratios were averaged over all foods, weighted by the share of the particular food item in the total domestic supply quantity and by the share of that food item in the total food supply quantity. The total food supply quantity is defined as the domestic food supply quantity, minus the quantities wasted; used for feed, seed, or other inputs; and given to food processing (FAOSTAT 2016). Third, the annual food import dependency ratio is averaged over a five-year period (2007-2011, for which the latest data are consistently available).

Agriculture and agro-processing for local development

The previous sections have shown key trends in economic structural transformation and the role of agriculture and agro-processing at the national level. However, Egypt is a heterogeneous country, with structural differences in its economy across its regions and governorates. Income per capita varies significantly across groups of governorates. [11] Frontier governorates (South Sinai, Matrouh, Red Sea, North Sinai, El-Wadi El-Gedid) have the highest average income per capita across the country, while only about 2 percent of the population live there (Table 2). These governorates' income mostly comes from oil and mining, with about 89 percent of GDP value added coming from that sector. Yet, as the sector is largely capital intensive, most of the employment in these governorates is in services. Agriculture plays a significant role in employment in these governorates, employing 20 percent of total employment, as significant areas of reclaimed land are located in these governorates.

The major cities in Egypt, namely Cairo, Alexandria, Suez, and Port Said, are the group with the second highest income per capita in the country, and the highest share in national GDP. These four governorates make around 42 percent of the country's output, with 55 percent of this output coming from services and 16 percent from manufacturing. 66 and 18 percent of the population are employed in services and manufacturing in these governorates, respectively. Almost all of the residents of these governorates live in urban areas, so agriculture accounts for only 2 percent of the group's GDP and 2 percent of its employment. Manufacturing is largest in Suez, accounting for 57 percent of GDP and 23 percent of employment in that city. However, this share goes down to 6 percent in Port Said; where mining makes up the largest share in GDP; accounting for 36 percent of value added (Table 3). Among this group of urban governorates, unemployment and poverty are highest in Port Said, while poverty is quite low in Suez – marking the governorate with the second lowest poverty rate in the country (Table 2).

[11] A common regional grouping used in Egypt is "Major cities", "Lower Egypt", "Upper Egypt" and "Frontier Governorates".

Table 2—Summary information on population and economic condition of governorates of Egypt

Governorate	GDP per capita (EGP '000) 2012/13	Population 2013	GDP (EGP '000) 2012/13	Share in national GDP 2012/13	Share in national population 2013	Population growth 1990-2014	Share of population that is urban. 2006-Census	Poverty rate (%) 2012/13	Unemployment (%) 2012/13
EGYPT	**21.3**	**84,628,982**	**1,806,513,702**	**-**	**-**	**2.1**	**42.6**	**26**	**13**
Major Cities	**51.4**	**14,906,945**	**766,399,691**	**41.9**	**17.6**	**1.6**	**100.0**	**-**	**-**
Cairo	68.2	9,002,783	613,640,226	33.6	10.6	1.4	100.0	18	16.0
Port Said	69.1	646,461	44,700,000	2.4	0.8	1.8	100.0	19	25.9
Alexandria	20.5	4,658,381	95,630,331	5.2	5.5	1.7	99.0	12	18.4
Suez	20.7	599,320	12,429,134	0.7	0.7	2.3	100.0	5	17.7
Lower Egypt	**11.8**	**36,340,612**	**429,257,826**	**23.5**	**42.9**	**2.0**	**28.0**	**-**	**-**
Damietta	20.7	1,284,710	26,656,892	1.5	1.5	2.0	38.7	10	10.6
Kafr El-Sheikh	15.3	3,054,770	46,599,236	2.6	3.6	1.9	23.1	18	11.7
Ismailia	14.6	1,128,373	16,458,856	0.9	1.3	2.7	45.3	15	13.1
Dakahlia	12.1	5,748,965	69,781,754	3.8	6.8	1.8	28.0	14	11.8
Sharkia	11.5	6,242,810	71,676,444	3.9	7.4	2.2	23.1	14	13.8
Gharbia	11.5	4,592,222	52,906,506	2.9	5.4	1.7	29.9	11	15.1
Menoufia	10.7	3,799,149	40,651,632	2.2	4.5	2.0	20.5	15	11.1
Behera	9.9	5,563,465	55,131,468	3.0	6.6	1.9	19.1	20	8.2
Kalyoubia	10.0	4,926,148	49,395,038	2.7	5.8	2.5	44.7	21	13.7
Upper Egypt	**11.0**	**31,836,015**	**349,768,109**	**19.1**	**37.6**	**2.4**	**32.8**	**-**	**-**
Giza	19.5	7,291,017	142,181,999	7.8	8.6	2.5	92.0	32	12.7
Fayoum	14.5	3,021,448	43,799,149	2.4	3.6	2.4	22.5	36	12.2
Aswan	9.9	1,374,985	13,668,948	0.7	1.6	1.9	42.5	39	15.3
Asyout	8.1	4,062,821	32,778,485	1.8	4.8	2.2	26.5	60	12.8
Menia	7.9	4,930,641	38,902,749	2.1	5.8	2.3	18.9	30	12.5
Beni Suef	7.6	2,727,614	20,647,632	1.1	3.2	2.3	23.2	39	10.9
Qena	7.4	2,918,086	21,591,096	1.2	3.4	0.7	21.3	58	9.3
Suhag	6.9	4,404,545	30,251,375	1.7	5.2	2.1	21.4	55	13.1
Luxor	5.4	1,104,858	5,946,676	0.3	1.3	6.6	47.8	47	12.5
Frontier Governorates	**168.9**	**1,545,410**	**261,088,076**	**14.3**	**1.8**	**3.9**	**67.9**	**-**	**-**
South Sinai	282.1	163,092	46,016,085	2.5	0.2	7.0	50.9	n/a	3.1
Matrouh	268.2	417,294	111,931,128	6.1	0.5	3.6	70.4	23	10.7
Red Sea	231.6	332,741	77,072,597	4.2	0.4	5.3	95.5	2	14.2
North Sinai	56.1	415,532	23,328,938	1.3	0.5	3.3	60.4	46	11.3
El-Wadi El-Gedid	12.6	216,751	2,739,328	0.1	0.3	2.4	48.1	25	9.6

Source: Authors' calculation based on Ministry of Planning (2016) and Ministry of Planning (2015).

Upper and Lower Egypt governorates host the vast majority of Egypt's population and virtually all of the rural population of the country. The two regions share several structural characteristics, but with some striking differences in development indicators. Both regions have income per capita of around 11,000 EGP, producing around a fifth of national GDP and with nearly 40 percent of the national population living in each, and accounting to 32 percent of the employment in agriculture (Table 3). Yet, a closer look at other indicators shows differences between and among those governorates. First, despite having comparable shares of employment in agriculture (according to national figures), agriculture accounts for a larger share of GDP in Lower Egypt, when compared to Upper Egypt. Agriculture's value added in Lower Egypt is 30 percent of GDP, while it is 18 percent in Upper Egypt. In tandem, the share of services is higher in Upper Egypt, accounting for 35 percent of GDP, compared to 26 percent in Lower Egypt. The share of construction in Upper Egypt is also higher than in Lower Egypt; accounting for 10 and 6 percent of GDP, respectively. Meanwhile, manufacturing shares are close, at 14 and 15 percent of GDP, for Upper and Lower Egypt, respectively. The difference in employment in manufacturing is, however, larger than the GDP shares; as 7 percent of employment in Upper Egypt is in manufacturing, but this share goes up to 12 percent for Lower Egypt.

Within Lower Egypt, the share of employment in agriculture ranges between 8 and 55 percent. Behera has the highest employment in agriculture, employing 55 percent of the employed labor force, followed by Kafr El-Sheikh with 44 percent. Kafr El-Sheikh and Behera also have the lowest employment rates in manufacturing, with 5 and 6 percent of employment, respectively. The share of employment in agriculture goes down to 8 percent in Kalyoubia, where agriculture accounts for 14 percent of GDP. The governorate with the lowest share of GDP in agriculture is Damietta, as agriculture accounts for just 12 percent of GDP, but 21 percent of total employment. The largest share of employment in Damietta is in manufacturing, despite the fact that the largest share of GDP in the governorate is generated in the oil and mining sector. Damietta has also the lowest poverty rate (10 percent) among this group of governorates, while Kalyoubia has the highest rate (20 percent). Meanwhile, unemployment rates range between 8 percent in Behera and 15 percent in Gharbia.

Upper Egypt has the governorates with the highest share of employment in agriculture and those with the highest poverty rates (Table 2 and Table 3). Nearly 55 percent of employment in Beni Suef is in agriculture, while this share goes down to 8 percent in Giza. However, it is important to note that Giza has a different setting compared to other Upper Egyptian governorates, as 92 percent of its population is living in urban areas – the share of urban population averages around 28 percent in the rest of Upper Egypt's governorates. In Menia and Beni Suef, the agricultural sector is the largest employer, and in most governorates agriculture makes up more than 30 percent of employment. Yet, the share of agriculture in GDP ranges from 14 percent (in Aswan) to 31 percent (in Menia). Services has the highest share in GDP in five out of the nine governorates of Upper Egypt, with the highest share in Giza, where services account for 50 percent of GDP. The highest share in manufacturing is also in Giza, accounting for 22 percent of GDP. Along with the significant magnitude of agriculture in Upper Egypt, these governorates suffer from the highest poverty rates in Egypt. The prevalence of poverty in Asyout, Qena, and Sohag is the highest, reaching 60, 58, and 55 percent of the population, respectively. The governorate with the lowest share of poverty is Menia; with a 30 percent poverty rate. Yet, this rate is still higher than in governorates in other regions in Egypt; with the exception of North Sinai where the poverty rate is 46 percent. Given these regional disparities, several development efforts have concentrated on Upper Egypt. For example, the Takaful and Karama conditional cash transfer program was first launched in Upper Egypt; since it is the area with the poorest governorates in the country and the highest level of employment in agriculture.

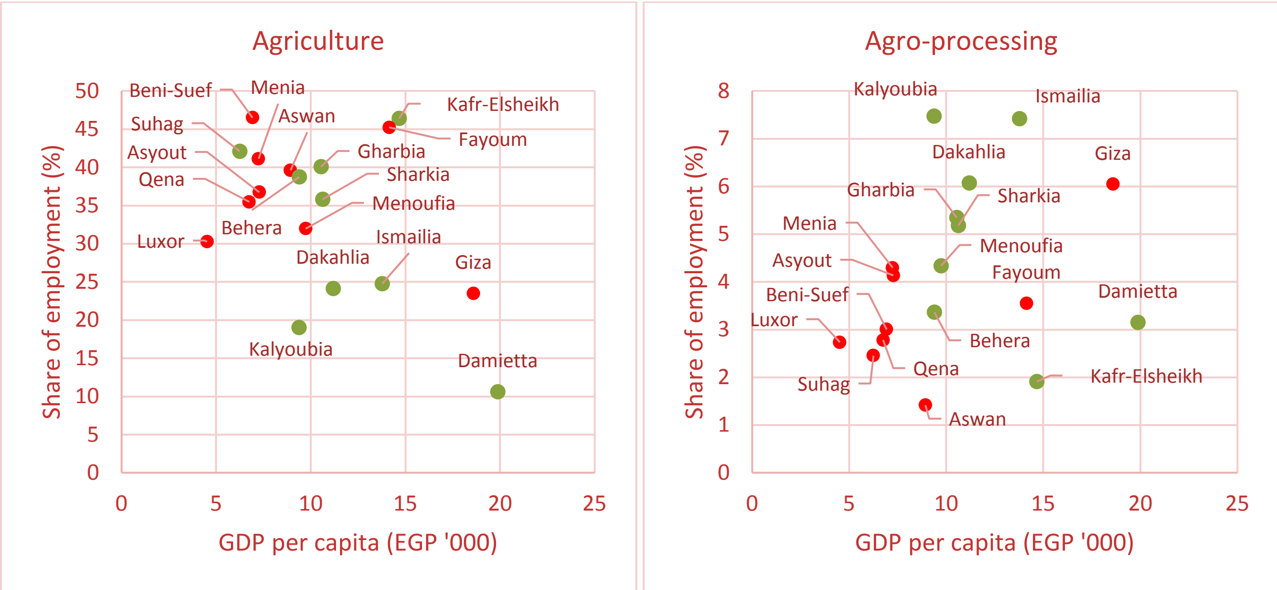
Table 3—Sectoral shares of employment (2013) and value added (2016) for governorates of Egypt, percent

	Share in total employment						Share in GDP					
Governorate	Agriculture	Manufacturing	Utilities	Oil & Mining	Construction	Services	Agriculture	Manufacturing	Utilities	Oil & Mining	Construction	Services
EGYPT	**27.1**	**11.1**	**1.7**	**0.2**	**11.8**	**48.1**	**11.6**	**13.1**	**1.8**	**15.8**	**4.8**	**52.8**
Major Cities	**2.4**	**17.8**	**2.5**	**0.1**	**11.3**	**65.8**	**1.9**	**16.2**	**1.8**	**1.4**	**3.5**	**75.2**
Cairo	0.3	17.3	2.0	0.1	12.0	68.2	0.8	13.9	1.5	1.2	3.5	79.2
Port Said	12.4	14.3	1.8	0.0	3.8	67.8	6.0	6.4	1.8	36.2	0.5	49.2
Alexandria	5.0	18.8	3.5	0.1	11.2	61.4	6.6	30.4	3.9	-11.5	5.0	65.6
Suez	2.8	23.3	3.6	0.3	9.1	60.9	5.7	56.7	4.9	-17.1	3.1	46.7
Lower Egypt	**32.3**	**12.1**	**1.6**	**0.1**	**9.0**	**45.1**	**30.3**	**15.0**	**2.7**	**5.9**	**5.7**	**40.5**
Damietta	21.4	30.5	1.1	0.1	5.8	41.0	12.3	14.7	0.5	36.1	2.6	33.8
Kafr El-Sheikh	44.1	4.6	0.7	0.1	8.6	42.0	48.2	4.7	1.5	16.7	3.9	25.0
Ismailia	25.7	9.0	2.9	0.1	8.5	53.7	26.2	10.9	19.8	0.9	4.5	37.8
Dakahlia	25.4	11.0	1.2	0.1	11.5	50.7	29.8	6.5	1.5	12.0	7.1	43.1
Sharkia	31.0	13.5	1.7	0.1	7.4	46.2	33.2	22.7	0.4	0.1	4.6	38.9
Gharbia	21.9	14.3	1.2	0.0	10.6	51.9	24.4	15.9	3.2	-0.6	6.1	50.9
Menoufia	37.7	10.9	2.0	0.0	8.9	40.4	27.3	22.6	0.9	0.0	6.1	43.2
Behera	54.9	6.0	1.6	0.0	5.4	32.0	44.2	3.2	6.9	2.9	5.9	36.9
Kalyoubia	7.6	20.8	1.9	0.1	13.1	56.6	14.2	32.9	0.4	-4.4	8.3	48.7
Upper Egypt	**32.2**	**7.2**	**1.5**	**0.3**	**15.7**	**43.0**	**17.8**	**13.7**	**2.1**	**5.2**	**10.0**	**51.1**
Giza	7.8	15.8	2.9	0.2	13.6	59.7	6.4	21.5	1.5	0.0	5.3	65.3
Fayoum	36.9	5.9	1.4	0.2	18.8	36.8	22.8	2.1	1.7	42.2	10.2	21.1
Aswan	33.3	5.1	4.2	0.7	12.4	44.3	13.5	7.5	12.6	7.6	6.1	52.7
Asyout	33.7	5.2	1.2	0.1	17.0	42.8	29.3	16.5	0.6	-5.5	14.5	44.7
Menia	47.0	4.9	0.6	1.1	12.9	33.5	31.0	9.3	4.3	1.2	10.4	43.8
Beni Suef	54.6	3.9	0.8	0.1	8.8	31.7	27.3	9.4	1.1	0.1	12.3	50.0
Qena	27.2	5.0	1.3	0.2	24.3	42.0	19.7	12.0	1.8	0.2	19.1	47.2
Suhag	30.6	5.0	0.8	0.0	21.9	41.8	29.6	4.1	0.9	0.1	19.7	45.7
Luxor	32.7	2.8	1.4	0.0	15.2	47.8	16.9	6.9	0.8	0.2	16.4	58.7
Frontier Governorates	**20.3**	**3.0**	**3.3**	**0.4**	**12.6**	**60.5**	**1.0**	**0.5**	**0.1**	**88.7**	**0.4**	**9.3**
South Sinai	4.9	5.0	3.9	0.0	12.3	73.9	0.3	0.2	0.1	75.1	0.5	23.8
Matrouh	44.5	0.8	3.6	0.0	12.7	38.4	1.2	0.1	0.1	95.7	0.4	2.5
Red Sea	3.5	7.4	1.5	1.1	10.6	75.9	0.8	0.1	0.1	90.8	0.2	8.0
North Sinai	14.0	2.7	4.6	0.5	17.2	61.0	1.5	3.5	0.1	82.9	1.1	10.9
El-Wadi El-Gedid	18.9	0.3	2.8	0.3	8.5	69.2	6.2	2.6	0.3	23.3	2.0	65.5

Source: Authors' calculation based on Ministry of Planning (2016) and CAPMAS (2013a).

Despite the importance of agriculture for both value added and employment, manufacturing of agricultural products is limited. Agro-processing enterprises employ a small share of the workforce in both Upper and Lower Egypt. Upper Egypt also seems to be lagging in this sector, as agro-processing employs more people in Lower Egypt in general (Figure 10), despite the fact that the share of agriculture in GDP is higher in the governorates of Upper Egypt. This could indicate that there is great potential for growth in the sector in Upper Egypt.

Figure 10—Employment in agriculture and agro-processing in the governorates of Upper Egypt and Lower Egypt, percentage share of total employment



Source: Authors' calculation based on OAMDI (2016) and Ministry of Planning (2016).

Note: The share of employment is calculated using ELMPS (2012), following the extended definition of employment explained earlier, so numbers may not be identical to employment shares reported from national figures in Table 2.

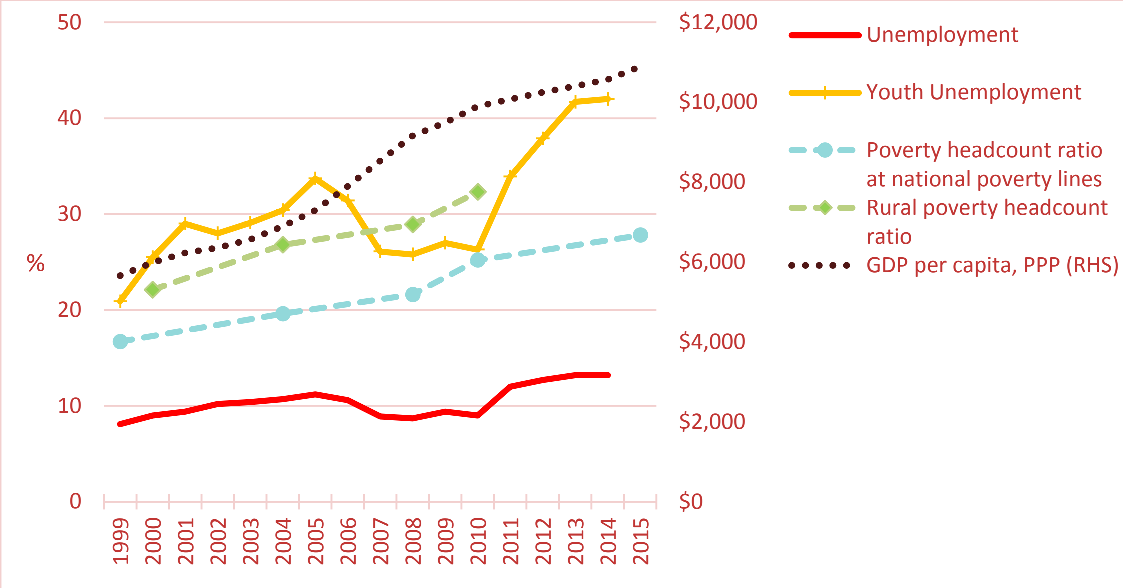
As this subnational-level analysis has shown, there are significant differences between Upper and Lower Egypt. Agriculture tends to play a more important role for the Upper Egyptian economy and poverty tends to be higher in Upper Egyptian governorates. Agro-processing and manufacturing generally play a more important role in Lower Egypt.

4. THE ROLE OF AGRICULTURE AND AGRO-PROCESSING FOR RURAL HOUSEHOLDS AND POVERTY REDUCTION

There are several possible explanations for why economic development and structural change in Egypt has not translated into improved social outcomes over the past years. Poverty and unemployment have constantly increased since the early 2000s (Figure 11). First, and most obviously, the succession of crises since 2007 has lowered GDP growth and, in combination with continued high population growth above 2 percent per annum, meant that there was no or little increase in per capita incomes. Second, even before 2008, economic growth did not seem to trickle down to the poor, mainly because growth rates were not high enough; growth did not create enough jobs; and redistribution mechanisms, such as social safety nets, were not effective enough. Figure 4 also suggests that economic growth in Egypt has been very volatile, especially in the job-creating manufacturing sub-sector.

Agriculture also seems to have played a limited role in poverty reduction. This may be explained by the sector's relatively low share in GDP, declining share in employment, and limited structural change. However, we also showed that there are significant difference in the importance of agriculture across different regions and, obviously, between rural and urban areas. Agriculture tends to play a larger role both in terms of share in GDP as well as for employment in those governorates that tend to be poorer, especially in Upper Egypt. By contrast, other often labor intensive sectors that have potential to reduce poverty, such as agro-processing, tend to be concentrated in relatively better off areas and are very limited in poorer areas like Upper Egypt.

Figure 11—Changes in key social indicators in Egypt, 1999 to 2015



Source: Authors' calculation based on World Bank (2016).

The following sections will analyze how the economic developments and structural changes have translated into outcomes at household level, with a special focus on rural households. Differences as to how households may be affected by structural changes may be related to initial household characteristics at earlier transformation stages, changes in these household characteristics during transformation, or opportunities that arise in non-agricultural employment in other sectors.

To analyze some of these changes in household characteristics and how they may be linked to households that stay and those who move out of agriculture, the following section starts by developing a typology of rural households in Egypt based on various rounds of the Egyptian Household Income, Expenditure and Consumption Survey (HIECS). Since the process of transformation occurs at a different pace even among people in the same household—some household members remain in agriculture, while other members move to other sectors—we differentiate between three types of rural households based on the number of people employed in agriculture in the household:[12]

1. Agricultural households (only-Ag household hereafter) are defined as those where all household members are employed in agricultural activities.
2. Non-Agricultural households (non-Ag households) are defined as those where none of the members work in agriculture, i.e. all members work in other economic sectors.
3. Mixed households are those, in which some members (at least one) remain employed in agriculture, while others (at least one) are employed in other sectors.

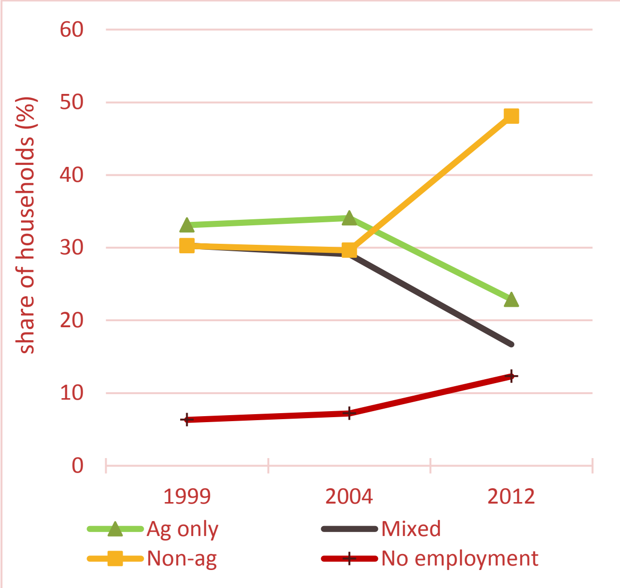
The analysis of how the share of each one of the three types of households has been changing over time sheds light on how the role of agriculture and the transformation process more generally have impacted household characteristics. To understand the factors pulling households out of agriculture, we analyze three points in time: 1999, 2004, and 2012 using the HIECS for Egypt (OAMDI 2014a; OAMDI 2014b; OAMDI 2014c)[13]. Results for Upper and Lower Egypt are presented separately because, as observed, those two regions in Egypt are the most relevant for agriculture and rural development. Moreover, Upper Egypt is still lagging behind in most economic indicators, which makes it a key region for any policies and investments targeted at poverty reduction.

The share and number of rural households that exclusively or partly rely on agriculture for employment has gone down sharply. As shown in Figure 12, in 1999, 33 percent of rural households in Egypt were agricultural, i.e., all members were working in activities related to agriculture (only-Ag households). At the same time, the share of Mixed households and that of non-Ag households was 30.3 and 30.25 percent, respectively. In contrast, by 2012, only 22.9 percent of households were only-Ag, while the share of non-Ag households increased up to 49 percent. The decline of employment in agriculture is also evident when looking at Mixed households: In 1999, one out of three households were Mixed as opposed to only one out of six households in 2012. This shows that not only has employment in agriculture declined, but also the role of agriculture for households has declined substantially.

[12] This classification follows Diao et al. (forthcoming).

[13] OAMDI, 2014. Harmonized Household Income and Expenditure Surveys (HHIES), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 2.0 of Licensed Data Files; HIECS 2012/2013 - Central Agency for Public Mobilization and Statistics (CAPMAS). Egypt: Economic Research Forum (ERF).

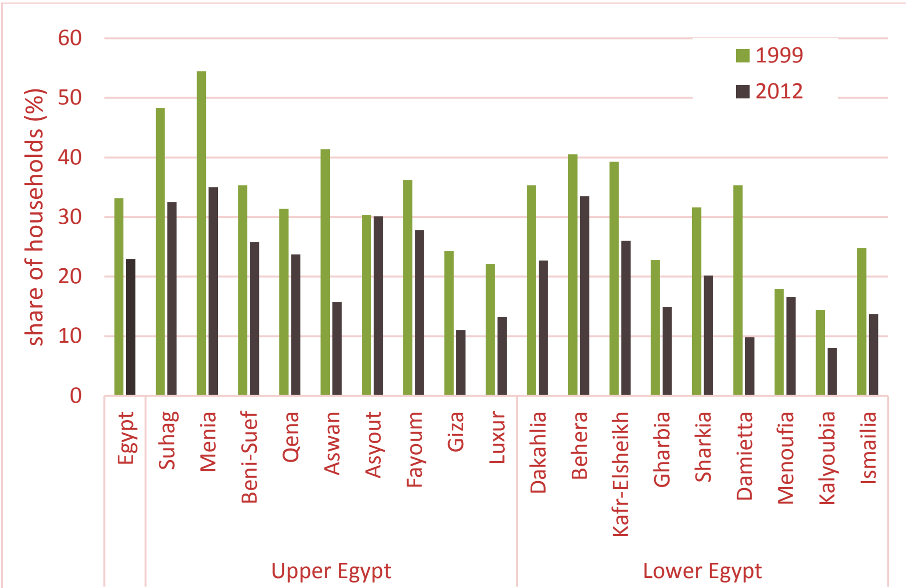
Figure 12—Share of rural households in Egypt with different levels of dependence on agriculture for employment, 1999 to 2012



Source: Authors' calculation based on OAMDI (2014a; 2014b; 2014c).

The decline in Ag-only households in Upper Egypt has been slower than in Lower Egypt. Agricultural transformation has been occurring at a very different pace in different areas in the country (Figure 13). The analysis of the different governorates shows that the decline in the share of households where all members are exclusively employed in agriculture is different in Upper and Lower Egypt. In Lower Egypt, the decline in agriculture-only households observed between 1999 and 2012 is larger than in Upper Egypt (36 and 33 percentage points, respectively). In spite of this, households depending exclusively on agriculture are more frequent in Upper Egypt than in Lower Egypt. In 1999, 36 percent of rural households in Upper Egypt, and 29 percent in Lower Egypt were only-Ag households. By 2012, the percentage of only-Ag households in Upper Egypt decreased to 24 percent and in Lower Egypt to 18.4 percent.

Figure 13—Share of agriculture-only rural households by governorates in Upper Egypt and Lower Egypt, 1999 and 2012



Source: Authors' calculation based on OAMDI (2014a; 2014c).

All governorates have experienced a decrease in the share of only-Ag households between 1999 and 2012 (Figure 13). In Upper Egypt, Aswan experienced the biggest percentage decline of only-Ag households (62 percent), whereas in Lower Egypt, the biggest decline occurred in Damietta with a 72 percent decrease in the share of households in which all members work in agriculture. In the following, we will explore the characteristics of agriculture only as well as other household types to explore what may explain why some household groups and household members are more likely than others to continue working in agriculture.

Households whose members work in agriculture have consistently lower levels of education and tend to be older. Table 4 shows the demographic composition by type of household.[14] Data from 2012 reveals that, in general, households in agriculture (both only-Ag and Mixed households) tend to be formed by older members when compared to non-Ag households. In particular, the head of the household and spouse from agricultural households is, on average, older in comparison with heads from non-Ag households. Also, the size of Mixed households is larger and they tend to be slightly more crowded (i.e., the number of household members per room is higher), with Mixed households in Upper Egypt being larger than in Lower Egypt.

Table 4—Demographic characteristics of rural households in Upper Egypt and Lower Egypt, 2012

	Rural Upper Egypt			Rural Lower Egypt		
	Only Ag	Mixed	Non Ag	Only Ag	Mixed	Non Ag
Age of head, years (mean)	48.5	51.0	43.5	48.7	48.8	43.6
Age of spouse, years (mean)	39.7	42.9	34.9	40.7	42.0	35.9
Household members/room (mean)	1.5	1.6	1.6	1.2	1.3	1.3
Household size (mean)	5.0	6.3	5.2	4.4	5.2	4.6
Number of income earners in households (mean)	1.4	2.6	1.6	1.4	2.3	1.6
Disposable income, yearly, EGP (mean)	22,683	32,077	26,778	24,961	33,294	29,643
Male headed households (%)	81.6	91.1	90.3	87.6	93.2	92.1
Education of head (%)						
None	78.5	65.1	43.3	72.0	58.7	32.3
Primary/Lower sec	7.6	8.6	6.0	10.1	13.0	13.5
Secondary	12.6	23.1	32.4	14.8	21.3	34.8
Post-secondary	0.2	1.5	6.1	0.8	1.8	5.6
University	1.2	1.3	12.1	2.2	5.2	13.4
Postgrad	0.0	0.4	0.2	0.0	0.0	0.4
Education of spouse (%)						
None	85.4	80.5	50.4	77.6	67.1	36.4
Primary/Lower sec	4.7	7.4	13.0	7.8	9.5	10.1
Secondary	9.4	10.2	26.1	14.2	19.7	39.1
Post-secondary	0.2	0.4	4.0	0.4	1.0	3.8
University	0.3	1.5	6.3	0.0	2.7	10.5
Postgrad	0.0	0.0	0.2	0.0	0.0	0.1
Highest level of education in household (%)						
None	34.1	10.3	14.0	31.9	9.5	9.7
Primary/Lower sec	28.6	24.5	15.9	27.7	21.4	15.5
Secondary	32.4	46.7	44.6	33.6	47.6	44.6
Post-secondary	1.3	2.9	6.2	1.4	4.4	7.1
University	3.5	15.1	19.0	5.4	17.0	22.4
Postgrad	0.0	0.4	0.3	0.0	0.0	0.6

Source: Authors' calculation based on OAMDI (2014a).

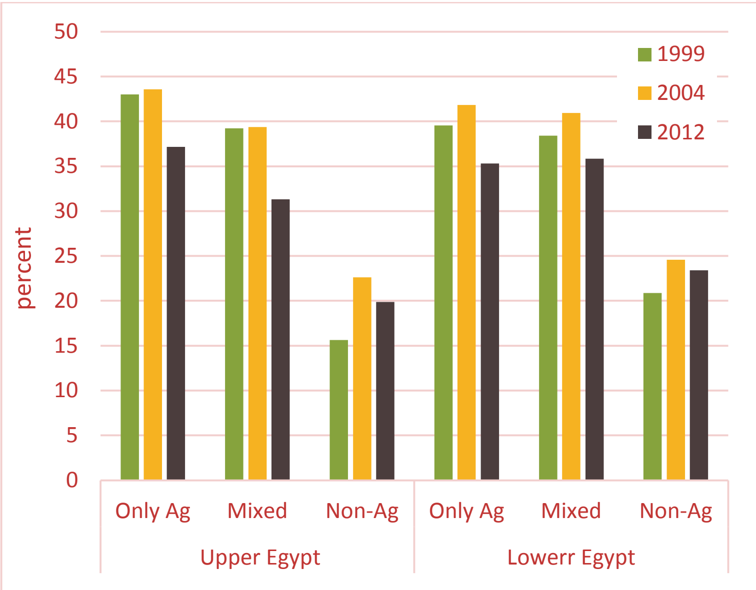
Education seems to be a key factor that determines the agricultural character of households in rural Egypt. Mixed households, for example, are more educated, in spite of having more crowded houses (an indicator often used to denote socioeconomic status). Mixed households have higher average levels of school education (secondary or high school education). However, non-Ag households have the highest university degree levels. In 2012, 35 percent of only-Ag households had no formal education, and less than 5 percent had an educational level higher than secondary studies. In contrast, only 10 percent of Mixed households have no formal education, while more than 50 percent have at least graduated secondary school, and around 15 percent have at least one member with a university degree. The level of education of households is also lower in Upper than in Lower Egypt. However, looking at the level of education of the head and spouse, somewhat different patterns emerge. The head and spouse of the average households not in agriculture (non-Ag) have higher levels of education than their counterparts from Mixed households. This might be the result of heads and spouses in Mixed households being older than in non-Ag households, since the level of education has been increasing in Egypt, resulting in younger generations being more educated. Also, higher levels of education may provide more employment opportunities outside of the agricultural sector.

Women play an important role in agricultural income generation in rural Egyptian households, and increasingly for non-agricultural income generation. The role of women in the transformation process is important to highlight, given the disadvantages that women often face in terms of labor opportunities, access to education, and the general cultural and social barriers that exist.

[14] We use the rounds 1999, 2004, and 2012 in order to observe effects that could be influenced by economic shocks occurring around these years. For example, 2012 would pick-up effects after the Revolution of 2011 and the economic crisis of 2008.

On average, 30 percent of households' earners in rural Egypt are women. Furthermore, the role of women is more salient among exclusively agricultural households than among Mixed and non-Ag households (Figure 14). In 2012 for example, more than 35 percent of only-Ag household earners in Upper Egypt were women compared to 20 percent of non-Ag households and around 30 percent of Mixed ones. Nonetheless, this role is becoming less important for agricultural households and more relevant for households out of agriculture, as the proportion of female earners among only-Ag and Mixed households has been declining between 1999 and 2012, while the opposite has occurred for non-Ag households. Starting out from 1999, the proportion of female earners in non-Ag households in Upper Egypt increased by 5 percent. The same trend is observed in Lower Egypt, showing an increase of 3.5 percent for female earners in non-Ag households. The role of women therefore is becoming more important among households out of agriculture, although, this role is still very significant for agricultural households.

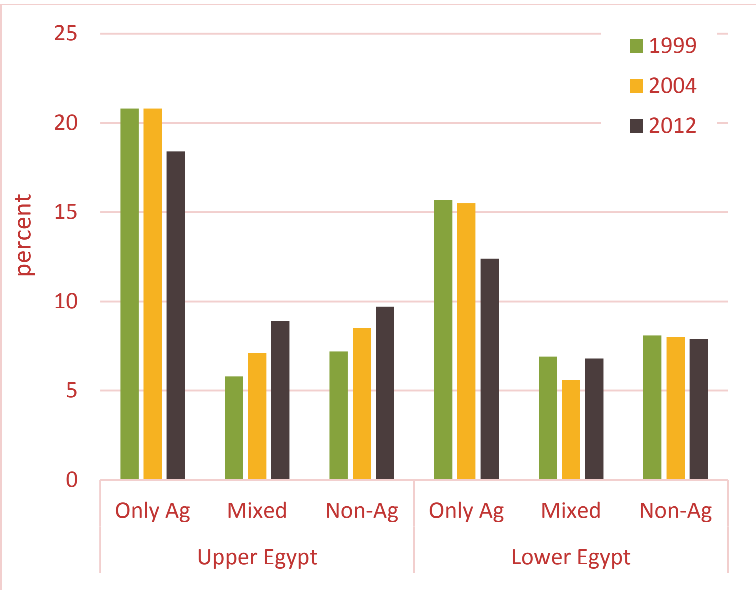
Figure 14—Percentage of rural households in Upper Egypt and Lower Egypt with female income earners, by type of household based on dependence on agriculture, 1999, 2004, and 2012



Source: Authors' calculation based on OAMDI (2014a).

An additional indicator that stresses the importance of women for agricultural development is the number of agricultural households led by women (Figure 15). In rural Egypt, around 15 percent of households are led by women, this percentage being higher in Upper Egypt than in Lower Egypt (21 and 15.4 percent, respectively, in 2012). Among only-Ag households, the proportion of female heads has decreased from 1999 to 2012, yet this proportion is higher when compared with Mixed and non-Ag households. Interestingly, the proportion of households led by women has been increasing over time among Mixed and non-Ag households.

Figure 15—Percentage of rural households in Upper Egypt and Lower Egypt with female heads, by type of household based on dependence on agriculture, 1999, 2004, and 2012



Source: Authors' calculation based on OAMDI (2014a).

To more rigorously analyze the descriptive findings of the previous sections, we conduct a multivariate regression analysis. Nonlinear models are useful to measure the relationship of a categorical independent variable with a group of independent variables. In our case, we model the relationship of household type with a set of socioeconomic and demographic characteristics, which presumably, are correlated with the agricultural nature of households (i.e., type). Further, we want to examine the contribution of these characteristics to better understand why households are at different stages of the transformation process. Since our dependent variables are binary (e.g., 1 if the household is Mixed, 0 otherwise) we use a logistic specification. Logistic models estimate the probability of an event (i.e., type of household) by calculating the logarithm of the odds ratio (logit) of that event for different levels of the independent variables, and fitting this logit using a linear regression. As such, given a group of demographic and socioeconomic characteristics, we can predict the probability of a household to belong to the category "only-Ag", "Mixed", or "non-Ag". We estimate three different models separately, one for each type of household, in order to compare the relative effect of characteristics for the three types of households. Inclusion of these factors is based on the results discussed on the previous section, and the criteria to judge the effect of these factors on the probability of household type are the magnitude, sign, and statistical significance of the estimated coefficient. Table 5 presents the results of the model.

Table 5—Logistic regression for variables predicting type of household in 2012

	Type of Household: 2012				Type of Household: 2012		
Household characteristic	**Only-Ag**	**Mixed**	**Non-Ag**	**Household characteristic**	**Only-Ag**	**Mixed**	**Non-Ag**
Poor[1]	0.518***	0.310***	-0.388***	Head has primary education[4]	-0.678***	-0.334**	0.411***
	(0.089)	(0.104)	(0.077)		(0.143)	(0.157)	(0.114)
Upper Egypt	0.323***	0.111	-0.352***	Head has secondary education[4]	-0.847***	-0.796***	0.580***
	(0.086)	(0.101)	(0.073)		(0.137)	(0.141)	(0.105)
Number of income earners in household	-0.113*	0.850***	-0.306***	Head has more than secondary education[4]	-1.178***	-1.808***	1.085***
	(0.059)	(0.059)	(0.049)		(0.269)	(0.232)	(0.166)
One female income earner in household[2]	0.725***	1.516***	-1.203***	Maximum level of education in household is primary[4]	-0.076	0.719***	0.253**
	(0.109)	(0.117)	(0.089)		(0.124)	(0.174)	(0.117)
Two or more female income earners in household[2]	1.016***	0.716***	-1.012***	Maximum level of education in household is secondary[4]	-0.562***	0.997***	0.750***
	(0.219)	(0.205)	(0.177)		(0.125)	(0.167)	(0.111)
Head age between 25 and 34 yrs[3]	0.485	-0.388	0.085	Maximum level of education in household is more than secondary[4]	-1.132***	0.809***	1.293***
	(0.351)	(0.452)	(0.304)		(0.197)	(0.207)	(0.145)
Head age between 35 and 49 yrs[3]	0.432	-0.478	0.403	Salary is main source of income[5]	-1.783***	0.564***	1.244***
	(0.355)	(0.453)	(0.307)		(0.091)	(0.106)	(0.075)
Head is older than 50 yrs[3]	0.647*	-0.217	-0.005	Remittance is main source of income[5]	-0.917***	-0.325	-1.560***
	(0.362)	(0.457)	(0.310)		(0.166)	(0.268)	(0.136)
Spouse age between 25 and 34 yrs[3]	-0.582***	0.207	0.167	Head is housewife/homemaker[6]	-0.122	0.684*	-2.972***
	(0.167)	(0.241)	(0.150)		(0.249)	(0.349)	(0.300)
Spouse age between 35 and 49 yrs[3]	-1.022***	0.231	0.134	Head is pensioner[6]	-1.980***	-2.159***	0.351***
	(0.193)	(0.262)	(0.170)		(0.198)	(0.259)	(0.130)
Spouse is older than 50 yrs[3]	-0.345	0.133	-0.138	Head does "Other activities"[6]	-1.622***	-0.867**	-0.490**
	(0.214)	(0.281)	(0.185)		(0.293)	(0.395)	(0.190)
Head is male	0.385**	0.558**	-0.924***	Constant	-0.444	-5.536***	0.967***
	(0.185)	(0.225)	(0.138)		(0.414)	(0.539)	(0.350)
				Observations		*6,154*	

Source: Authors' calculation based on OAMDI (2014a).

Notes: 1. Poor defined as the 3 lowest deciles of per capita average expenditures; 2. Reference is no female earners; 3. Reference is 15-24 y; 4. Reference is no education; 5. Reference is business; 6. Reference is employee.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In this analysis, we define households in the lowest 3 deciles of average per capita expenditures as poor, taking into account the latest available rate of poverty in rural areas of about 32 percent for 2010/11 (CAPMAS 2013b). Results show that non-Ag households are less likely to be poor than only-Ag and Mixed households. This can be seen from the negative association between the only-Ag variable and the variable indicating if the household belongs to the lowest 3 deciles of per capita expenditures. Only-Ag households are more likely to be found in Upper Egypt than are non-Ag households. In fact, for only-Ag households the magnitude of the associations is similar, but with the opposite sign, to that observed among non-Ag ones (0.32 vs -0.35). Also, as discussed above, Mixed households are more likely to have a higher number of earners, and together with only-Ag households, more likely to have a higher number of female earners than non-Ag households, which confirms the descriptive analysis presented earlier. However, as argued, a higher number of income earners does not entail better socioeconomic conditions. This result suggests that Mixed households have to rely on more household members bringing income to the household, and probably engage in lower-value activities than do non-Ag households.

Households in agriculture have a lower capacity to generate income and rely more on informal, low-value activities than households where some members are employed in non-Agricultural activities. Looking at the main occupation of the head and main source of income, a similar conclusion can be made. Compared to households whose main source of income is a household business, non-Ag households are less likely to rely on remittances and more likely to rely on formal salaries and wages (-1.56 and 1.22, respectively). It is worth noting the negative association between remittances and only-Ag households, which suggests that agricultural households rely more on household business than remittances as a source of income. Another indication of non-Ag households having better labor conditions is the occupation of the head. Among only-Ag households, it is less likely to find a head whose main occupation is domestic activities, and more likely to find heads that are pensioners.

Finally, education and demographic factors play a key role in defining the agricultural character of households in rural Egypt. Education, in particular, is central, as more education is associated with a higher probability of households moving out of agriculture.

5. THE FUTURE OF AGRICULTURAL AND AGRO-PROCESSING DEVELOPMENT

Opportunities and challenges for agricultural growth

There are potentially three broad avenues through which agricultural growth in Egypt may be sustained or even accelerated: a) through further increases in productivity; b) through land expansion; and c) through structural changes within the sector.

Productivity

Egypt's agricultural sector is already characterized by high land productivity, high yields, and high cropping intensity, as discussed in previous sections of this paper. However, there is potential to further raise productivity, as the sector still suffers from inefficiencies which hinder higher crop productivity levels (Abou-Ali and Kheir-El-Din 2010, ICARDA 2011). Land fragmentation is also a factor. Technical efficiency tends to be higher in larger landholdings, which can benefit from economies of scale, and where producers are also better linked to processing firms and have better access to markets (Abou-Ali and Kheir-El-Din 2010).

However, a number of factors related to water and land use practices affect productivity and prospects for sustainable agricultural growth. Egyptian agriculture depends almost entirely on irrigation, due to the arid climate and low rainfall. The sector dominates water consumption, using between 80 and 85 percent of Egypt's scarce water resources (ICARDA 2011). The fixed water share from the Nile River (55.5 bcm per year) is already fully utilized and supplies most irrigation water (Conniff et al. 2012). Around 10 percent of irrigated areas rely on groundwater, both renewable and non-renewable (FAO 2011). At farm level, there is room for improvements in irrigation efficiency as water use efficiency is estimated to be as low as 50 percent. Other related factors negatively affecting the sustainability of the agricultural sector include poor land leveling, poor drainage, and the misuse of heavy machinery which has led to soil compaction in the Delta (ICARDA 2011). There seems to be limited potential to further increase the use of fertilizer as Egypt is already one of the heaviest users of fertilizer globally (FAO 2015).

Land expansion

Reclaiming new lands for agriculture can be an opportunity for agricultural sector growth, especially as it can also help in redistribution of the population horizontally to relieve pressure on the Nile valley. One of the national mega-projects planned to achieve Egypt's Sustainable Development Strategy is to reclaim 4 million acres of new land in the desert (Government of Egypt 2015). The project aims to build an integrated society within the new land and create new jobs. The first phase of reclaiming 1.5 million feddans is already underway, with the land to be allocated to small, medium, and large companies. However, one challenge remains that non-renewable groundwater may be used for irrigation in the new project, which exerts further pressure on aquifers. More research may be needed to support the implementation of the project by assessing its economic and environmental sustainability.

While the new land reclamation plan may add around 20 percent more land under cultivation, there is also significant loss of fertile, alluvial land in the Nile Delta and Valley due to urban encroachment. Such encroachment on fertile agricultural land has reached a rate of 8,400 ha/year (20,000 feddan/year) (ICARDA 2011). A study in the eastern Nile delta shows that between 2002 and 2010, about 400,000 acres of fertile agricultural lands were lost to urbanization (Elnaggar 2013).

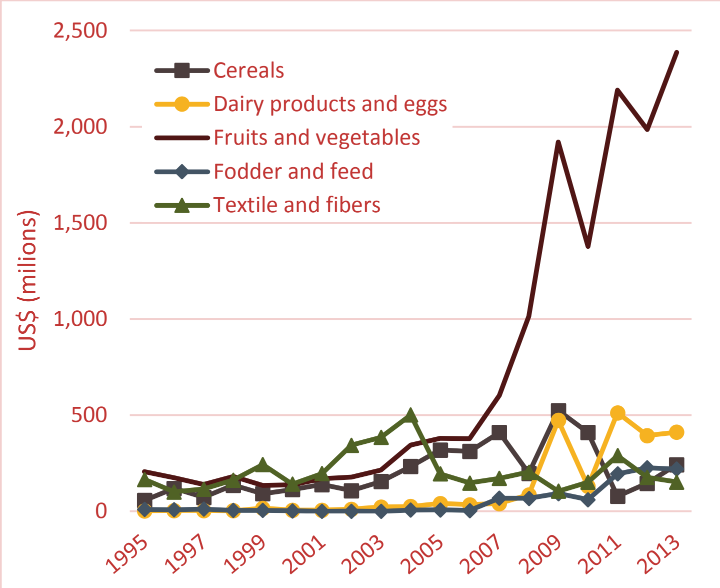
Structural change from cultivation of cereals to fruits and vegetables

Moving from a sector focused on traditional crops, like cereals, to fruits and vegetables can have significant effects on the sector's growth in terms of employment, incomes, and value added. Egypt has a comparative advantage in producing fruits and vegetables (Abou–Hadid 2006; Helmy 2010). As shown above, although the majority of cultivated area is still dominated by traditional field crops, horticultural crops are gaining a higher share in production. Farmers growing horticultural crops generally have higher incomes than those growing traditional field crops. Also, higher revenues can be obtained per ton of vegetable production (Devlin

2010). In Upper Egypt, 8 percent of the area is planted with non-traditional crops, and generates around 15 percent of the net farm income in the region (Kheir-El-Din and El-Laithy 2008). Similarly, in Lower Egypt, 37 percent of the area is dedicated to fruits, vegetables and aromatic and medicinal plants, which provides 45 percent of the net farm income. Further, horticulture production is more labor intensive compared to cereals (Devlin 2010), which means that, if more investments are targeted towards growing the fruits and vegetables sector, more employment opportunities can be generated.

In addition to the large and growing domestic market, fresh and processed fruits and vegetables represent a large export potential for the country (Figure 16).

Figure 16—Value of Egyptian agricultural exports, by category, 1995 to 2013



Source: Authors' elaboration based on FAOSTAT (2016).

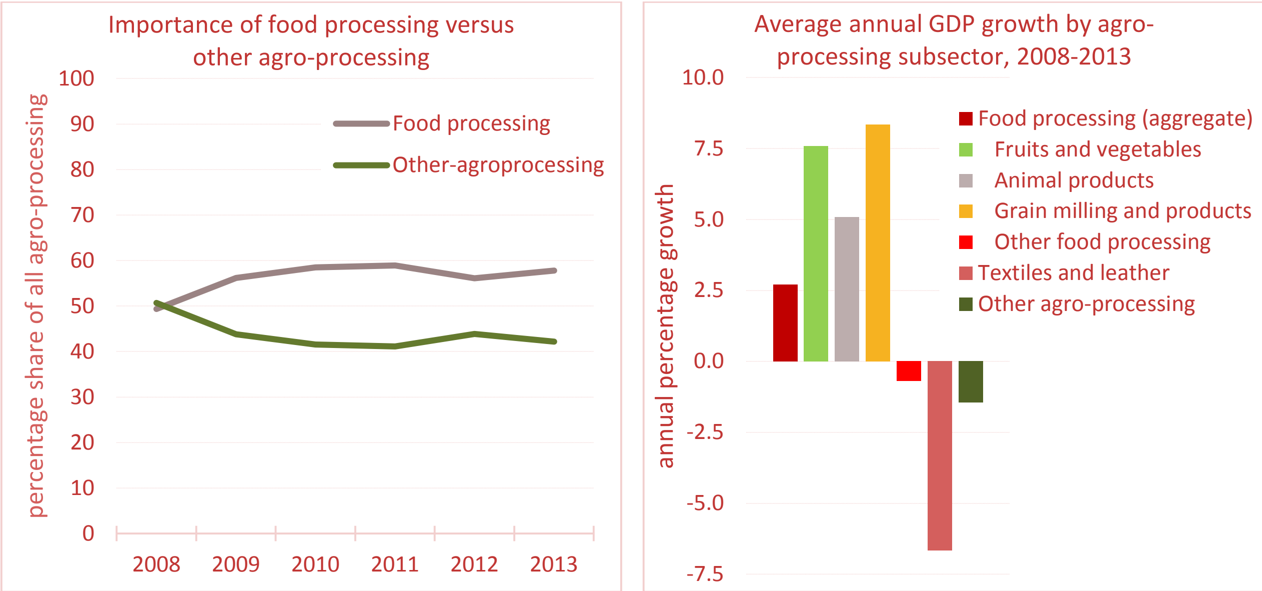
Some of the challenges facing a successful transition to production of higher value crops for both domestic and export markets are related to the agricultural policies in place, while others have to do with providing farmers with access to markets, extension services, and information. For example, the wheat policy in place incentivizes farmers to grow wheat, as the government guarantees buying it from farmers and sets an artificially high price for it (FAO 2015). Thus, growing wheat is at competition with higher value crops, particularly vegetables. Further, a major hindrance affecting the agricultural export sector is the inefficiency of transport and storage, which can result in considerable losses, given the easily perishable nature of fruits and vegetables (Kheir-El-Din and El-Laithy 2008). Key factors that can enable Egypt to improve access to agricultural export markets is improving fruit and vegetables' preservation and processing technologies, developing marketing strategies and processes, and providing extension services and market information locally to farmers in order to better link them to international markets (Helmy 2010). Finally, large commercial farmers have predominantly benefited from the exports of high value fruits and vegetables. Going forward, it will be important also to support smallholder farmers to expand their production of fruits and vegetables, replacing a portion of their traditional field crops, and provide them with better access to domestic and export markets for fruits and vegetables. Several development projects are now focusing on developing the skills of smallholder farmers, integrating them into the agricultural value chains, and linking them to local and export markets (e.g. IFAD's project "Promotion of Rural Incomes through Market Enhancement" and USAID's project "Food Security and Agribusiness Support", among others). Yet, ensuring the sustainability of these activities post-project implementation will be the real driver for smallholders' successful agricultural transition.

Harnessing agro-processing for job creation and poverty reduction

Previous sections have shown that employment in agro-processing has declined over the past few years, both in relative and absolute terms. Because this is somewhat unexpected, this section will decompose agro-processing sector performance by sub-sector in order to identify avenues for reversing the decline and potentially make the sector a driver of growth and job creation.

Figure 17 shows that the decline in agro-processing is mainly driven by the textile and leather sector, which shrank by an average of more than 6 percent per year since 2008. There are at least two reasons for this dramatic decline. First, Egyptian manufacturing in general has suffered from years of crises, which has led to reductions in investments and consumer demand. Second, the Egyptian textile sector has been in decline since the early 2000s due to a more open and competitive global environment (El Haddad 2010). To reverse this trend, the sector's structural problems that result in high production and transaction costs need to be tackled by moving up the clothing industry value chain, providing conditional export incentives and skills upgrading, and conducting comprehensive institutional reform (El Haddad 2010).

Figure 17—Changes in Egypt's agro-processing sector, 2008 to 2013



Source: Authors' calculation based on Central Agency for Public Mobilization and Statistics (CAPMAS), Annual industrial production statistics for the public and private business, various years.

In contrast to textiles and leather, the food processing sector, including grain milling and bakery products and processed fruits and vegetables, have become more important in relative terms (Figure 17, left panel) and in absolute terms (Figure 17, right panel). The food processing sector as a whole has grown at an average of 2.7 percent per annum since 2007, although with considerable volatility. Annual growth rates ranged from 16.1 percent in 2007/8 to -6.0 percent in 2010/11. Among the food processing sectors, grain milling and related products, followed by fruits and vegetables and animal products showed the strongest growth, whereas other food processing sub-sectors such as sugar refining and beverages shrank over the same period.

While more research is needed to assess the potential for agro-processing development, there are several reasons to believe that the food processing sector in particular has large potential for accelerated growth. First, Egypt's population continues to rapidly grow by an estimated 2 million people per annum, creating additional demand. Second, about 17 percent of the processed food and beverages consumed in Egypt are imported. With the recent sharp devaluation of the Egyptian pound, domestic producers may find it easier to compete with imports and take some of the market share now held by imported goods by increasing domestic production and, thus, substituting for some of the imports. Finally, Egypt currently exports about 10 percent of locally produced processed foods and beverages. There may be potential to further increase this market share by fostering exports to Europe, the Gulf countries, and elsewhere.

6. CONCLUSION AND RECOMMENDATIONS

Egypt has implemented ambitious macroeconomic reforms and continuing this path is likely to help revive and accelerate economic growth, including in the agriculture and agri-business sectors. Especially the floating of the exchange rate is expected to help improve the competitiveness of agriculture and agri-business both in exports and domestic markets. However, more sector-specific policies and investments are needed to unleash these sectors' full potential. Against this background, this paper has examined the role of agriculture and agro-processing for development in Egypt.

The paper shows that agriculture still plays a relatively more important role in the Egyptian economy compared to other countries globally at similar levels of per capita income. One explanation for this relatively important role is the high productivity/yield growth in Egyptian agriculture over the past decades. The high productivity growth contributed to a relatively constant average annual agricultural GDP growth rates of about 3 percent over the past 15 years. As such, agricultural growth proved a reliable source of output even when other sectors' growth was volatile, especially during the crises years. In addition, agricultural output growth helped to keep the food import dependency ratio fairly constant despite rapid population growth. However, after several decades of remarkable performance, agricultural yield growth has slowed down and almost stagnated over the past 10 years.

The analysis also shows that employment in agriculture (expected) and agro-processing sectors (unexpected) in Egypt has declined both in absolute and relative terms. This decline has been consistent across all governorates, but with strong regional difference. Both in terms of contribution to GDP and employment, agriculture tends to play a larger role in governorates that have lower per capita incomes. This is particularly the case in Upper Egypt. At the household level, the latest available data suggests that in Egypt only about 23 percent of rural households exclusively depend on agriculture for their income. That share reaches 24 percent in Upper Egypt and 18 percent in Lower Egypt. The share of those rural households which have no income from farming has reached 50 percent in Egypt, and 49 and 62 percent in Upper Egypt and Lower Egypt, respectively. Moreover, the household level analysis shows that exclusively agricultural households tend to have older household heads, lower education levels, and lower incomes. Such households also comprise more female income earners and have a higher chance of being headed by women, when compared to mixed or non-agricultural households.

There may still be room for accelerating agricultural growth through 1) structural change within the agricultural sector; 2) additional cultivated land; or 3) further productivity gains. Allocating more resources to higher value crops like vegetables and fruits could have at least two advantages. Higher value addition per feddan of these crops could result in a more efficient use of the scarce land under irrigation, create new jobs in agriculture, and also increase labor demand in upstream and downstream sectors, like farm services and agro-processing. Adding new land by reclaiming land from the desert is a top priority of the Egyptian Government and, if done well and in a sustainable way, can boost production and jobs. The strategy followed so far of high intensification and increased land productivity is challenged by increasing pressure on natural resources and water scarcity. In particular, there is scope to use scare water resources more efficiently and to improve the efficiency of public investment in agricultural research to provide the needed new technologies and the most efficient production systems that can sustain growth in Total Factor Productivity and technical change in coming years. Perhaps most importantly, a more market-oriented policy environment is key to promoting, and perhaps even accelerating, sustained agricultural growth through all three pathways.

Even if all three pathways to agricultural growth are followed, agricultural growth is unlikely to reverse the trend of decreasing employment in agriculture. But a competitive and labor intensive agricultural production can serve as a buffer to reduce the push factor out of agriculture while Egypt develops a more productive non-agricultural economy to absorb agricultural labor. In addition, agriculture can still play a role in poverty reduction as poverty is highest among agricultural households, even though only about half of rural households have income from farming. Non-agricultural growth will also have to play an increasingly important role. Particularly agro-processing and related services may become a new driver for rural growth and job creation, including in Upper Egypt. However, as this paper has shown, agro-processing activities are not necessarily located in regions where agriculture plays an important role for local economies and where poverty and unemployment tend to be high. In fact, the large majority of agro-processing industries are concentrated around Cairo, the Nile Delta, and the Mediterranean coast, with very few factories in the governorates of Upper Egypt.

The question is how to promote agro-processing-led growth? In general, industrial strategies led by the state have often failed in the past. Globally, approaches where governments focused on ensuring that markets work rather than “picking winners” have often been more successful as industrial development strategies. Standard recommendations for boosting private sector engagement are to provide a conducive macroeconomic and business environment. While the macroeconomic environment in Egypt has substantially improved with the recent reforms, more could be done to improve the ease of doing business in Egypt.

In addition to such “top down” reforms, a promising example of a “bottom-up” approach is cluster-based development (CBD). CBD, or cluster-based industrial production, spatially clusters small businesses that are part of the same industry, where each can specialize in a narrowly defined segment of the production processes for that industry (Zhang, 2012). This development model builds on countries’ and communities’ existing strengths and on local institutions. For example, people generally have strong social trust within a community, so the CBD model makes use of this strong social capital to overcome weaknesses associated with financial constraints. Within clusters, an integrated production process is divided into incremental steps, greatly lowering capital-related entry barriers and enabling otherwise more financially constrained entrepreneurs to set up businesses. The new businesses in turn generate a great number of employment opportunities. However, cluster development is not an automatic process and *local* governments need to play a facilitating role by providing necessary basic public goods and services in order to remove those bottlenecks. The rapid economic transformation in China offers a good example of cluster-based industrialization. Most agricultural and industrial production in China is cluster-based. There are more than 2,000 clusters in China with each specializing in one major product. Despite the lack of a well-developed financial market and sound institutions in the first place, China has become a world factory over a three decade period. The cluster-based model played a key part in this rapid growth.

The objective of this paper was to provide answers to broad development questions related to agriculture and agri-business. To provide specific policy advice that goes beyond the general recommendation for more market-oriented agriculture, more research is needed on several fronts.

1. An analysis of current agricultural policies, including input subsidies, producer price support, and trade measures, will provide estimates of the expected impacts of alternative policy reform options on different types of farms and households and, more generally, of the impact of a more market-oriented approach to agriculture. For example, one important rationale of policy makers for supporting wheat production is to sustain a certain level of wheat self-sufficiency. But it is not clear if farmers would indeed produce less wheat without government support, so more research is required. Moreover, what other options there are to ensure *food security*?
2. An evaluation is needed of the institutional and legislative reforms necessary to foster good governance and effectiveness in implementing development strategies.
3. A rural public investment review would shed light on the often voiced concern that public investments in rural areas and agriculture are too low. In addition, such an analysis should examine the efficacy of rural public investments in terms of their growth and poverty impacts, including investments in agricultural research.
4. A decomposition of agricultural growth by components, including water, will shed light on remaining unrealized agricultural productivity potentials and measures on how to leverage this potential. This could also answer the question of why yields have stagnated and why, despite stagnating yields, agricultural GDP growth remained fairly stable until 2013.
5. An assessment of expected climate change impacts will provide options for making the agricultural sector climate smart and thus preparing the agricultural sector for the future.
6. More actionable research is needed to assess opportunities and constraints for agri-business development, especially in Upper Egypt.
7. Further research should examine labor market dynamics across households, sectors, and regions; the role of agriculture and agro-processing for youth employment, and female employment.
8. Gender empowerment through agriculture and the role of women in agriculture and in small and medium size agro-processing enterprises should also be a top research priority, since women are important actors for rural livelihoods in Egypt.
9. Research is also required on nutrition-sensitive agriculture; how agriculture may help improving nutrition of household members; and how agricultural interventions can have strengthened nutrition impact.

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