Unleashing the Potential of Agriculture to Boost Growth in Interior Regions

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"Tunisia does not have an agricultural policy; rather it has a food security policy, which goes against the potential of its agricultural sector"

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The agricultural sector plays a key role in the Tunisian economy, especially in the poor rural areas of the interior. In 2010 the agricultural sector accounted for nearly eight percent of GDP, contributed nearly one-tenth of total exports, and accounted for nearly 20 percent of employment (directly in agriculture and indirectly in the food industries). In fact nearly 34 percent of the population lives in rural areas and depends on the agricultural sector, whether directly or indirectly, as the sector remains the main source of employment in rural areas, accounting for about 44 percent of rural employment. Moreover, agriculture provides employment to almost all women in the countryside. Hence, agriculture is a very important sector for growth and poverty reduction, especially in lagging regions (annex 9.1).

This chapter suggests that Tunisia does not really have an agricultural policy but has instead a food security policy that in fact hinders the development of its agricultural sector [1]. The current system of state intervention has repressed the agricultural sector, distorting production away from Mediterranean products in which Tunisia has a natural comparative advantage toward continental products in which Tunisia is not very competitive but which are key to food security. This policy has helped increase self-sufficiency in staple foods by "inflating" the growth of continental agricultural products, but in the process it has led to distortions and inequitable redistribution of wealth, keeping agricultural production at a sub-optimal level and unable to realize its full potential. Further, this chapter highlights that current agricultural policies in Tunisia, while well intended, are in fact both inefficient and inequitable and, paradoxically, contribute to increasing unemployment and regional disparities.

Food security is an essential priority that cannot be compromised, but food security is not synonymous with food self-sufficiency. The relevance of food security concerns has been reemphasized by the severe international food prices spike in 2007 to 2008[2]. Nevertheless in light of the problems with agricultural policies discussed in this chapter, Tunisians should carefully consider possible alternative ways to ensure food security, ways that do not undermine the development of their agricultural sector.

9.1 / The Agricultural Sector Performs Below Its Potential and Appears Distorted Toward the Production of Goods in Which It Is Not Competitive

Countries have a comparative advantage at making products that are intensive in the use of the factors with which they are relatively well endowed—Tunisia is relatively well endowed in labor but has a relatively scarce supply of arable land and water resources. Hence we expect Tunisia's comparative advantage to be in the production of goods that are least intensive in arable land and water. In order to assess Tunisia's comparative advantage in agricultural production, we calculated the domestic resource cost (DRC) of production for various products using price data for the years 2000, 2004, and 2008 (World Bank 2009d). This indicator measures the ratio of the social cost of production (production valued at social prices) to the cost of production at domestic factors prices, thereby giving an indication of Tunisia's competitiveness of Tunisia in the production of each given agricultural good (box 9.1). International agricultural commodity prices are currently between the 2004 and 2008 prices (figure 9.1), such that the results of the analysis for those two years can provide a valid approximation of the current competitiveness of Tunisian agriculture.

Tunisia has a comparative advantage in crops with greater labor intensity and a disadvantage in crops with high land intensity. The results of the calculation of DRCs suggest that Tunisia does

Box 9.1: Methodology for the Analysis of the Competitiveness of Agricultural Products in Tunisia, 2000-2009

An analysis of the competitiveness of agricultural products in Tunisia was performed calculating the Policy Analysis Matrix (PAM) based on data from 2000, 2004, and 2008 (World Bank, 2009d). This analysis allows a measure of the discrepancy between economic or real costs of production and international reference prices (the prices prevailing in a situation of perfect competition without market failure or distortion). Specifically, the PAM is composed of two types of budgets: one valued at market prices (financial budget) and the other valued at the social opportunity cost or economic prices (economic budget). Market prices are those farmers pay (or receive) while economic prices reflect the cost to the economy or society. We can thus calculate the difference between the financial budget and the economic budget. In developing the budget, all inputs and outputs are classified as tradable or non-tradable. Tradable products are those that can be imported or exported, and theoretically valued at world market prices, while non-tradable goods and domestic factors are those that are not normally traded in the international market. PAM is used to calculate private profit (or financial profit), which measures the competitiveness of the production system, and a social profit (or economic profit) that measures the comparative advantage.

The products reviewed are soft wheat, durum wheat, barley, tomatoes, potatoes, olive oil, peaches, oranges, milk, ovine meat, and bovine meat. In addition the analysis differentiates the productivity across four different classes of farm size (< 5 hectares, from 5 to 10 hectares, from 10 to 50 hectares, and > 50 hectares) and three different agro-climatic and agro-ecological zones (humid and sub-humid, semi-arid superior, and semi-arid inferior).

An indicator of competitiveness, the domestic resource cost (DRC), has been calculated for each product. This indicator measures the ratio of the social cost of production (production valued at social prices) to the cost of production at domestic factors prices. In practice, the DRC is calculated as the ratio of the value of domestic resources and non-tradable inputs (land, labor, certain types of capital, and water) to value added (defined as the value of output less the cost of tradable inputs). The ratio indicates whether the use of domestic production factors is socially profitable (DRC <1) or not (DRC> 1). So if DRC <1 for a given good, it would be cheaper in domestic resources to produce the good locally rather than to import it (that is, less than one dinar of domestic resources is needed to produce a dinar of value added) and vice versa.

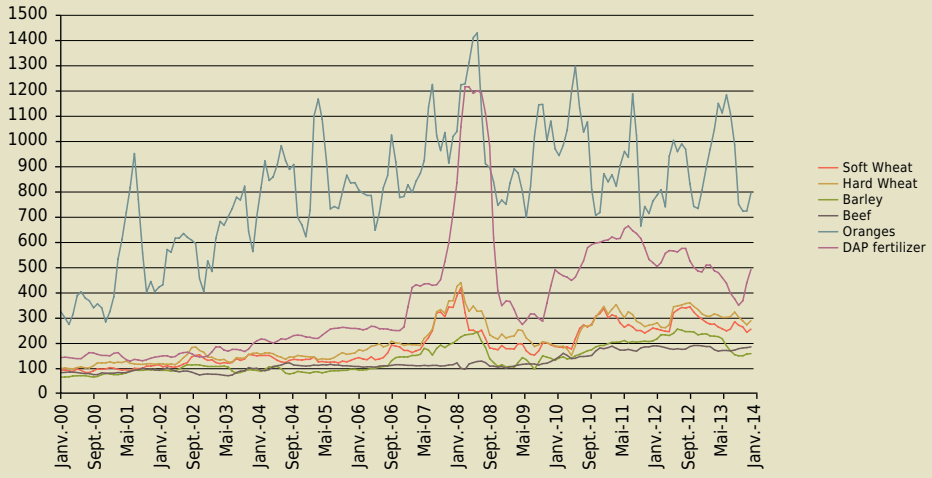
Table B9.1.1 Cost of Production in Domestic Resources

Products	2000	2004	2008
Soft wheat	1.86	3.13	0.9
Soft wheat, irrigated	0.97	n.d.	0.65
Hard wheat	1.2	0.96	0.56
Heard wheat, irrigated	0.61	n.d.	0.39
Barley	3.14	4.02	1.69
Potatoes	0.56	0.5	1.39
Tomatoes	0.6	0.45	0.66
Oranges	0.83	0.31	1.29
Peaches	0.49	0.49	1.39
Olive oil	0.91	0.82	0.36
Bovine integrated local breed	0.79	2.22	3.65
Bovine, non-integrated local breed	1.85	2.6	4.57
Bovine, integrated pure breed	1.32	1.75	<0
Bovine, non-integrated pure breed	1.46	2.03	<0
Integrated milk	0.82	1.23	1.15
Non-integrated milk	1.06	2.1	1.91
Ovine	0.44	0.65	0.5

Source: World Bank 2009d (the results for 2000 and 2004 are based on a report by IDEACONSULT in 2005).

not have a strong comparative advantage in cereals, which are intensive in land and are socially less profitable than arboriculture, fruits, and vegetables (box 9.1). Tunisia is very competitive in production of olive oil and tomatoes (as shown by the DRC < 1) in each of the three years for which the analysis has been carried out (2000, 2004, and 2008). It is also competitive in production of oranges and potatoes, except in 2008 when the price of fertilizer was extremely high. Tunisia is also competitive in durum wheat (rain-fed and irrigated) and was also competitive in irrigated soft wheat when the international prices spiked in 2008, such that temporarily it became profitable to produce soft wheat in Tunisia. The competitiveness in soft wheat is limited to the irrigated areas and areas in the north and northwest regions where the rainfall is more favorable (not shown). In terms of farm size, unsurprisingly, the larger the farm the more competitive the wheat production (not shown). Tunisia is not at all competitive in production of barley. In terms of meat, Tunisia is very uncompetitive in production of beef and milk (DRC > 1), but it is very competitive in ovine meat.

Figure 9.1: International Price of Selected Agricultural Commodities and Fertilizer, 2000-2014



Source: World Development Indicators (WDI).
Note: Soft Wheat (U.S.), no. 2, soft red winter, export price delivered at the U.S. Gulf port for prompt or 30-days shipment, U.S. Dollars per metric ton; Hard Wheat, No.1 Hard Red Winter, ordinary protein, Free On Board (FOB) U.S. Gulf port , U.S. Dollars per metric ton; Barley, Canadian no.1 Western Barley, spot price, U.S. Dollars per metric ton; Beef, Australian and New Zealand 85% lean fores, Cost and Insurance Freight (CIF) U.S. import price, U.S. cents per pound; Oranges, miscellaneous oranges, CIF French import price, U.S. Dollars per metric ton; DAP (diammonium phosphate), standard size, bulk, spot, FOB. U.S. Gulf port, U.S. Dollars per metric ton.

These results highlight that Tunisia's agricultural sector is not realizing its growth potential because it concentrates on products in which it is not competitive. Conversely, in areas where Tunisia is competitive, it does not capitalize on its advantage. The most competitive products, namely durum wheat, arboriculture (including fruit and olive oil), vegetables, and fisheries—which represent 58 percent of production over the last 20 years—contribute to the growth of the sector only up to about 46 percent, while non-competitive products (cereals, excluding durum wheat, beef, milk)—which concern 39 percent of production—contributed up to about 52 percent (table 9.1).

A quick review of Tunisian exports to the European Union also signals that the comparative potential in the arboriculture and fruits and vegetables segments is not fully exploited. In fact, in 1998 Tunisia used only approximately 55 percent of its citrus export quota (CNEA 2005b), and this amount was still only approximately 60 percent in 2010 and 2011 (table 9.2 and figure 9.2);

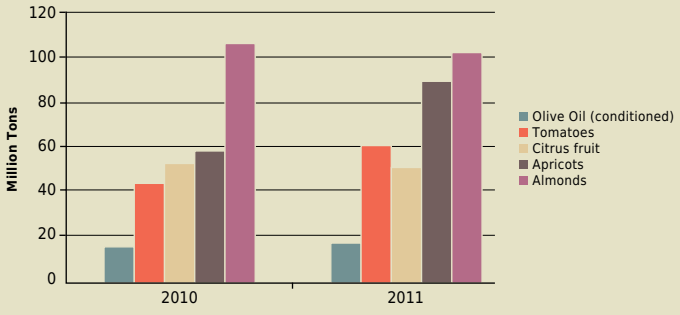
Table 9.1: Contribution of Individual Products to the Growth of the Agricultural Sector

	Share in overall production (1990-2010)	Contribution to the growth of the sector (1990-2010)
Competitive		
Durum wheat	10.0	8.0
Arboriculture	27.0	23.5
Horticulture	15.2	15.2
Fisheries	5.8	-0.7
Total	**58.0**	**46.0**
Non competitive		
Cereals (excluding durum wheat)	4.2	5.0
Livestock	35.2	46.7
Total	**39.4**	**51.7**
Other products	2.6	2.3

Source: Author's calculations.

exports of tangerines and clementines are virtually non-existent because farms can supply only the local market. Exports of apricots have increased from a mere 15 percent of the available EU quota in 1998 to approximately 70 to 100 percent of quota in 2010-2011. Similarly, Tunisian used only 25 percent of its tomato quota in 1998 and still used only 50 to 70 percent of its quota in 2010 and 2011, respectively. Even for olive oil, Tunisia still manages to export only about 20 percent of its quota. In sum, Tunisia is not taking advantage of the existing opportunities to export agricultural products to the EU. This largely reflects the weakness of Tunisia's production systems, which is partly the result of lack of government action to support these Mediterranean crops, notably for olive oil and citrus (box 9.2). For other products, such as tomatoes, the shortfalls in taking advantage of these export opportunities is also due to the fact that the EU import quotas are subject to specific calendars which further restrict their use.

Figure 9.2: Exports to the EU of Selected Products as a Percentage of Quota, in 2010 and 2011



Source: Tunisia Ministry of Agriculture

More generally, the potential to increase the quantity and value of olive oil exports worldwide remains unexploited. Tunisia is the second largest olive oil exporter in terms of volume worldwide, and olive oil constitutes about 5.5 percent of Tunisia's total exports in 2010. Despite a clear comparative advantage in olive oil production given its high quality and low costs of production, however, Tunisia's production has stagnated over the last 12 years even though world demand has steadily been increasing (box 9.2).

Box 9.2: High Unexploited Potential for Export of Olive Oil and Citrus

Olive oil prices depend on quality. Virgin olive oil is the highest olive oil quality and represents over 70 percent of the international market. Tunisian oil exports, however, consist mainly of the lowest grade of such virgin olive oil. This low quality rate is the result of various factors such as (a) inappropriate harvest, storage, and transport methods; (b) a long harvest and storage cycle; and (c) obsolete extraction equipment. The vast majority (above 90 percent) of Tunisian olive oil is still traded unbranded and in bulk. Several factors constrain productive investments in Tunisia's olive oil sector: variability in terms of production is high and returns are low in Tunisia mainly due to antiquated production techniques—it has been estimated that mechanization could increase returns by 20 percent (World Bank 2008a). There is also a lack of local norms and clear quality standards, which does not help the process of creating a quality brand and targeting high-end markets. While many origin trademarks exist in Greece, Italy, and Spain, Tunisian olive oil producers are only now developing origin trademark and quality labels. Moreover, the Vegetable Oils Marketing Board (*Office National des Huiles*, ONH) undermines Tunisian exporters because it sets prices, controls access to the EU quotas (allocating some of the quota to private operators through procedures that are not made public), and at the same time monopolizes the control of quality. In the past it also occasionally banned exports at times of lower supply and higher international prices—at a great loss to private investors. In addition, many olive producers have difficulties in accessing finance in part because olive oil production is a long-term investment (as it takes several years before the olive trees start producing olives). Private-sector exporters believe there is significant scope for increasing olive oil exports by targeting emerging markets, such as China, India, or the Russian Federation; improving packaging and marketing (for instance using a label of origin and quality); creating an organic agricultural label; and perhaps promoting cooperatives. Still, although the olive oil sector would also provide an opportunity to increase labor demand in Tunisia's inner provinces, necessary reforms to boost the performance of the sector seem to have been stalled for decades.

Citrus production has stagnated for more than a decade, and growing domestic demand absorbs more than 90 percent of local production. Current citrus exports to the EU amount to 24,000 tons and represent only 60 percent of the country's preferential quota. To take advantage of this opportunity, Tunisia needs to increase the quantity and quality of production. Tunisian citrus fruits are graded as being of "average" quality. Many citrus orchards are old and unproductive. The conversion of old orchards into younger and more productive farms is slow. Yields are low, and fruit are too small to get good prices. Negligence at harvest is damaging fruit. Fruits that are tree-harvested and those collected on the ground are often mixed together. More efforts should therefore be made in applied research and extension service to develop appropriate harvest and post-harvest techniques that ensure high fruit quality for exports. These techniques must be developed for all stages of the supply chain and be easy to implement by citrus growers, fruit processing centers, and traders. Despite price liberalization, retail margins are still regulated by a 1988 decree that retail margins be set based on official purchase prices. Fruits growers and collectors are required to sell their produce to the official wholesale market, and fruit retailers must purchase their goods at the same market. The permitted retail margin is low, encouraging retailers to avoid the formal wholesale market and directly purchase fruit from local producers or collectors. This trend is coupled with quality-damaging practices where fruits of all quality levels and sizes are mixed and sold as a whole regardless of size and quality differentiation.

Table 9.2: Exports to the EU for Selected Products under Quota, 2010 and 2011

	Tons			Percentage of EU quota	
	2010	**2011**	**UE Quota**	**2010**	**2011**
Citrus fruit	24580	23610	39355	62	60
Apricots	1522	2337	2240	68	104
Almonds	1384	1330	1120	124	119
Tomatoes	9820	13384	18816	52	71
Olive oil (conditioned)	10877	12035	56000	19	21

Source: Tunisia Ministry of Agriculture

9.2 / A Distortive, Expensive, and Inequitable Agricultural Policy

The focus of farmers on products in which Tunisia is not competitive is the direct result of existing agricultural policies. In fact much of the growth in agriculture has been driven by subsidies and the trade protection of products in which Tunisia is not competitive. Agricultural production increased by 67 percent (in value) over the period 1990-2010, but almost one-third (17 percent of the value) originates in bovine beef and milk, in which Tunisia is not competitive. In other words, much of the growth in agriculture has been caused by support provided to the agricultural sector (input subsidies, market price support, and trade protection) that has artificially inflated the growth of the sector, but at a net loss for the country (see below). This support policy provides agriculture with a transfer of resources that are borne by taxpayers, consumers, and the rest of the economy. Further the amount paid by taxpayers, consumers, and the other sectors of the economy is greater than the benefits received by the agricultural sector, which implies a net loss for the country.

Tunisian agricultural policy aims to ensure food security, protect farmers' incomes, and support economic activity in interior regions through provision of input subsidies, guaranteed prices, trade protection, and other ad hoc interventions. We briefly review the main features of each of these instruments below (table 9.3).

- *Market price support is significant, accounting for over 30 percent of total budgetary transfers to agriculture in recent years:* The amount of price support for each product varies from year to year depending on movements in international prices. Market price support is carried out mostly through the implementation of a guaranteed minimum price for producers of cereals and intervention purchases carried out by the state marketing boards for milk, sugar beet, and tobacco[3]. The level of guaranteed prices is determined annually by the relevant marketing boards, taking into account international prices, production costs, and the situation of the domestic market. Market price support is particularly important in the milk sector, which accounts for over 50 percent of expenditure on market price support in recent years. Cereals (soft wheat, durum wheat, and barley) account for a further third of the expenditure on market price support.

- *Tunisian agricultural trade policies entail customs duties and quotas on imports of agricultural products:* Overall the impact of the international push to liberalize agricultural trade (and notably the 1994 Uruguay Round of trade negotiations) has had a limited impact on the level of protection and trade in Tunisia. Agricultural products continue to be subject to much higher customs duties compared to international standards, and import penetration into the domestic food products markets is much

lower than in the industrial sector. In general, tariff protection for agricultural products far exceeds that of other products. The simple average of the "most favored nation" (MFN) rates applied to agri-food products is 24.6 percent (compared to 16.5 percent for all products), with a maximum rate of 36 percent. "Record prices" (those above 15 percent, according to the World Trade Organization [WTO] definition) account for about 60.5 percent of agricultural tariff lines, compared to 32.5 percent for non-agricultural products. Among the categories of agricultural products, the highest overall tariffs (around 32 percent) are for animal products, milk products, and fruits and vegetables. In addition to ad valorem duties, Tunisia also applies tariff quotas (a combination of quotas and customs duties where these duties increase when imports exceed a specified amount).

- *Input subsidies (such as improved seeds, forage seeds, energy, irrigation water, and so on) also play an important role and account for approximately 20 to 25 percent of total budgetary transfers in recent years:* In 2008-2009, the largest share was allocated to fuel subsides (approximately 40 percent of total input subsidies), milk collection premia (approximately 40 percent), and irrigation subsidies (approximately 18 percent). Fertilizer subsidies were discontinued in 1991.

- *In addition to marketing boards, trade protection, and input subsidies, the state intervenes extensively in the agricultural sector by directing the activities of farmers and private traders:* For instance, the state controls the margins of retail sales of several products, puts pressure on wholesalers to keep their prices low, imports when prices are rising (including for products like vegetables for which there is no guaranteed price), pays inadequate quality bonuses for cereals, and caps the prices of processed foods. Although the intention is to stabilize markets and support farmers' incomes, in fact all these interventions create distortions to marketing systems and reduce the efficiency of resource allocation, thereby undermining the performance of the agricultural sector.

The overall cost of agricultural support in Tunisia is high. In addition to budgetary costs, which are borne by taxpayers, there are also direct costs to consumers who have to pay higher prices for food products[4]. Moreover, the distribution of these benefits (that is, the transfers to support agricultural production) is regressive both geographically and in terms of household wealth of the beneficiaries. Price interventions also distort production and trade, generating efficiency losses borne by the rest of the economy. Finally, the bureaucratic machinery required to administer this array of interventions also poses a challenge to the farmers. We review each of these items in turn below.

Budget Transfers: Support measures to agriculture (pricing and input subsidies) are expensive. The budgetary direct costs of policies reached approximately 0.8 percent of GDP in 2010 (or TND 350 million), which represents a significant burden for taxpayers. These budgetary transfers grew substantially during the 2000s, primarily due to expenses incurred by market price support and input subsidies. Hence, although Tunisia committed (in the framework of the 1994 Uruguay Round of trade negotiations) to reduce the overall mass of domestic support (from 76 million to 66 million dollars), in fact the budget expenditure for agricultural support has been steadily increasing (table 9.3 and figure 9.3). Further, the composition of budget transfers to the agricultural sector shows a shift in the type of support away from horizontal measures toward more distortionary measures. Between 2000 and 2009 the share of market price support and input subsidies increased from 31 to 53 percent while those of investment aid (budgetary funds to support small farmers and investment subsidies granted under the investment code and intended for integrated projects) and those intended for general services actually decreased (support to research and extension, preservation of the natural environment by soil and forestation work, and the fight against certain diseases by vaccination and treatment campaigns) (table 9.3 and figure 9.1). This trend runs counter to the commitments made by Tunisia with regard to the WTO to move away from disruptive measures. These observations about the total cost and form of budget support to the agricultural sector highlight the need to phase out administered prices (guaranteed prices and input subsidies) and replace them with direct income

payments (which do not vary with international prices). This type of reform would be in line with the changes to the EU Common Agricultural Policy since the mid-1990s.

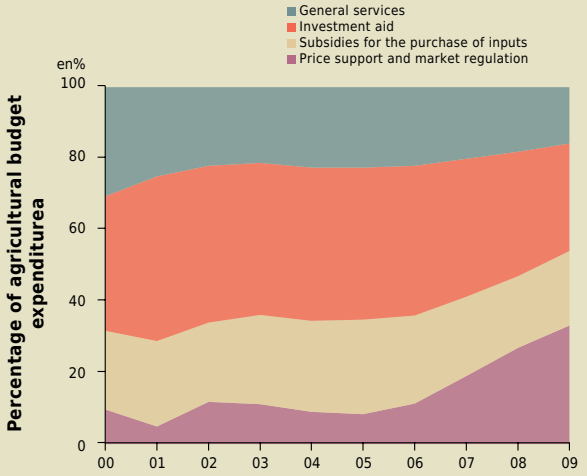
Table 9.3: Composition of Budget Transfers to the Agricultural Sector (in TND Million)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Price support and market regulation	20	10.4	27.3	25.2	20.7	19.5	26.4	49.8	79.9	116.7
Subsidies for the purchase of inputs	44.9	49.9	50.9	55.6	57.7	61.9	57.3	57.3	59.2	73.4
investment aid	77	96.1	101	94.6	97.8	99	97	100	103	105
General services	62.6	52.1	50.5	47.1	50.9	52.2	50.9	52	53.3	55.5
Total support	204.5	208.5	229.7	222.5	227.1	232.6	231.6	259.1	295.4	350.6

Source: WTO (Domestic support) and Ministry of Agriculture and Water Resources.

Consumer Costs: In addition to the budgetary costs, consumers also bear a significant financial cost as a result of the current agricultural policies. In fact, border protection raises farm gate prices and reduces consumer welfare. Consumers are forced to pay much higher prices compared to world market prices. These extra amounts particularly affect low-income people, who tend to spend a larger share of their income on food purchases. Using an economy-wide computable general equilibrium (CGE) model, the World Bank estimates that the net effect of trade protection of agricultural goods is equivalent to a loss of approximately four percent of consumer spending if the consumer purchases remain constant, and approximately 5.6 percent if consumers readjust their spending in response to changes in relative prices (table 9.4) (for a full discussion of the model and these results see World Bank 2006)[5].

Figure 9.3: Composition of Budget Transfers to the Agricultural Sector in Tunisia, 2000-2009



Source: WTO (Domestic support) and Ministry of Agriculture and Water Resources.

Cost of Food Subsidies: In addition to direct transfers to the agricultural sector, the state also supports agriculture by providing consumption subsidies for key food products. In 2009 the budgetary cost of food subsidies was approximately 1.5 percent of GDP, and this amount increased to over three percent of GDP in 2012 (table 9.3). This cost should be compared with the weight of agriculture in economic activity, which is relatively small at eight percent of GDP.

Efficiency Losses Borne by the Rest of the Economy: Using the CGE model of the Tunisian economy, the World Bank has estimated that the elimination of tariff barriers on agricultural products would increase GDP by approximately 0.8 percent (agriculture would shrink by 1.4 percent of GDP, but the rest of the economy would grow by 2.2 percent of GDP) and produce a total gain of approximately TND 7.1 billion over 25 years (table 9.4; World Bank 2006)[6]. However, the elimination of tariff barriers on agricultural goods would also cause a loss of approximately 87,000 jobs from agriculture that would have to be absorbed by other sectors. Half of the

benefits estimated by the simulations would be induced by the liberalization of arable crops, mainly cereals—which has a limited impact in terms of employment (nearly 9,000 jobs) since arable crops use little labor. In this respect, it is estimated that the annual cost of protecting employment in the cereals sector is four times the national per capita income. Therefore, the overall economic costs of protecting the agricultural sector are self-evident. The protection of agriculture encourages producers to keep more resources in agriculture and prevent them from being allocated to other sectors (industry and services), even though they could be used more productively in those other sectors[7]. While providing support to the agricultural sector could be the result of a legitimate choice of Tunisian society (for example, to ensure food security, protect farmers' incomes, and support economic activity in interior regions), it appears that these policies are not achieving their objectives.

Table 9.4: Effects on the Entire Economy of Opening Up Trade in Agricultural Goods

Variables and parameters	Baseline scenario	Full liberalization scenario	
		With EU agricultural subsidies	Without EU agricultural subsidies
Economic growth (% per year, in the years following liberalization)	5.7	6.5	6.2
Agricultural labor force (% of employed population)	20.2	17.4	18.3
Labor force transferred to other sectors (in thousand jobs)	-	87	67
Adjustment costs (million TND through 2025)	-	984	874
Gains of adjustment (million TND through 2025)	-	7107	4441

Source: CGE model simulations, World Bank (2006)

Efficiency Losses Borne by the Agricultural Sector, Mainly in the Interior Regions: The bias introduced by protection of selected agricultural products results in a reallocation of capital and labor toward those overprotected products at the expense of alternative products in which Tunisia's exports have a comparative advantage, thus introducing an anti-export bias. Agricultural liberalization can lead to significant gains in production for some farmers. Using a linear programming model (which takes into account farming methods and profitability by type of farm), the World Bank estimates that nearly 70 percent of farms would gain from the removal of price distortions in the agricultural sector (table 9.5). Further, the results of the linear programming model highlight that "winning" farms would be distributed in the driest central and southern zones, producing sheep, olives, fruit, and vegetables. The winning subsectors (mainly breeding, arboriculture, and horticulture), which are particularly tradable sectors, represent together about 60 percent of the agricultural labor force and are geographically dispersed—thus benefiting the interior regions of the country. The farms that would lose from liberalization are generally those that produce cereals in the better—watered north and northwest parts of the country.

Table 9.5: Winners and Losers from a Reform of Agricultural Policies in Tunisia

Farm	Change in gross margin	% of total farms	% of the arable area	Type of farm
Farms benefiting from the liberalization	Gain from 55 to 294%	41	30	Olive oil, Off season Horticulture (Gabes) Citrus (Nabeul)
Farms the profitability of which would be more or less the same	Gain of 47%	42	41	Arboriculture and sheep rearing (Central and South) Irrigated farms
Farms loosing from liberalization	Loss from 1 to 79%	16	30	Cereal farms (North and North West)

Source: Linear Programming modelling results, World Bank (2006)

Regressive Impact of the Interventions: Finally, contrary to popular belief, the agricultural policy does not promote small family farms but mostly benefits a few large land owners (producing wheat, milk, and beef), who are often the most prosperous. This is because most support is provided based on output and farm size. Hence, the distribution of the benefits from existing agricultural subsidies is highly inequitable. As such, contrary to commonly held beliefs in Tunisia, current agricultural policies also fail to fulfill a positive social role.

Finally, perhaps the greatest cost of current agricultural policies is that they distort attention away from the products in which Tunisia can be competitive. Existing policies are strongly targeted toward supporting continental products (that is, they are largely focused on supporting cereals, milk, and beef), implicitly discriminating against Mediterranean products. In addition, the current set of policies is focused on price-support mechanisms, marketing boards, and trade barriers, and as a result insufficient attention is given to addressing cross-cutting problems, especially those affecting Mediterranean crops in which Tunisia can be competitive. Agricultural producers who operate in *filieres* (sectors) that hold great promise (for example, dried fruit, olive oil, fruit, and vegetables), prevalently in interior regions, often receive little or no support from agricultural policies and have great difficulty in accessing financing, inputs, information, or advice on agronomic matters and in marketing and exporting their output (box 9.3). A better approach would be to focus government intervention toward horizontal policies that do not privilege one crop at the expense of another but that support farmers by improving access to financing and risk management, access to quality inputs, extension services, and the marketing of their products.

Box 9.3: Know-How, But No Support—Tunisian Farmers Struggle to Move Up the Value Chain

SOUK ESSEBT, Jendouba—Hassen Abidi crumbles a sickly-looking ear of wheat in his hand. He doesn't need an agronomist to tell him it's infected with a fungal blight known to local farmers as *septoria*. "I know more about growing things than any doctor knows about medicine. But I'm at my wit's end with all this," he says. "I sometimes wonder why I carry on planting." This year he and his associates had no cash for pesticides for the wheat, nor to repair the broken pump that is part of an ageing irrigation system. For their melons and tomatoes, they will have to bring water by truck from a cistern some distance away.

It is two years now since they rented these 37 acres (15 hectares) from other locals, under simple verbal agreements. At 1,000 dinars per hectare, they need to find 15,000 dinars (about 6,750 euros) annually for rent.

Their low-volume business is on the brink of failure. This year, tomato seedlings have been supplied on credit by a company producing tomato paste, which also lent planting machinery and will provide pesticides on credit for the tomatoes. But producers' margins leave little cash for other expenditures, says Abidi. Even the plastic to cover the melons has been a major expense.

Agricultural economists estimate that farmers like Abidi could gain from moving into higher-end products such as sun-dried tomatoes or certified organic vegetables, which have a high markup on European tables. For this, however, Abidi would need advice about the shifting tastes of European consumers. "We know about growing things. We're ready to work day and night. What we don't have is the support," he says.

Down in central Tunisia, 40 miles (65 km) inland from the port city of Sfax, Mohamed Messaoudi knows that the olives, seedless table grapes, and early peach varieties he produces are of a high quality. Part of his crop has already been certified as organic.

The olive oil he produces at his Italian-made press is sold in bulk either to the official Vegetable Oils Marketing Board (*Office National des Huiles*, ONH) or to an exporter in Sfax—whose range includes extra-virgin infused with lemon, basil, and garlic.

Messaoudi wants to add more of that value himself, out here in the fields. And he knows that, despite the recognized quality of its olive oil, Tunisia is still using only 20 percent of its quota of exports to the European Union. For more than a year he has been seeking a lender for the 600,000 dinars (270,000 euros) needed to set up a bottling and marketing operation that would allow him to export directly. Bank lending at affordable rates has not been forthcoming.

He also plans to invest in packaging his fruit and vegetables. "I have plenty of contacts, in Libya and Algeria. They are ready to take my produce but they need it properly packaged," he says. In the meantime, he spends evenings running his business from the Publinet public Internet café in Regueb. Even just a few kilometers out of town, Internet connections are too slow and sporadic to allow for effective work.

Source: Interviews with Hassen Abidi, near Souk Essebt (Jendouba region, northwest Tunisia), and with Mohamed Messaoudi, near Regueb (central Tunisia), April 2014.

9.3 / Distinguishing Between Food Security and Food Self-Sufficiency[8]

The distortions, costs, and inequality of the agricultural policies in Tunisia are often justified because of the need for Tunisia to ensure its food security. Food security is indeed an essential priority, which cannot be compromised. The 2007-2008 food price crisis has made governments across the world consider the food security of their countries and their vulnerability to the movements in grain markets.

However, food security does not require achieving food self-sufficiency. There exists an array of options to ensure the food security of Tunisians at a time of possible crisis (World Bank 2008d, World Bank, FAO and IFAD 2009; Syroka and Nucifora 2010; Wright and Cafiero 2011)[9]. Recognizing the unreliability of imports, vulnerable countries face various options: (i) pursuing self-sufficiency by growing domestic grain supplies; (ii) acquiring foreign land to ensure supplies for domestic consumption; (iii) reducing the trade-related risk through closer regional coordination and integration; and/or, (iv) investing in strategic reserves (physical and virtual). In deciding the best policies to adopt, each country must carefully consider the tradeoffs from different policy options[10].

Traditionally MENA countries have put food self-sufficiency at the center of their food security strategy. Looking ahead, Arab countries can take steps to further increase food production at home, even with the constraints imposed by the limited availability of water and land (World Bank, FAO and IFAD 2009). This approach would require improving agricultural productivity through investments in research and development. Improved technology would boost cereal yields, which are currently only half of the average yields worldwide. Better water management will also be critical in raising agricultural productivity.

Most MENA countries, however, have no comparative advantage in expanding cereals production, given restricted water supplies. Given the adverse agro-climatic conditions, however, ensuring food self-sufficiency may prove very expensive. Saudi Arabia has recognized the folly of producing grain at a cost five times the prevailing world price while depleting its scarce supply of fossil water and spreading salinity. Tunisia and other MENA countries around the Mediterranean have better agricultural potential. However, as discussed above, Tunisia's agricultural comparative advantage lies in Mediterranean products and not in the production of soft wheat. At the margin, it would be better to turn to larger stockpiles rather than to the expansion of grain production to ensure food security.

In practice, Tunisia (and other Arab countries) will continue to need to import much of their cereal consumption, even in cases when they produce some domestically. There is a complex balance of advantages and sacrifices involved in either importing less cereal, or having more agricultural export earnings with which to import[11]. The tradeoffs between these options need to be carefully evaluated when considering water policy that shapes production choice. This tradeoff is unique in each country, depending on its food needs and agricultural potential. So long as the necessary time series data on planted areas and yield is available, an optimization model can be used to evaluate the tradeoff (World Bank, 2007b).

The possibility of purchasing lands abroad to cultivate grains for domestic consumption entails inherent risks at a time of crisis. Investment in foreign land for grain production is unlikely to solve the problem of unreliability of access to imports in emergencies, manifest in the actions of many exporters to ban food exports during the recent food price spike. Acquisition of foreign lands leaves food supplies exposed to sovereign risk and other supply chain problems beyond importers' control.

Improving trade integration, particularly at the regional level, should be part of the overall strategy. A food security policy does not have to be developed at the national level. The food security policy

could be defined in a regional context in which strong trade partnerships are established which entail commitments to protect food security (FAO 2003). The Food and Agriculture Organization (FAO) study on North African food security recommends the joint management of the volatility of grain prices to improve supply to domestic markets and ensure stable and affordable prices. Key aspects of the project would entail: (a) the creation of a Maghreb observatory for cereals to ensure the smooth supply of markets; (b) piloting the establishment of a Maghreb strategic cereals reserve to better manage the volatility of international prices; and (c) the expansion of the trade in food commodities among Maghreb countries. (FAO Maghreb Program on management of volatility in international cereals market volatility). A similar approach could also be developed with the European Union.

Increasing grain reserves has figured prominently in international discussions as a security mechanism. Accumulation of stocks to be used in case of tight global markets may be a more efficient and much cheaper strategy than attempting grain self-sufficiency by expanding domestic grain production[12]. A national (or regional) food reserve is thus likely an essential element of a prudent national security policy for many MENA countries. The key question, then, is the size of the reserve. The answer must depend on such facts as the diversity of food supplies, dependability of traditional suppliers, and the cost of the program. Such stocks tie up capital for the substantial intervals between releases and can be expensive to maintain (stocks are "rolled over" with no net release, as required to maintain quality). Their efficient management also uses scarce human capital, and temptations for corruption can easily arise.

A "virtual grain reserve" also entails some risks, as it relies on the actions of the country which hosts the physical commodity and on the reliability of supply routes. Since Arab countries are likely to remain net cereal importers even with the successful implementation of these measures, financial instruments such as options and futures provide an attractive means for reducing exposure to market volatility by hedging risk. A virtual grain reserve refers to the possibility of having access to call on a stock of grain through the purchase of commodity futures and options trading. Futures contracts eliminate counterparty risk with respect to performance of the futures contract, including delivery at the designated delivery point. Most countries, however, do not view international futures markets as reliable substitutes for the local accumulation of stocks. This is easy to understand for landlocked countries that rely on the transport infrastructure of neighboring countries and are subject to foreclosure of crucial trade routes when they are most needed. More generally, governments have a perhaps unfounded concern that a futures market might be shut down or exports banned by the host country in a time of severe crisis, and a futures market therefore does not provide a secure alternative to having food already available in country. In practice, therefore, a virtual reserve is more likely to be useful as a complement to a physical reserve.

In sum, food security is not synonymous with self-sufficiency. There exists an array of options to ensure the food security of Tunisians at a time of possible crisis (World Bank 2008d, World Bank, FAO and IFAD 2009; Syroka and Nucifora 2010; Wright and Cafiero 2011)[13]. In light of the problems with agricultural policies discussed in this chapter, Tunisians should carefully consider possible alternative ways to ensure food security that are more cost-effective and do not undermine the development of their agricultural sector.

9.4 / Reforms Agenda: Unleashing the Potential of the Agricultural Sector

Tunisia holds great potential in the production of several Mediterranean agricultural products, notably durum wheat, olive oil, fruit, vegetables, and fisheries; but its agricultural policies are not conducive to realizing this potential. Current agricultural policies are focused on assuring food security, by pursuing

self-sufficiency in food production. This objective, however, comes at the expense of supporting the performance of the agricultural sector because it has focused production toward continental products that are core for food security (wheat, milk, and beef) but in which Tunisia is not competitive.

To unleash the potential of agriculture and enhance its competitiveness, a major reform of agricultural policies must be implemented. As discussed in the previous section, a prerequisite is to decide on a food security policy that does not undermine the agricultural sector. Once food security policy has been separated, the reform of the agricultural policy should follow five main parallel priorities: (a) progressively phase out price support and input subsidies and replace them with a system of direct support to incomes that creates less distortions; (b) gradually end direct state intervention in the marketing of agricultural products; (c) implement targeted social assistance programs to help the poor and vulnerable citizens directly (and not through agricultural support); (d) significantly invest in and improve the soft and hard infrastructure and services for the agricultural sector, notably by strengthening research and extensions, irrigation, land registry, financing, and transport infrastructure, which are essential to the growth of agriculture; and (e) simplify the procedures and improve the effectiveness of the public administration. We discuss each briefly below:

(a) Progressively shift away from price support and orient agricultural policy toward direct income support: The reform of the pricing policy involves reducing customs tariffs and government controls as well as the gradual elimination of the commercial role of state marketing boards. It is important to highlight that distortions cannot be corrected quickly in the agricultural sector. Unlike in the industrial sector for example where it is possible to change from one activity to another relatively quickly in response to international market data, in the agricultural sector the response time is longer and may require years to change activities. The first step would be to convert all quantitative restrictions into tariff equivalents and then to gradually reduce all customs duties (soft landing). Reducing guaranteed production prices (for cereals, sugar, and tobacco) and removing input subsidies would produce budgetary savings that could be reallocated to investment in rural infrastructure, thereby boosting private investment in rural areas. This reform should be accompanied by measures to help farmers adjust their production to the new systems of relative prices and compensate them against potential income losses due to price liberalization. The progressive phasing out of price support and input subsidies should be accompanied by a system of direct support for incomes based on a uniform area payment (which creates less distortion). The experience of other emerging countries (such as Mexico and Turkey) shows that this type of reform is feasible. In Tunisia, the establishment of such a mechanism of direct area-based support would first require strengthening of the institutional framework for property and land registration. As discussed above, this reform would bring economic gains to Tunisia that far outweigh the job losses. In fact, the agricultural sector is competitive in labor-intensive industries (notably, arboriculture, fruit and vegetables, and ovine).

(b) Gradually end direct state intervention in the marketing of agricultural products: To unleash the potential of agriculture, the state needs to play a different role in agricultural markets. The state should allow markets to freely establish prices and should refrain from direct intervention in the market, focusing instead on providing a regulatory framework and public goods to support the development of the sector. The experience of other countries suggests three main roles for the state: (a) design and implement a legal framework to ensure the efficient functioning of markets for goods, services, and factors of production (finance, land, labor); (b) protect people's health, natural resources, and the environment; and (c) provide essential public goods to encourage high-quality production through research, extension, pest control, and regulation of food safety. It would also be necessary to develop a strategic cereals reserve for food security purposes (with a combination of physical stocks and financial derivatives, to cover approximately three months of imports).

(c) Introduce social programs to alleviate the cost of adjustment: Move to separate agricultural policy from social policy, while ensuring that social policy is effective to protect all the poor and vulnerable (including, but not limited to, poor and vulnerable farmers). As discussed above,

current agricultural policies do not help small family farms and instead mainly benefit large farms (which are often the most prosperous). Nevertheless, it is estimated that the transition from a protected and distorted agriculture to a more competitive agriculture may entail the loss of 87,000 jobs from agriculture. While the reforms in non-agricultural sectors are expected to generate additional employment (in industry and service—see Chapter Seven and Chapter Eight), it may not be these same workers who find the new jobs. Social tensions may occur, and the less skilled workers and those who are not capable of coping with the adjustment will be the most affected. To make the transition successful, therefore, agricultural sector reform should proceed hand in hand with the introduction of stronger social protection programs to mitigate the cost of economic adjustment, and more generally to support the poor and vulnerable.

(d) Shift the support to strongly invest in and improve soft and hard infrastructure and horizontal services for agriculture: In order to boost agricultural growth there is a need to substantially improve the legal and institutional framework of inputs and outputs. Only a brief discussion is provided in this study because an in-depth discussion has been provided in previous World Bank reports (2006; 2009; 2012b). Similarly issues related to land markets and the land registry are discussed in detail in a recent report (World Bank 2014g). It is important to emphasize, however, that these government interventions need to be seriously strengthened and scaled up in order to enable the agricultural sector to fulfill its potential. The main aspects of soft infrastructure include:

- Redefining the role of professional agricultural associations (agricultural service cooperatives, collective interest groupings (GIC), agriculture development groupings, and so on) (World Bank 2006; 2009d);
- Focusing the work of the Ministry of Agriculture by revising programs and objectives toward the provision of public goods essential to encourage high-quality output (through research, extension, pest control, and regulation of food safety) (World Bank 2006; 2009d);
- Putting much more emphasis on research, extension, and training, which are the keys of agricultural development; as part of this effort there is a need to reform the management of research and extension by institutionalizing the involvement of farmers in directing research and the management of extension services as well as implementing budgeting by objectives (World Bank 2006; 2009d);
- Implementing an integrated water management system that can determine the least expensive means to better achieve the objectives of increasing water volume and water supply stability (for example, infrastructure investment vs. soil conservation, extension services, protection against water pollution, and so on) (World Bank 2006; 2009d);
- Facilitating the consolidation of land plots by simplifying the legal and regulatory framework, creating local one-stop shops for land transactions, and fostering the development of the land market (see Chapter Four; World Bank 2006);
- Simplifying and improving access to land (notably land which is held in public domain) and land registration process and cadaster. There is also a need to allow for longer-term land leases to facilitate large investments in agriculture (World Bank 2014g);
- Taking action to improve access to finance for the agricultural sector[14]. Access to finance is especially challenging for investments in arboriculture (olive oil and fruit), which entail several years between the initial investment and the start of the production phase. Specific reforms required to improve access to credit for farmers (such as completing the reform of the legal and institutional frameworks for microfinance) are discussed in detail in a

dedicated report on financing services for agriculture in Tunisia (World Bank 2012b);

- Establishing a framework to facilitate risk management in agriculture. For instance, promoting the development of weather-based insurance instruments can help farmers cope with the impact of drought in areas where there is no access to irrigation (World Bank 2006; 2009c; 2009d).

(e) Simplify the bureaucratic procedures and improve the performance of the public administration: The extensive system of intervention is supported by complex bureaucratic machinery. Farmers complain about the bureaucracy and lack of accountability of the public administration (box 9.4). There is a need to significantly reduce bureaucratic requirements in agriculture and to improve the efficiency, accountability, and transparency of the public administration. There are ongoing efforts to revitalize public administration in the agriculture sector. The Ministry of Agriculture is aware of the difficulties with the administrative machinery and is carrying out a reorganization of administration services. It has also taken seriously its part in the ongoing regulatory simplification reform launched by the government in 2012: out of 212 procedures identified, the ministry has proposed eliminating 61 (24 percent), and simplifying 109 (43 percent), and maintaining untouched only 42 (17 percent).

Box 9.4: A View from the Farm on the Problems with the Agricultural Sector and Priorities for State Intervention

"There are so many problems with agriculture in Tunisia. To start with, the state should distribute the state lands to those who can use them efficiently, and there should be much more transparency regarding the award process of these lands. These processes are very slow, often taking about two years, which seems wholly unnecessary.

More generally the lethargy of the administration frustrates farmers and constitutes a real barrier to agricultural investment, notably in matters related to water resources. And I don't even want to talk about the widespread corruption in the administration.

Then there is a strong need for research labs to develop local seeds and seedlings, as the imported ones are very expensive. In addition, imported seedlings often are not well adaptable to our climate. Today many farmers have local (Tunisian) seed varieties of excellent quality, but the Ministry of Agriculture does not grant the authorization to produce them. The *Coopérative Centrale de Semences et de Plantes* (CCSP) and the Office of State Lands have a monopoly on seeds and seedling production. The only seeds locally produced are for wheat and some other cereals.

There is also a need to encourage firms to invest in production of fertilizer compounds. We are one of the largest world producers and exporters of phosphates, and we import fertilizers! The Ministry of Industry should try to understand why this is happening. And also why are there no firms to produce phytosanitary products? The imported products are very expensive….

To boost the profitability of agricultural products, they should encourage basic transformation (for example,. drying) or local packaging (local sorting, packaging, storage). This will help to control the flow of products to the market and avoid the sale on the spot to intermediaries or to the wholesale market at rock-bottom prices. The wholesale operators do not know how to differentiate between the various high-quality varieties and impose a price cap on the best quality—but later they sell them at a much higher price to the fruit and vegetable retailers. My impression is that wholesale markets represent the biggest rip off for the farmer—there is no transparency!

Then there are the problems of the labor force and the mechanization, etc., etc. We could go on for a long time…."

Source: Interview with Tunisian agricultural investor, February 2014.

9.5 / Conclusions

Current agricultural policies pursue self-sufficiency in cereals production in order to ensure food security. Clearly food security cannot be put at risk: nevertheless, ensuring food security should not be synonymous with pursuing self-sufficiency in grains production. A prerequisite to agricultural policy reform is to put in place a food security policy that does not undermine the agricultural sector. In light of the problems with agricultural policies discussed in this chapter, it is reasonable to ask whether there are better ways to ensure food security, ways that do not undermine the development of the agricultural sector in Tunisia. Several options have been proposed that can help constitute a different food security policy that would not run against the development of the agricultural sector in Tunisia.

Current agricultural policies undermine growth and employment and exacerbate regional disparities. This chapter has shown that, while well intended, agricultural policies in Tunisia have repressed the agricultural sector by distorting production away from labor-intensive Mediterranean products in which Tunisia is competitive and toward continental products such as cereals, beef, and milk in which Tunisia is not competitive. While such a policy may make sense through the lens of a self-sufficiency drive to ensure food security, it runs counter to the development of the agricultural sector because it keeps agricultural production at a sub-optimal level and unable to realize its full potential.

Tunisia is not taking advantage of the existing opportunities to export agricultural products, notably to the EU. The EU does not subsidize its fruit and vegetable production as much as it does continental products. Although Tunisia has a comparative advantage in Mediterranean products, however, for most of these products Tunisia uses only a small fraction of its available export quotas to the EU. Instead of taking advantage of this export opportunity, Tunisia subsidizes products in which it does not have an advantage and which continue to be protected under the EU Common Agricultural Policy. Beyond the EU the potential to increase agricultural exports (in quantity and value), most notably of olive oil, remains unexploited.

Current agricultural policies are expensive and inequitable. In addition to budgetary costs borne by taxpayers, which amount to approximately one percent of GDP, there are also direct costs paid by consumers who have to pay higher prices for food products, estimated at four percent of consumption. Moreover, beyond budgetary and consumer costs, the agricultural interventions also distort production and trade, generating efficiency losses that are borne by the entire economy and that are estimated at approximately 0.8 percent of GDP. The result has been a net loss of welfare for the country, as well as the redistribution from consumers and taxpayers toward farmers in coastal areas. Further, contrary to commonly held beliefs in Tunisia, the distribution of the benefits from existing agricultural production subsidies is highly inequitable. In fact, benefits accrue mostly to a few large landowners (producing wheat, milk and beef) and do not benefit smallholders. As such, current agricultural policies also fail to fulfill a positive social role, which goes against commonly held beliefs in Tunisia.

Further, although well intended, current agricultural policies in Tunisia are inefficient and paradoxically contribute to increased unemployment and regional disparities. While Mediterranean products are labor intensive and better suited to interior regions of the country, continental products are land intensive and water intensive and are produced only along the coastal northern regions. Hence, paradoxically, agricultural policies contribute to shifting production away from labor-intensive products in which interior regions of Tunisia are competitive, thus increasing unemployment and regional disparities. The result of current policies has been a net loss of

welfare for the country, as well as the redistribution away from interior regions and toward coastal areas.

A major reform of agricultural policies away from distortive price support policies and toward strengthening horizontal interventions would help unleash the potential of agriculture and reduce regional disparities. It would be in Tunisia's interest to shift the support toward labor-intensive products and to help investment in arboriculture (fruit and olive oil) and in greenhouses. The state should gradually withdraw from intervention in the marketing of agricultural products. At the same time, agricultural policy reform should progressively phase out price support and input subsidies and replace them with horizontal measures that create less distortion. This would entail the adoption of strong measures to improve the soft and hard infrastructure and services for the agricultural sector, notably by strengthening research and extensions, irrigation, land registry, financing, and transport infrastructure, which are essential to the growth of agriculture. Tunisia also needs to simplify bureaucratic procedures and improve the performance of the public administration.

A move away from distortive agricultural policy, and to support agriculture instead with horizontal policies, would result in gains for almost 70 percent of farmers and benefit mainly the interior regions of the country. In fact, farmers benefiting from price liberalization are particularly those located in the driest central and southern zones producing sheep, olives, fruit, and vegetables. The "winning" subsectors (mainly ovine breeding, arboriculture, and horticulture) are tradable sectors, in which Tunisia could boost its exports without any subsidies; represent together about 60 percent of the agricultural labor force; and are geographically dispersed.

A system of direct income transfers could be introduced to mitigate the impact of the reform on existing beneficiaries. Beyond compensation transfers to current beneficiaries, there is a need to ensure well-functioning social protection programs targeted to the poor and vulnerable citizens directly (separate from agricultural support).

Notes

1. This chapter draws on previous World Bank reports on the Tunisian agricultural sector (World Bank 2006; 2009d). The chapter does not discuss issues related to management of water and natural resources use, even though these are clearly central to sustainable agriculture, because these have been discussed in separate World Bank studies (World Bank 2006; 2013c).

2. In 2007-2008 aggregate stocks of major grains declined to minimal feasible levels due to high global income growth and biofuel mandates. Given these minimal stocks, prices were very sensitive to shocks, such as the Australian drought, and biofuel demand boosts due to the oil price spike. The effects of these shocks were magnified by a sequence of trade restrictions by key exporters to protect vulnerable consumers. Beginning in the thin global rice market in the fall of 2007, these turned market anxiety into panic, which sent agricultural commodity prices skyrocketing during late 2007 to summer 2008. Prices have since dropped back by more than 50 percent but remain well above the average during the decade prior to the 2008 crisis (figure 9.1).

3. For example, the Cereals Marketing Board (the *Office des Céréales*) is responsible for controlling wheat purchases from producers and supply to mills. In addition to its domestic intervention, it has a monopoly on duty-free cereal imports (of durum wheat, soft wheat, barley, corn, and soybean meal). The *Office* sets the wheat purchase price paid to producers as well as the selling price to millers. The purchase price is usually higher than the selling price. The *Office* is able to fulfill this function because it receives the necessary subsidies to maintain the selling price below the purchase and import prices. This mechanism reduces the average price charged to processors. Hence, the intervention mechanism provides support both to producers (as the purchase price is higher than the import price) and to processors and thereby to consumers, because in fact all the margins along the value chain from the miller to the consumer are regulated by law. Generally, the administrative centralization of grain marketing is harmful in many ways: (a) it is expensive for the budget; (b) it does not target the poor because large farms benefit most from it; (c) it discourages the restructuring of the private sector; (d) it artificially promotes growing of non-competitive cereals at the expense of other crops; (e) it prevents the development of competitive markets; and (f) it often has a detrimental impact on the environment because it leads to an inefficient use of scarce water resources. In the milk sector, the producer price is fixed by agreement between the professions involved in the industry, under the auspices of the Organization of Milk Professionals (*Groupement Interprofessionnelle du Lait*).

4. Alternatively, when food consumer prices are subsidized, such as is the case for wheat, this will result in additional costs to the budget.

5. A CGE model is one of the most rigorous, cutting-edge quantitative methods to evaluate the impact of economic and policy shocks—particularly policy reforms-in the economy as a whole. CGE modeling reproduces-in the most possible realistic manner—the structure of the whole economy and therefore the nature of all existing economic transactions among diverse economic agents (productive sectors, households, and the government, among others). Therefore, CGE analysis, in comparison with other available techniques, captures a wider set of economic impacts derived from a shock or the implementation of a specific policy reform. Thus, it is possible to evaluate the implementation of a policy reform as well as the distributive effects within the economy at different levels of disaggregation. CGE analysis, on the other hand, presents several caveats. The first one relates to its significant data and time requirements. Collecting updated, high-quality, multiregional data; building Social Accounting Matrixes; and programming and calibrating a CGE model are very time-consuming processes and often require making assumptions and data imputation to accommodate gaps in the available data. A second caution should be made about the interpretation of results. Because of its complexity (ironically, in its complexity is also its strength), interpretation of results should be focused more on magnitudes, directions, and distributive patterns than on numeric outcomes themselves. In that sense, results from CGE models should be used as "road maps" for policy implementation, which should be complemented by additional analytical work using alternative quantitative methods. Third, while assumptions can be introduced to account for inertia and price-stickiness, most CGE models generally assume the perfect operation of markets. In practice, however, price transmission may be less than perfect across the various stages of the value chain, which will then impact the results in terms of growth, employment, and welfare effects.

6. GDP growth would increase by only 0.5 percent if the EU agricultural subsidies are lifted simultaneously with Tunisian liberalization. In fact, lifting subsidies on European products would increase the prices in international markets by about 10 percent, which will accordingly raise the food bills of Tunisian consumers.

7. It should be noted that the evaluation of welfare effects of agricultural trade liberalization in Tunisia does not take into account barriers to the level of market integration, which would result in imperfect vertical and horizontal price transmission. In other words the magnitude and speed with which price movements are transmitted along the various stages of the agro-food chain (from farm to processing and retail levels or vice versa) depend on the level of market integration, which may be weak especially in remote areas (see Chapter 10). This may hinder the realization of the full impacts, especially in remote areas, as price transmission assumptions along the supply chain play an important role in determining the size and distribution of welfare effects of trade policy reform.

8. This section draws on World Bank, FAO and IFAD (2009) and on Wright and Cafiero (2011).

9. The Food and Agriculture Organization (FAO) study on North African food security recommends the joint management of the volatility of grain prices to improve supply to domestic markets and ensure stable and affordable prices. Key aspects are: (a) the creation of a Maghreb observatory for cereals to ensure the smooth supply of markets; (b) piloting the establishment of a Maghreb strategic cereals reserve to better manage the volatility of international prices; and (c) the expansion of the trade in food commodities among Maghreb countries. (FAO Maghreb Program on management of volatility in international cereals market volatility)

10. In addition, Tunisia should seriously consider whether a policy that substantially subsidizes grain consumption, even for wealthy citizens, and discourages control of waste and diversification of calorie sources is worth its price in terms of budget expense and does not paradoxically increase Tunisia's vulnerability and dependence on foreign supplies.

11. Encouraging farmers to replace cereals with high-value crops has mixed implications for food security. The World Bank's 2008 World Development Report (2007b) argues that the top agricultural priority for the majority of Arab countries is to diversify production out of staples and into high-value crops (like fruits and vegetables) for export. High-value crop production gives landowners more entrepreneurial opportunities, creates more employment for women and landless workers, and raises agricultural wages. In countries that have a mix of rain-fed and irrigated agriculture, such as the Maghreb countries, the Mashreq, and Sudan, water pricing could create a natural split; cereal would be grown primarily under rain-fed conditions, and high-value crops under irrigation. This would increase dependence on imported cereals, but it would also generate more foreign exchange from high-value crop exports that would cover the cost of additional cereal imports. This would also be more profitable for farmers and leave them disposable income with which to buy staples. This is not to say that countries that depend entirely on irrigation should stop growing cereal where it is economically viable and sustainable (such as for instance in the Nile Basin of Egypt). In Gulf countries, where irrigation water is more limited, cereal production might be eliminated completely in favor of more efficient high-value crops.

12. Saudi Arabia has recognized that storing one or two years' supply in its dry desert climate, though incurring a substantial capital cost, might be a sustainable and far more economical use of its resources than its former production regime.

13. The Food and Agriculture Organization (FAO) study on North African food security recommends the joint management of the volatility of grain prices to improve supply to domestic markets and ensure stable and affordable prices. Key aspects are: (a) the creation of a Maghreb observatory for cereals to ensure the smooth supply of markets; (b) piloting the establishment of a Maghreb strategic cereals reserve to better manage the volatility of international prices; and (c) the expansion of the trade in food commodities among Maghreb countries. (FAO Maghreb Program on management of volatility in international cereals market volatility)

14. As of 2010, the portion of farmers benefitting from bank loans did not exceed seven percent, and bank financing accounted for just 11 percent of total agricultural investment. The share of investment funded by credit halved in the second half of the 2000s, and seasonal credit covers only one-fourteenth of agricultural input use. The share of farmers reporting that their credit demand was satisfied fell from 54 percent in 1990-94 to 36 percent in 2000-04. The share of farmers investing fell from 36 percent to 26 percent over the same period, limiting the ability of the sector to modernize and grow.

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