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The impact of direct subsidies on the development of the lemon growing sector in Azerbaijan

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Abstract

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As one of the citrus crops, lemon growing is among the comparative advantage sectors of the agricultural sector of Azerbaijan, particularly in the southeastern part of the Lankaran-Astara Economic Region. Agriculture plays an important role in the provision of food security, the livelihood of rural populations, the balanced development of the regions, and the diversification of the economy. In the frame of agricultural policy measures, agricultural producers have not been taxpayers since 1999 (excluding land tax) and have been provided direct and indirect subsidies.

In order to increase agricultural production in the country, various supporting mechanisms have been launched. Since 2019, subsidies have been differentiated by areas, and base amounts have been determined. At the same time, an electronic agricultural system has been created in order to increase transparency and efficiency with the state support of the agricultural sector (Hatamov, A. et al. 2022).

Forms of state support in the agricultural sector can be grouped as direct payments to farmers (according to the cultivated area, per animal, or means of production), price support (through market intervention), crop insurance, credit, marketing, irrigation water, etc. subsidies, export subsidies, as well as import quotas and tariffs, and non-tariff regulations (Fikratzade, F. 2020).

Contribution to innovative development in agriculture, as well as in the citrus growing sector through stimulus programs, including direct payments for intensive orchards, is at the center of the agricultural policy of the government.

The article examines the impact of direct subsidies on the development of the lemon-growing sector in Azerbaijan. The research was carried out in the frame of the "EU Support to Lankaran-Astara Economic Region of Azerbaijan Project," and the author is the national expert on the value chain assessment of the lemon growing sector in Lankaran district of Azerbaijan. The project aims to enhance the competitiveness and value-added of the fruit and vegetable sector of the Lankaran-Astara economic region, which also supports the elimination of the negative economic consequences of the COVID-19 pandemic through the establishment of a modern network of local economic and community cooperation hubs in the fruit and vegetable sub-sectors. (EU, 2021).

Keywords: Azerbaijan; agriculture; lemon growing; innovative; subsidy; intensive; yield
JEL classification: Q12

Introduction

Citrus is one of the most popular and widespread fruit crops, grown in more than 140 countries around the world. As citrus crop, lemon production worldwide reveals that the top 10 countries for this indicator include: India 3,548,000 tons, Mexico 2,983,802.19 tons, China 2,610,791.1 tons, Turkey 1,550,000 tons, Brazil 1,499.71 tons, Argentina

1,378,020.98 tons, the United States of America 801 950 tons, the Republic of South Africa 656 382 tons, Iran 478 971.78 tons (Atlas Big, 2023).

The basis of the development of citrus fruit growing in Azerbaijan, including the lemon plant, was laid in 1930, and since that year, the planned increase of its areas began, and the development of this area accelerated even more in the 70s and 80s. However, in the beginning of the 1990s, as in other fields of agriculture, there was a decline in the field of citrus fruit growing. Since 2009, further strengthening of state support for agricultural producers has led to the rapid expansion of citrus orchards (SPDCF, 2018).

According to the data of the State Statistics Committee of the Republic of Azerbaijan, 5527.1 tons of lemons produced 650.8 hectares of orchards in the country in 2022. In recent years, there has been an increase in production due to the increase in both the area and yield of lemon orchards. This, along with other agricultural policy measures of the state, plays an important role, especially the provision of subsidies for intensively planted lemon orchards (AZSTAT, 2023).

Despite the increase in lemon production in the country in recent years, Azerbaijan is considered one of the main importers of lemons (ARC, 2021). Based on the methodology of calculating the self-sufficiency level indicator of the State Statistics Committee of the Republic of Azerbaijan, according to the calculation, the level of self-sufficiency is approximately up to 30 %.

In 2022, 19,052.75 tons of lemons and limes worth 15,651.48 thousand US dollars were imported into the country, of which 16,368.78 tons came from Turkey, 2395.4 tons from the Republic of South Africa, 123.55 tons from Egypt, 121.53 tons from Vietnam, 31.14 tons from Argentina, 6.37 tons from Mexico, 1.06 tons from Colombia, and other countries. In addition, the analysis shows that citric acid, salts and complex esters of citric acid, and essential oils of lemon fruits worth 5580.2 thousand US dollars were imported in the mentioned year. The amount of the exported product was 2.08 tons, or 1.36 thousand US dollars, where the Russian Federation and Qatar were the importing countries.

Thus, the assessment of the impact of the existing subsidy mechanism on the development of the lemon growing sector, area, yield, total harvest, and self-sufficiency level is considered one of the important points of the current analyses (AZSTAT, 2023).

Materials and Methodology

The impact of direct subsidies is calculated based on the impact on orchard area ($\mathbf{S_a}$), impact on yield (**Sy**), and impact on harvest ($\mathbf{S_h}$).

1. The impact on orchards is calculated based on the following formula:

$$S_a = \frac{A_1 - A_0}{S_1 - S_0}$$

S_a – impact of direct subsidies on orchard area, ha
A_1 – area of orchards in a current year, ha
A_0 – area of orchards in a previous year, ha
S_1 – direct subsidies for 1 hectare of intensive orchards in a current year, manat
S_0 – direct subsidies for 1 hectare of intensive orchards in a previous year, manat

2. Impact on a yield:

$$S_y = \frac{Y_1 - Y_0}{S_1 - S_0}$$

Sy – impact of direct subsidies on a yield, kg
Y_1 – yield in a current year, kg/ha
Y_0 – yield in a previous year, kg/ha
S_1 – direct subsidies for 1 hectare of intensive orchards in a current year, manat
S_0 – direct subsidies for 1 hectare of intensive orchards in a previous year, manat

3. Impact on a harvest:

$$S_h = \frac{H_1 - H_0}{S_1 - S_0}$$

S_h – impact of direct subsidies on harvest
H_1 – harvest in a current year, ton
H_0 – harvest in a previous year, ton
S_1 – direct subsidies for 1 hectare of intensive orchards in a current year, manat
S_0 – direct subsidies for 1 hectare of intensive orchards in a previous year, manat

2020 and 2022 years are accepted for comparative analyses. As a baseline, 2020 is a launching year for direct subsidization of intensive orchards in the country.

Results with Discussions

Currently, the direct subsidization of the agricultural sector is one of the key elements of the agricultural policy of Azerbaijan. Subsidization rules are based on "Rule on subsidizing agricultural production" was approved by Decree No. 759 of the President of the Republic of Azer-

baijan dated June 27, 2019, and subsidization rates, amounts are decided by the Agrarian Subsidy Council and annually renewed. The classifications of direct payments are the following (ACDA, 2019):

- Planting subsidy: a part of the expenses spent on the purchase of agricultural production tools for the cultivation of agricultural plants in accordance with the intended purpose of those lands, conducting agrochemical analysis of the soil, the purchase and construction of modern irrigation systems and poles for perennial plantings on the lands under planting, and perennial crop subsidy for each hectare of cultivated area to compensate;
- Crop subsidy: a subsidy provided in addition to the planting subsidy for each ton of agricultural produce delivered to suppliers;
- Seed subsidy: subsidy provided for the sale of certified 1st and 2nd reproduction seeds and seedlings produced in the country;
- Animal subsidy: a subsidy provided for each healthy calf obtained through artificial insemination or embryo transfer for the purpose of improving the breed composition of local animals, increasing the number of animals with high productive genetic potential;
- Bee subsidy: subsidy given to each bee family (hive);
- Cocoon subsidy: subsidy given for each kilogram of fresh cocoons produced in the country and delivered to suppliers.

Direct payments for intensive orchard planting subsidies are applied based on the following calculation:

Base amount × output factor = output subsidy

Base amount: fixed financial means used in the calculation of subsidies (200 manat).

In order to provide innovative development in the agricultural sector of the national economy, taking into consideration the impact of subsidies on the application of good agricultural practices and new technologies is one of the main goals of agricultural policy.

When direct farm input subsidies are not accompanied by improved farm technology, the resulting shift in farm output supply will be nothing but parallel and likely to occur at net social cost (Bosch R.A., 1985).

Since 2020, direct subsidization of intensive orchards in the country has been carried out in a differential manner in Azerbaijan. According to regulation, intensive citrus fruit orchards are considered where at least 650 saplings are planted per hectare for lemon, kinkan, orange, mandarin, and feijoa plants provided with a drip irrigation system.

In 2020 and 2022 years, outpout factor for intensive lemon orchards increased by 54 coofficinet, with direct subsidies of 10,800 manats per hectare (Table 1).

One of the key elements of subsidization in agriculture in Azerbaijan is the specialization of the regions. Direct subsidy for lemon orchards is applicable for southeastern part-Astara, Lankaran, and Masalli districts. In 2022, in the country, 98.5 % of lemon produced by these districts, including Astara district 39.6 %, Lankaran district 57.3 % and Masallı district 1.6 %.

Subsidies have impacted the share of lemon orchard farmers, who are more interested in the fields that receive a significant amount of subsidies. However, overconcentration on a specific sector increases the risks of farming activity.

Farmers respond to the incentive of lower growing costs by replacing existing crops with the subsidized crops. Less diverse cropping systems and farm portfolios increase the probability of suffering from adverse consequences such as crop failure, blights, pests, frost, drought, and oversaturation (Chadwick O'Neal, 2017).

Even bank and nonbank institutions are more interested in financing diversified farmers than overconcentrated ones. In this context, ensuring income stability and reducing risks through the diversification of economic activity is considered one of the main priorities. In Azerbaijan, one of the aspects that characterize the comparative advantage of the lemon-growing farms is the expansion of multi-sector specialization. In other words, farms specialize in different fields, not specifically in lemon production, which is significantly important in terms of diversification of farm activity and risk reduction.

Table 1. Direct subsidization of intensive lemon orchards

Years / Indicators	2020	2021	2022	Difference in 2020 and 2022, +;-
Base amount, manat*	200	200	200	0
Output factor	4	3,65	58	+54
Subsidy per hectare, manat**	800	730	11600	+10800

* National currency, 1,7 manat=1,0 USD

** First 4 years since planting

Source: The table was developed by the author based on information of Agrarian Credit and Development Agency. http://akia.gov.az/en/content/255-256.html

Considering this point, the introduction of the subsidized insurance system through the Agricultural Insurance Fund plays a key role in reducing risks. According to Decision No. 479 dated December 17, 2019 of the Cabinet of Ministers, the agrarian insurance system initially covers 14 types of crops, including lemon. The insurance package includes hail, fire, earthquake, landslide, hurricane, storm, and actions of third parties. The subsidy paid from the state budget, 50% of the insurance premium (AIF, 2023).

It should be noted that climatic factors including frosts, droughts, heavy rains and hurricanes are major challenges facing lemon production and the industry. Production is largely dependent on climatic conditions which are often outside growers' control, although some initiatives can reduce the impact of weather, e.g. irrigation (Greenhalgh, P. 2021)

Agricultural subsidies stimulate additional production of government-favored commodities by raising incentives to use scarce land and farmer talent on some products rather than on others. Farm subsidy programs typically transfer income from consumers and taxpayers to farm operators, especially to owners of farmland and other resources used in farm production. The impacts of the subsidies depend on their form. (Sumner, Daniel A. 2023).

The impact of direct subsidies on the area, yield, and total harvest are shown in Table 2.

Based on the calculation, a 1000 manats change in direct subsidies caused 10,25 ha icrease of orchards in the country, 5.11 ha in Lankaran-Astara Economic Region, 3.51 ha in Astara district, 1.47 ha in Lankaran district, and 0.13 ha in Masalli district. Regarding yield, except Lankaran district, the indicator increased in all regions in the compared years. As a result of the area and yield of orchards, the harvest increased to 62.39 tons in the country, 59.95 tons in the Lankaran-Astara Economic Region, 49.94 tons in Astara district, 13.71 tons in Lankaran district, and 0.30 tons in Masalli district. As is seen, subsidies have more impact on the area of orchards than yield and harvest.

In the structure of the existing subsidization mechanism, area subsidy has a significant share compared to crop subsidy, which is provided in addition to the planting subsidy for each unit of production. The crop subsidy is only applicable to cotton, cocoon, tobacco, and sugar beet.

Although the evidence confirms that smart subsidies contribute to higher rates of technology adoption, the literature indicates that it has been difficult to quantify impacts on yields due to the dynamic and complex process that leads from the adoption of a technology to its sustainable and effective incorporation into the production system (Schling, M., Pazos N.,2022).

Conclusions with Recommendations

The role of direct and indirect subsidies in the development of the agricultural sector, including the lemon-growing sector, is indisputable. Providing intensive lemon orchard areas with a significant amount of direct subsidy has positively impacted both area and yield. However, along with area subsidies, crop subsidies have not been applied for most crops, including lemon, which is important to increase the intensification and yield of the production.

The structure of farming has been diversified, which leads to risk reduction and income generation. Meanwhile, providing direct subsidies for selected regions and crops stimulates specialization in lemon and other citrus production. Nevertheless, overconcentration increases risks and

Table 2. The impact of direct subsidies on the area, yield, and harvest of lemon

	Direct subsidy per hectare, manats		Area of orchards, ha		Yield, kg/ha		Harvest, ton		Impact on per 1000 manats of subsidy		
	S_0	S_1	A_0	A_1	Y_0	Y_1	H_0	H_1	Orchards, ha	Yield, kg/ha	Harvest, ton
	2020	2022	2020	2022	2020	2022	2020	2022	$S_a = \frac{A_1 - A_0}{S_1 - S_0}1000$	$S_y = \frac{Y_1 - Y_0}{S_1 - S_0}1000$	$S_h = \frac{H_1 - H_0}{S_1 - S_0}1000$
Country	800	11600	621.5	732.2	10840	11010	4940.5	5614.3	10.25	129.63	62.39
Lankaran-Astara ER	800	11600	595.6	650.8	11210	11730	4879.6	5527.1	5.11	48.15	59.95
– Astara district	800	11600	328.3	366.2	8510	9860	1728.4	2224.6	3.51	125.00	49.94
– Lankaran district	800	11600	251.8	267.7	14080	13920	3066.2	3214.3	1.47	-14.81	13.71
– Masallı district	800	11600	15.5	16.9	5990	6000	85.0	88.2	0.13	0.93	0.30

Source: Own calculation of the author

income fluctuations for farmers. Therefore, improving the rates of subsidies provided to other sectors besides lemon production will contribute to the diversification of farms.

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