



PROJECT

Transboundary water management adaptation in the Amudarya basin to climate change uncertainties

1.3. Collection and analysis of data (climate, water and land resources, HEPS operation regimes, etc.)

1.3.2. Agricultural product and energy prices in 2050

1.3.2a. Agricultural product prices (2010-2015)

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1. BASIC CONCEPTS

Research objective and tasks

Objective – collecting and analyzing price dynamics of the main agricultural products in the Amudarya basin.

Given that, the following **tasks** were set:

- Collect and process statistical information on prices of the main agricultural products for 2010-2015 in the Amudarya basin.
- Analyze price dynamics of the main agricultural products for 2010-2015 in the Amudarya basin.

Research objects

Research objects are the countries in the Amudarya River basin: Tajikistan (Districts of Republican Subordination, Gorno-Badakhshan Autonomous Region, and Khatlon province); Turkmenistan (Akhal, Mary, Lebap and Dashoguz provinces); Uzbekistan (Republic of Karakalpakstan, Khorezm, Bukhara, Navoiy, Kashkadarya and Surkhandarya provinces).

Research methodology

In the given research, the following **methods** were used: analysis and synthesis, statistical method, plotting time series, and comparative analysis.

2. PECULIARITIES OF AGRICULTURAL PRODUCTS PRICING IN THE AMUDARYA BASIN

The prices of agricultural products both in the Amudarya basin and all countries all over the world are formed on the markets taking into account the costs under the best conditions of production (weather and climate, technology, political situation, as well as the state's support of agricultural producers, support system of prices of products, stimulation of export, development of rural infrastructure, etc).

Factors determining prices of agricultural products include:

- *weather and climatic conditions*. They influence yield and supply of products on the market. Changes in these conditions may cause destabilization in a market. Both unfavorable weather conditions and good yield determine the volume of production and, hence, the supply and price of products. On the basis of indicators related to percentage of moisture, temperature during the growth, time of frost, growth conditions of specific crops in different parts of the country, changes in supply of products and the prices may be projected. Worsening of weather in winter, snowstorms and snowfall may block the road and make difficulties for product delivery to the market. This will influence the pricing;

- *natural disasters* (floods, droughts, frosts and animal diseases). For instance, there may be observed the peak of high prices of agricultural products due to frost in the middle of the year and droughts in the areas of crop production. In dry years, cattle-breeders try to reduce the number of stock due to high expenditures on fodder. This causes meat abundance and low prices in the short-term period;

- *dryness of the year*. In dry years, cropping pattern and crop production may be changed. Thus, there may be observed the increase in prices of some products. During these years, the areas under rice are steeply reduced. This results in decrease in rice production and steep increase in rice prices;

- *quality and differences in soil fertility* (bonitet score, groundwater table, salinity, etc.). Soil fertility among the regions and even some farms may significantly differ. That is why similar labor inputs in different areas give different financial results, in particular in terms of cost of products. This causes problems related to land rent and income regulation;

- *stocks of agricultural products* in the country. The volume of grain, cereal and oil-bearing crops and other primary goods (excluding meat and other products) that are not sold during the season of sales influences the stability of prices in short and long-term periods. Large volumes of left stocks potentially increase the future supply and result in low prices. Few stocks may result in restriction of supply and increase in prices;

- *seasonality of crop production*. This influences the prices on cash market. For instance, harvesting will result in decrease in prices at the end of the current year and beginning of the next year. At the same time, new technologies of production and storage of

products may balance the influence of this factor. Thus, widespread use of greenhouses for growing vegetables allows supplying products the whole year;

– *interchangeability and interconnection of agricultural products.* The competition in the sector allows changing one resource to another. For example, if the prices of forage (meal and husks) from cotton seeds increase, the cattle-breeders may replace them by wastes from corn flour (mixed fodder) as supplements to the forage. The decrease in prices of grain will result in decrease in cost and price of forage. This will cause the decrease in price of live stock and poultry products;

– *trade policy related to agricultural products* in the country. Almost all countries in the world control this economy sector to a greater or lesser extent. This, directly and/or indirectly, influences the prices. For example, the selling price of raw cotton and grain is regulated by the government in Uzbekistan. Various types of regulation related to agricultural market are applied at supranational level. Moreover, there exist international agreements, for instance, on coffee, cacao, etc., which stipulate market regulations in order to decrease or increase the prices;

– *change in the standard of living* in the country. According to the Engel's law, as income rises, the proportion of family income spent on food falls¹. The more money consumers have, the less they spend on food.

– *Other factors.* They may influence the demand, supply and prices both in the long and short-term periods. These factors may include global state of the market and competition, new technology in agricultural production, exchange rates, rates of interest, cost of transportation, etc.

¹ Savelyeva A.V. The place of food related problems in the modern global economy. Economics Journal of the Higher School of Economics. № 3 /Volume 17 / 2013 / Moscow. Page 534.

4. ANALYSIS OF PRICE DYNAMICS OF THE MAIN AGRICULTURAL PRODUCTS IN THE AMUDARYA BASIN

In the Amudarya basin, agricultural market is the market with free competition, excluding the market of raw cotton and grain in Uzbekistan and Turkmenistan. This free competitive market is represented by a great number of independent sellers, hence the prices are automatically set at the average level and individual sellers cannot change them.

There are many relatively small producers on the agricultural market in the Amudarya basin, so there are no economies of scale, which is characterized by the reduction in the cost of production and enhancement of competitiveness. So, there are no barriers to enter this market. Additionally, no patents on technology are required in the agricultural production; this also makes easier to enter the market.

Hence, agricultural market may be divided into three markets in the Amudarya basin:

- markets of *strategic products* (raw cotton and wheat);
- markets of *cash crops* (vegetables and cucurbits, fruits and grapes);
- markets of *feedstuff*.

As mentioned above, all prices of agricultural products are set according to the principles of free trade and competition, excluding the markets of strategic products in Uzbekistan and Turkmenistan and partly in Tajikistan.

4.1. Analysis of average prices of agricultural product in the Tajik part of the Amudarya basin ²

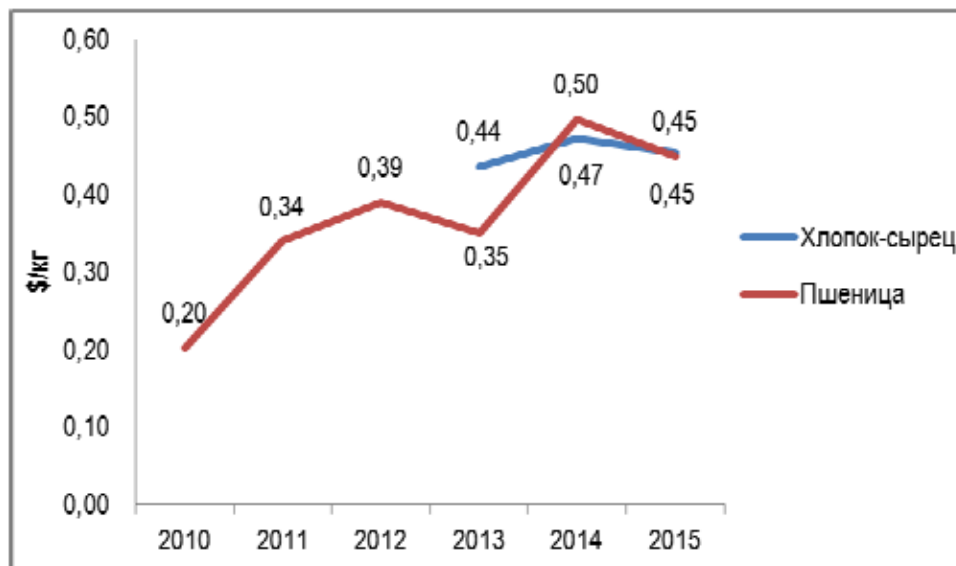
Based on the analysis for the period 2010-2015, the average prices of **strategic products** were unstable. So the average price of raw cotton varied from 0.44 to 0.45\$/kg. This is directly linked with the changes in global prices of cotton fiber. For the given period, the average prices of wheat stably increased from 0.20\$/kg in 2010 to 0.45\$/kg in 2015, i.e. 25% increase (Chart 4.1).

In particular, *the purchase price of raw cotton* is set as follows: Tajikistan Universal Goods Exchange registers contracts on internal and external purchase of cotton and prices are set at the minimal level on the basis of Index of Liverpool cotton market for Asia, including the prices of f.o.b. plant. As a rule, the loans are issued at rates lower than the bank rates. However, the access to resources is also restricted as they are not produced in the country, particularly to small farms³.

² Exchange rates were downloaded from the web-site of the National Bank of the Republic of Tajikistan: <http://www.nbt.tj/ru/kurs/kurs.php>.

³ Simon Ferrineu. 2014. Production and processing of organic cotton in Tajikistan: the assessment of the current situation and future potential. Geneva. Page 22.

Chart 4.1. Average prices of raw cotton and wheat in 2010-2015

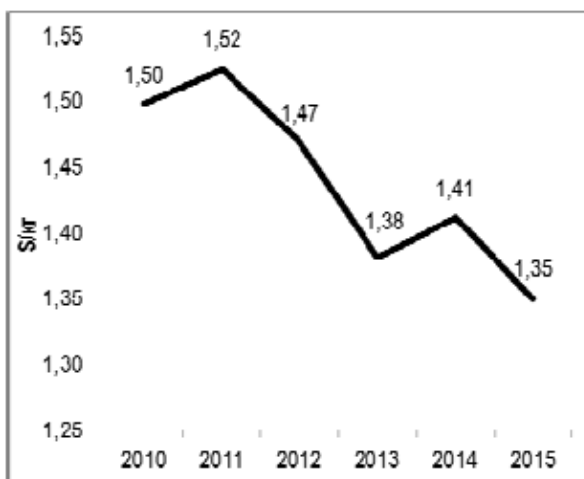


Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

While analyzing the prices on the markets of **cash crops and feedstuff**, the average prices of central markets in Rasht (Districts of Republican Subordination), Khrug (Gorno-Badakhshan Autonomous Region) and Kurgantyuube (Khatlon province) were used.

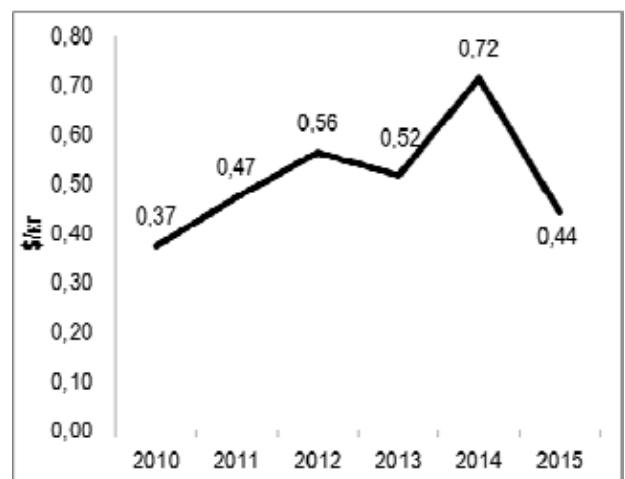
During the review period, the average price of *rice* decreased by 10% from 1.50 \$/kg in 2010 to 1.35\$/kg in 2015 (Chart 4.2).

Chart 4.2. Average prices of rice in 2010-2015



Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

Chart 4.3. Average prices of potato in 2010-2015

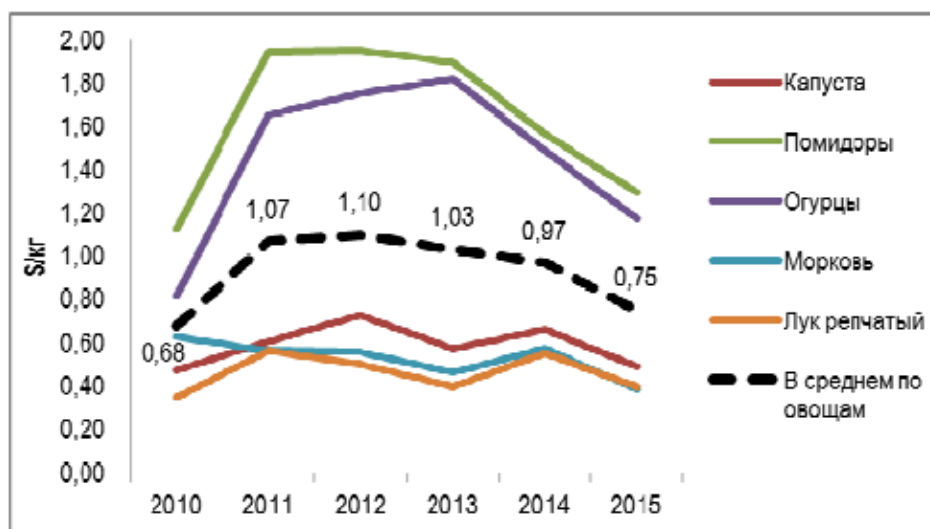


Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

The average price of *potato* significantly increased from 0.37 \$/kg in 2010 to 0.72\$/kg in 2014 but steeply decreased and amounted to 0.44\$/kg in 2015. However, the average price increased by 19% during the review period (Chart 4.3).

During the last 4 years (from 2011), the average prices of *vegetables* moderately decreased and varied from 0.68 to 1.10\$/kg in the Amudarya basin. The average prices of some vegetables (potato, onion, carrot and cabbage) were unstable. The average prices of tomato and cucumber significantly decreased as compared to that in 2011, i.e. this 30% decreased (Chart 4.4).

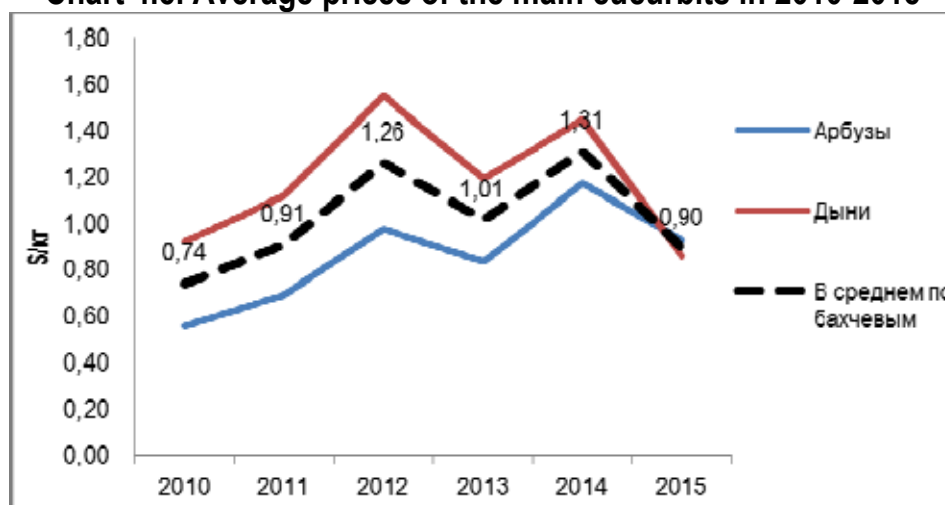
Chart 4.4. Average prices of major vegetables in 2010-2015



Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

In the Amudarya basin, the average prices of *cucurbits* steadily increased until 2012 and after that they were unstable. During the review period, the prices varied from 0.74 to 1.31 \$/kg. However, in 2015 the rise of average prices of cucurbits achieved 20% as compared to that in 2010 (Chart 4.5).

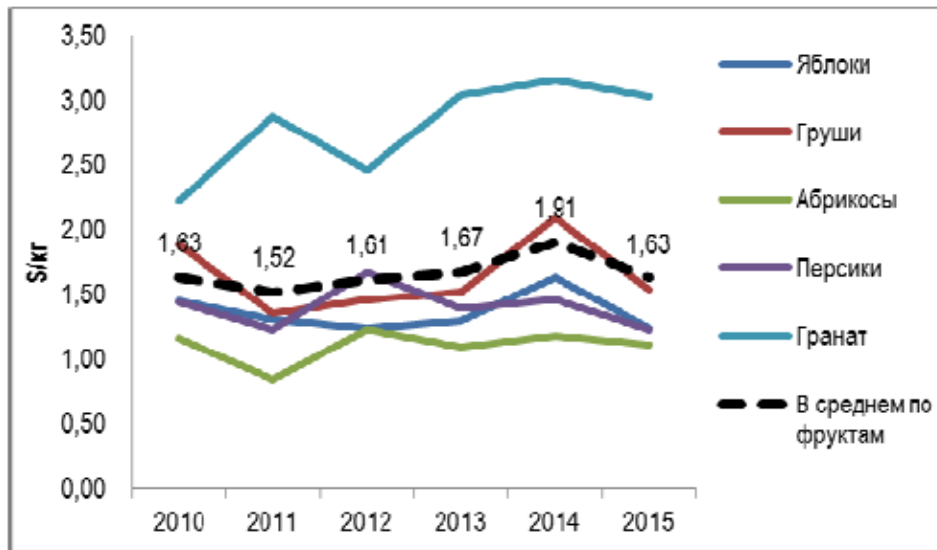
Chart 4.5. Average prices of the main cucurbits in 2010-2015



Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

During the review period, the average prices of *fruits* varied from 1.61 to 1.91\$/kg. There observed a decrease in prices of fruits but of pomegranate (37% increased) (Chart 4.6).

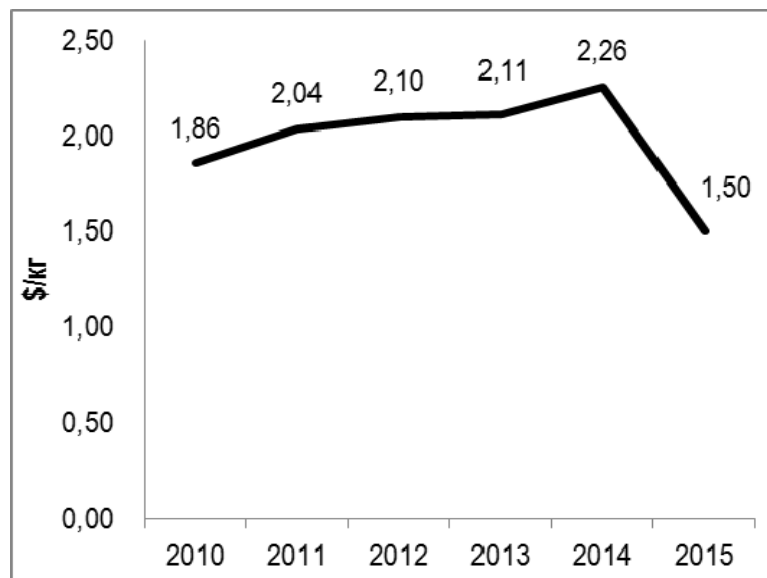
Chart 4.6. Average prices of the main fruits in 2010-2015



Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

In 2010-2014, the average prices of grapes steadily increased but sharply decreased in 2015 and amounted to 1.50\$/kg (Chart 4.7).

Chart 4.7. Average prices of grapes in 2010-2015



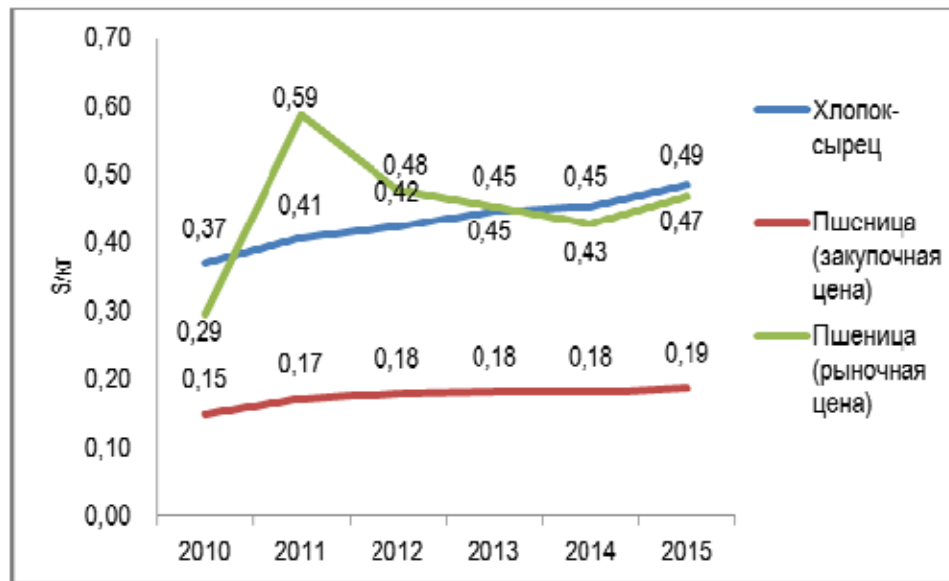
Source: Author's estimations based on the materials from the web-site www.agroinform.tj.

In the Amudarya basin, the average prices of *feedstuff* amounted to 0.90\$/kg in 2014 and 0.53\$/kg in 2015, i.e. 41% decreased (Annex 1).

4.2. Analysis of the average prices of agricultural products in the Uzbek part of the Amudarya basin⁴

In 2010-2015, the purchase prices of **strategic products** have steadily increased, particularly, the prices of raw cotton. Thus, the average purchase price of raw cotton increased from 0.37\$/kg in 2010 to 0.49\$/kg in 2015, i.e. 31.2% increased. However, the average prices of strategic products are much lower than those of the cash crops. Moreover, the difference between the purchase and market prices of wheat is high (Chart 4.8).

Chart 4.8. Purchase prices of raw cotton and wheat in 2010-2015



Source: Author's estimation based on the materials of the Ministry of Agriculture and Water Resources of RUz

The purchase prices of raw cotton are set by the Ministry of Finance of the Republic of Uzbekistan not later than 15 days before harvesting, taking into account the average prices of cotton fiber projected on the world market by harvesting and the projected exchange rates of the Central Bank⁵. In case of a positive difference between the internal price (including selling costs) and actual price of cotton selling on the external market, this difference is transferred to the special account of the Agricultural Products Settlement Fund at the Ministry of Finance of the Republic of Uzbekistan for accumulation of money and further transfer to farms⁶.

⁴ Exchange rates were downloaded from the web-site of the Central Bank of RUz: <http://cbu.uz/uzc/arkhiv-kursov-valyut/>.

⁵ The Decree of the Ministry of Finance №81 of 31.08.2007, the Ministry of Economy №32, the Ministry of Agriculture and Water Resources №163, the Ministry of Foreign Economic Relations, Investments and Trade №EG-01/22-4209 and the Association "Uzpakhtasanoat" № 01/1829 "On approval of the Regulations on formation of purchase prices of raw cotton and wholesale prices of cotton fiber" (registered by the Ministry of Justice of the Republic of Uzbekistan, 03.09.2007 №1711).

⁶ The Decree of the Cabinet of Ministers of the Republic of Uzbekistan №30 of 04.02.2011 "On the order of accumulation and use by farms of the part of funds received as a result of the positive difference between internal and actual sale price of cotton fiber".

The purchase prices of grain grown to meet the state needs on the basis of contractual agreements with grain farms are set annually by the Cabinet of Ministers of the Republic of Uzbekistan taking into account the current price of grain on the world and regional markets⁷.

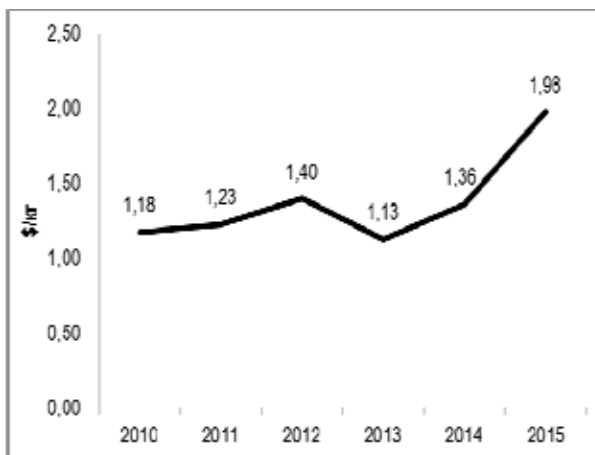
When the wholesale and selling prices of grain change, the prices of grain of the state reserve change accordingly to the level of new wholesale and selling prices. The increased amount is considered as the funds of the state budget and used for financing of costs of grain storage as the state reserve⁸.

The market prices of grain are determined through market mechanisms that are based on demand and supply on the food market.

The analysis of **cash crops and feedstuff** is based on the average prices of the central market of the relevant province in Uzbekistan.

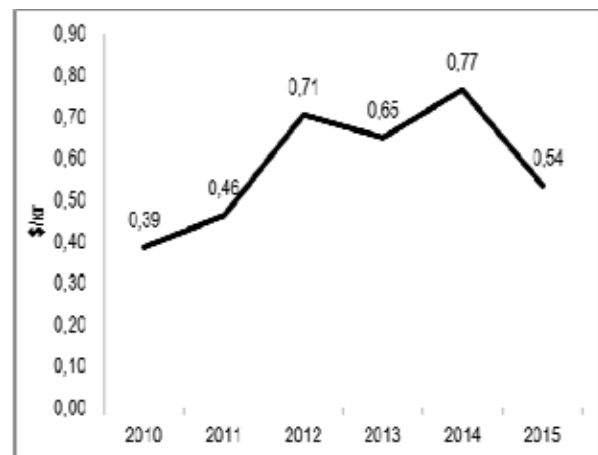
In 2010-2013, the average price of rice varied from 1.13 to 1.18\$/kg, but it significantly increased within the last three years. During the review period, the average price of rice increased by 68% (Chart 4.9).

Chart 4.9. Average prices of rice in 2010-2015



Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

Chart 4.10. Average prices of potato in 2010-2015



Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

During the review period, the changes in average prices of potato were unstable. Thus, the average price increased by 38.5% from 0.39\$/kg in 2010 to 0.54\$/kg in 2015 (Chart 4.10).

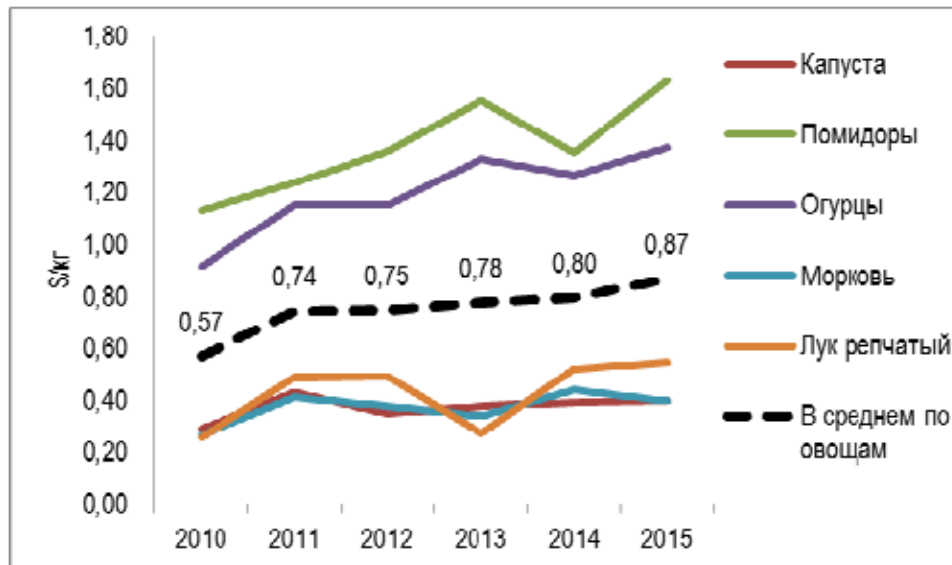
During the review period, the average prices of vegetables steadily increased from 0.57\$/kg to 0.87\$/kg in the Amudarya basin. Moreover, the average prices of some vegetables (tomato and cucumber) and stable growth remain high. Thus, the growth in 2010 was 44%,

⁷ The Decree of the President of the Republic of Uzbekistan №PD-867 of 15.05.2008 "On purchase prices of grain and cereal crops.

⁸ The Decree of the Ministry of Finance №83 of 10.09.2007, the Ministry of Economy № 28 and the State Tax Committee № 2007-51 "On approval of the Regulations on control over variations in prices of grain" (registered by the Ministry of Justice of the Republic of Uzbekistan № 1729 of 20.10.2007).

whereas in 2015 it was 50%. In 2010-2015, the average price of onion increased 2.1 times (Chart 4.11).

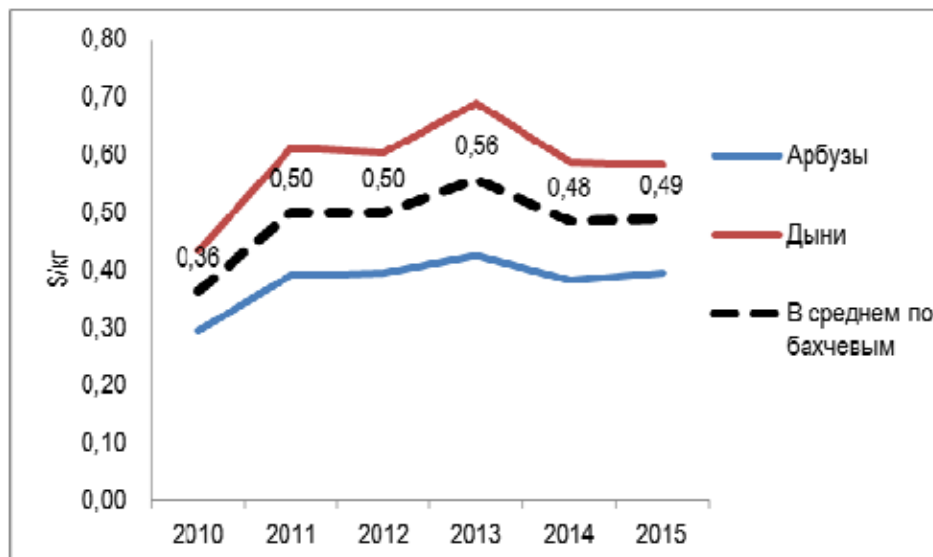
Chart 4.11. Average prices of major vegetables in 2010-2015



Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

During the review period, the average prices of *cucurbits* were unstable and varied from 0.36\$/kg to 0.56\$/kg in the Amudarya Basin. The average price increased by 34.5% (Chart 4.12).

Chart 4.12. Average prices of the main cucurbits in 2010-2015

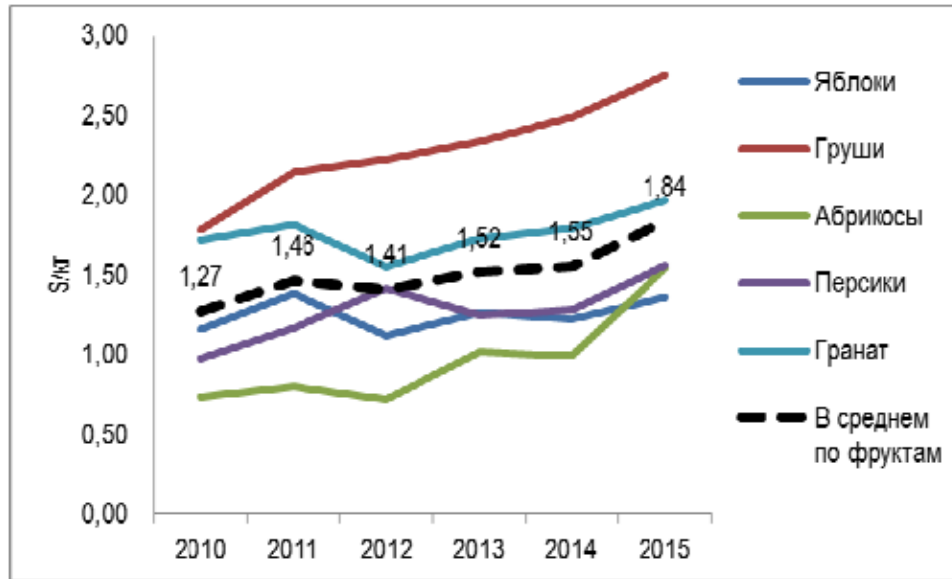


Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

During the review period, the average prices of fruits steadily increased. The increase in prices of some fruits was as follows: apricots –2.1 times (from 0.74\$/kg in 2010 to 1.54\$/kg

in 2015), peaches –1.6 times (from 0.97 \$/kg to 1.56 \$/kg) and pears –1.5 times (from 1.79 \$/kg to 2.76 \$/kg) (chart 4.13).

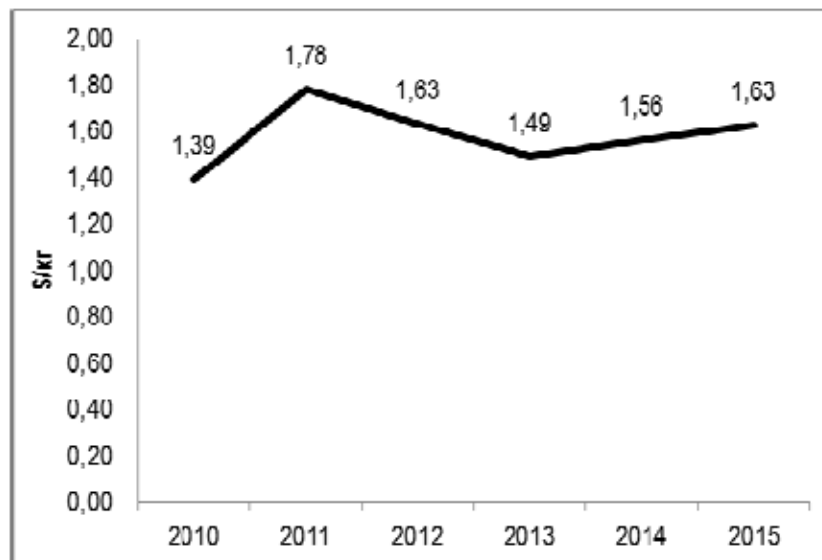
Chart 4.13. Average prices of the main fruits in 2010-2015



Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

During 2010-2014, the prices of grapes were unstable. They increased by 17% and amounted to 1.63\$/kg (Chart 4.14).

Chart 4.14. Average prices of grapes in 2010-2015



Source: Author's estimations based on the materials of the State Committee on Statistics of RUz

During the review period, the average prices of feedstuff were unstable and varied from 0.17\$/kg to 0.32\$/kg in the Amudarya basin. In addition, the average price increased 1.6 times (Annex 2).

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8. Statistical information of the State Committee of the Republic of Uzbekistan for 2010-2015.
9. The web-site: www.agroinform.tj.
10. The web-site of the Central Bank of RUz: <http://cbu.uz/uzc/arkhiv-kurov-valyut/>.
11. The website of the National Bank of Tajikistan: <http://www.nbt.tj/ru/kurs/kurs.php>.

ANNEXES

Annex 1

Average prices of agricultural products in the Tajik part of the Amudarya basin, \$/kg

	2010	2011	2012	2013	2014	2015
Raw cotton	n/a	n/a	n/a	0.44	0.47	0.45
Wheat	0.20	0.34	0.39	0.35	0.50	0.45
Rice	1.50	1.52	1.47	1.38	1.41	1.35
Potato	0.37	0.47	0.56	0.52	0.72	0.44
Cabbage	0.48	0.61	0.73	0.57	0.66	0.49
Tomato	1.13	1.95	1.95	1.90	1.57	1.30
Cucumbers	0.82	1.66	1.75	1.82	1.49	1.18
Carrot	0.63	0.56	0.56	0.47	0.58	0.39
Onion	0.35	0.56	0.50	0.40	0.55	0.40
Average for vegetables	0.68	1.07	1.10	1.03	0.97	0.75
Water melon	0.56	0.69	0.98	0.83	1.17	0.93
Melon	0.92	1.12	1.55	1.19	1.45	0.86
Average for cucurbits	0.74	0.91	1.26	1.01	1.31	0.90
Apple	1.45	1.30	1.24	1.29	1.63	1.23
Pear	1.88	1.35	1.46	1.52	2.10	1.54
Apricot	1.17	0.84	1.23	1.09	1.18	1.11
Peach	1.44	1.23	1.67	1.39	1.46	1.23
Pomegranate	2.22	2.88	2.46	3.05	3.16	3.03
Average for fruits	1.63	1.52	1.61	1.67	1.91	1.63
Grape	1.86	2.04	2.10	2.11	2.26	1.50
Feedstuff (pressed form)	n/a	n/a	n/a	n/a	0.90	0.53

Annex 2

Average prices of agricultural products in the Uzbek part of the Amudarya River basin, \$/kg

	2010	2011	2012	2013	2014	2015
Raw cotton	0.37	0.41	0.42	0.45	0.45	0.49
Wheat (purchase price)	0.15	0.17	0.18	0.18	0.18	0.19
Wheat (market price)	0.29	0.59	0.48	0.45	0.43	0.47
Rice	1.18	1.23	1.40	1.13	1.36	1.98
Potato	0.39	0.46	0.71	0.65	0.77	0.54
Cabbage	0.29	0.43	0.35	0.38	0.39	0.40
Tomato	1.13	1.24	1.36	1.55	1.35	1.63
Cucumber	0.92	1.15	1.15	1.33	1.27	1.37
Carrot	0.27	0.41	0.38	0.34	0.44	0.40
Onion	0.26	0.49	0.49	0.27	0.52	0.55
Average for vegetables	0.57	0.74	0.75	0.78	0.80	0.87
Water melons	0.29	0.39	0.39	0.42	0.38	0.40
Melon	0.43	0.61	0.60	0.69	0.59	0.58
Average for cucurbits	0.36	0.50	0.50	0.56	0.48	0.49
Apple	1.16	1.38	1.12	1.26	1.22	1.36
Pear	1.79	2.14	2.23	2.34	2.49	2.76
Apricot	0.74	0.80	0.72	1.01	0.99	1.54
Peach	0.97	1.17	1.42	1.24	1.28	1.56
Pomegranate	1.72	1.82	1.55	1.73	1.79	1.96
Average for fruits	1.27	1.46	1.41	1.52	1.55	1.84
Grape	1.39	1.78	1.63	1.49	1.56	1.63
Feedstuff (pressed form)	0.17	0.28	0.32	0.27	0.26	0.28