AGRICULTURE, LIVESTOCK, FISHERY
AND ENVIRONMENT STATISTICS DIVISION
Agricultural Input-Output and Indices Section

INFORMATION NOTE

on the revision of Cost Indices for the Factors of Agricultural – Livestock Production

Base year 2015 = 100.0

Piraeus, July 2020

General notes

The compilation of the cost indices for the factors of agricultural and livestock production started in 1975 with base year 1976=100.0. The overall cost index for the factors of the production, is subdivided into the following groups and subgroups:

1. Labour (agricultural wages)
2. Land (land rents)
3. Capital (capital charges)
   a) Loans interest
   b) Machinery rents

Compiled indices - Weighting coefficients

The overall cost index for the factors of agricultural and livestock production calculated as a weighted average of the three categories of the indices for the factors of production.

The categories of the indices for the factors of production are the following:

a) Labour remuneration index (Labour)
b) Rent remuneration index of utilized land (Land)
c) Capital remuneration index (Capital)

The annual weighting coefficients have been calculated on the basis of the expenditures of National Accounts in Agriculture (EAA) for the year 2015, taking into account the available 2016 Farm Structure Survey (FSS) data, for each category of individual indicators.

Purpose of the indices - Base period - Sources of data collection

The purpose of the cost indices for the factors of the agricultural and livestock production is to measure the changes in the prices paid by producers for the agricultural wages (Labour), for the land rents (Land) and for the capital remuneration (Capital), which are the machinery rents and the loans interest, necessary for the productive function of the agricultural and livestock holding.

The Cost indices for the factors of agricultural and livestock production are annual indices and covers the whole of the country. Thus, the reference area of the data is Greece Total.

These indices are fixed base year indices and are updated every five (5) years in years ending in 0 or 5. The most recent revision is with base year 2015=100.0, with year 2019 as first reference year.

The price data for the cost indices for the factors of agricultural and livestock production are collected for the agricultural wages (Labour), land rents (Land) and machinery rents from Municipal / local

communities. For the capital remuneration (Capital), as the loans interest, data are collected from Piraeus Bank (previous Agricultural Bank).

The methodology for the compilation of the cost indices for the factors of production is outlined in detail in the following paragraphs. The data entry, editing and calculation of the indices is done via the integrated information system (IIS).

1. Labour

A representative sample of wages in agriculture is the wage of seasonal workers, since the number of permanent workers in agriculture is very limited (according to the census of agriculture-livestock in year 2009 and agricultural structure surveys and holdings). The type of seasonal work and, consequently, the corresponding remuneration depend on the type of crops and the period of the year when this job is offered. Furthermore, the wages of seasonal workers vary from geographical area to geographical area (since moving of seasonal workers is not easy) but without significant changes. Note, that depending on the type of the crops, or depending on the geographical area, seasonal workers may work and be paid on a piece rate or on an hourly basis. In several cases, beside their wages, seasonal workers are also provided with and food or housing, while in others only the wage.

Finally, wages paid to men seasonal workers differ from wages paid to female workers (men usually offer more specialized services). Therefore, for the main crops employing seasonal workers, selected representative areas cultivated the specific kinds (according to the size of areas cultivated per specific kind-product, with data from the census of agriculture-livestock in year 2009 and the Farm Structure Survey in year 2016). Besides, after suggestions of experts-agriculturists, the time periods of seasonal work were chosen e.g., for apple trees crops, the periods for seasonal works are: a) February (pruning), b) May-June (spraying), c) September-October (harvesting). The main crops in specific kinds, where seasonal workers are employed, are: cotton, tobacco, vegetables, citrus fruits, olives, vines and other trees, while, main types of work where prices are recorded, are: ploughing, milling, planting, spraying, carving, collecting, loading-unloading, etc.

For each geographical area and for each crop, a detailed description of the type of employment was done, such the gender of the seasonal worker, the method of payment as described above, so that the collected data be comparable over time.

Two agricultural wage indices are compiled. The agricultural wage index for men and the agricultural wage index for women. The overall wages index is the weighted mean of the above individual indices (according to the year 2016 FSS data):

$$H = \sum_{s=1}^{2} H_s * W_s$$

H the overall wage index and W_s is the weighted coefficient per gender $s, s = 1,2$.

The wage index by gender, H_s , is calculated according to the formula:

$$H_s = \frac{1}{n}\sum\left[\frac{1}{m}\sum\left(\frac{1}{g}\sum\frac{T_{sijk}^{(1)}}{T_{sijk}^{(0)}}\right)\right]$$

Where, the index H_s , is calculated as the simple arithmetic mean of the wage indices for each crop kinds i , $i = 1,2,...,n$, ($n \le 9$):

$$H_s = \frac{1}{n}\sum_{i=1}^{n} H_{si}$$

The wage index by crop is calculated as simple arithmetic mean of the individual wage indices by specialty j , $j = 1,2,...,m$,($m \le 12$):

$$H_{si} = \frac{1}{m}\sum_{j=1}^{m} H_{sij}$$

The wage index by speciality is calculated as simple arithmetic mean of the individual indices by geographical area (local communities) k, $k = 1,2,...,g$:

$$H_{sij} = \frac{1}{g}\sum_{k=1}^{g}\frac{T_{sijk}^{(1)}}{T_{sijk}^{(0)}}$$

Where, $T_{sijk}^{(1)}$ and $T_{sijk}^{(0)}$ are the average wages for the current period *(1)*, for the base period *(0)* for the specific gender *s,* crop kind *i*, specialty *j* and geographic area *k* .

2. **Land**

The most representative prices for the remuneration of land are the rents paid for utilize land by farmers. Since the rents of the farms depend on the type of the crops and the geographical area, a representative sample of farms were chosen for the main crops from various different geographical areas of the country. The main crops in specific types are: wheat, maize, cotton, sugar beets, potatoes, alfalfa, rice, tobacco and vegetables. The Land cost Index is the weighted mean of the land rents indices per crop, according to the percentage of leased area cultivated in the FSS year 2016.

The Rent index of utilized land (Land cost Index) is calculated by the formula:

$$L = \sum_{i=1}^{n} L_i W_i$$

Where, L_i is the land rents index by crop and W_i is the weighted coefficient for each crop i ,$i = 1,2,...,n$ ($n \le 10$).

More specifically, the land rents Index Γ is calculated by the formula:

$$L = \sum_{i=1}^{n} \left(\frac{1}{g} \sum_{k=1}^{g} \frac{Y_{ik}^{(1)}}{Y_{ik}^{(0)}} \right) * W_i$$

According to this formula, the land rents index for the crop L_i is calculated as the simple arithmetic mean of the indices of the average land rents for the geographical areas (local communities) k, $k = 1,2,...,g$:

$$L_i = \frac{1}{g} \sum_{k=1}^{g} \frac{Y_{ik}^{(1)}}{Y_{ik}^{(0)}}$$

Where, $Y_{ik}^{(1)}$ και $Y_{ik}^{(0)}$ are respectively the land rents for the current period *(1),* for the base period *(0),* for a specific crop *i* and geographical area *k* .

3. Capital

a. Interest

The remuneration of the factor “Capital” is the loans interest. The funds loaned to farmers are usually used either for the means of agricultural production (short-term loans), or for the fixed capital formation (long-term loans). As a consequence, the interest paid depend on the interest rates on the expenditures pertaining to the purchase of the means of agricultural production, of goods and services which contribute to investment in agriculture (fixed capital formation).

If we assume that $E_A^{(0)}$ is the interest rate of short-term loans for the base period *(0)* and $E_A^{(1)}$ for the period *(1),* and $I^{(0)}$, $I^{(1)}$, are the corresponding Price Indices of the means of agricultural-livestock production, $E_B^{(0)}$is the rate interest of long-term loans for the base period *(0)* and $E_B^{(1)}$ for the period *(1),* and $\Delta^{(0)}$, $\Delta^{(1)}$, are the corresponding Price Indices of fixed capital formation, then the index of loans interest *T* is:

$$T = \frac{E_A^{(1)} I^{(1)}}{E_A^{(0)} I^{(0)}} W_1 + \frac{E_B^{(1)} \Delta^{(1)}}{E_B^{(0)} \Delta^{(0)}} W_2$$

Where, $W_{1,2}$ are the weights or else the ratio, of short-term loans and long-term loans.

At the initial compilation of the indices with base year 1976 = 100.0, in the factor Capital, only data for renting machinery was used, while from 1980=100.0 revision onwards, the index of loans interest is compiled, so, the capital remuneration index derived from the composition of the indices of loans interest and renting machinery.

b. Machinery

A number of producers are hiring agricultural machinery either from other producers either from machinery rental companies. The rent for using the machinery rental represents:

1. The interest on the capital,
2. The depreciation,
3. The profit of the entrepreneur.

For the compilation of the rent index, the machinery used by type of crops was selected, and then, from the most representative geographical areas the machinery rental data are collected. Main crops in specific kinds where rented agricultural machinery are used, are: wheat, maize, cotton, sugar beet, alfalfa, rice, potatoes, vegetables, tobacco, citrus, while, main types of work where rented machinery are used and prices are recorded, are: soil preparation (plowing, harrow, cultivator), seeding, fertilizing, spraying, carving, cutting, harvesting, export and transportation, collection, baling, etc. The compiled machinery rent index is the weighted average of rent index by type and crop, according to the rental value of machinery per type and cultivation, with data calculated from technical and economic indicators and the size of cultivated areas in the FSS year 2016.

The rent index *K* is calculated by the formula:

$$K = \sum_{i=1}^{n} C_i \Pi_i$$

Where, C_i the rent index by crop and Π_i is the weighted coefficient for each crop i ,$i = 1,2,...,n$ ($n \le 10$).

More specifically, the machinery rent index is calculated by the formula:

$$K = \sum_{i=1}^{n} \left[\sum_{j=1}^{m} \left(\frac{1}{g} \sum_{k=1}^{g} \frac{M_{ijk}^{(1)}}{M_{ijk}^{(0)}} \right) * P_j \right] * \Pi_i$$

According to this formula, the rent index by crop C_i is calculated as weighted average of the C_{ij} indices and P_j is the weighted coefficient for the different types of machinery j, $j = 1,2,...,m$,($m \le 15$):

$$C_i = \sum_{j=1}^{m} C_{ij} P_j$$

The rent index by type of machinery C_{ij} is calculated as simple arithmetic mean of the indices by geographical areas (local communities) k, $k = 1,2,...,g$:

$$C_{ij} = \frac{1}{g} \sum_{k=1}^{g} \frac{M_{ijk}^{(1)}}{M_{ijk}^{(0)}}$$

Where, $M_{ijk}^{(1)}$ and $M_{ijk}^{(0)}$ are respectively the average rents for the current period *(1)* and for the base period *(0)* for a specific crop *i*, type of machinery *j* and geographic area *k*.

Announcement of the revised Cost Indices for the Factors of Agricultural and Livestock production and transmission to Eurostat

The revised cost indices are released 6 months after the end of the reporting year, with a planned press release (Greek and English) and are available on the website of ELSTAT at: www.statistics.gr.

The transmission of data of Rent index of utilized land (land cost index) to Eurostat, takes place annually in the month September of the next year of the reference year.

Back casting of time series

Backdated calculations for retrospective indices of the annual Cost Indices for the Factors of Agricultural and Livestock production, for the period 2000–2018, were calculated using the individual annual indices in year 2015, according to the following type:

$$R_{i(2015)}^{(t)} = R_{i(2010)}^{(t)} * \frac{100}{\overline{R}_{i(2010)}^{(2015)}}$$

Where:

$R_{i(2015)}^{(t)}$ *is the* retrospective indices *i in the current period (year) t with 2015 as base year,*

$R_{i(2010)}^{(t)}$ *is the compiled indices i in the current period (year) t with 2010 as base year and*

$\overline{R}_{i(2010)}^{(2015)}$ *is the mean compiled annual indices i in 2015, with 2010 as base year.*

In the following tables, the weighting coefficients and the annual cost indices for the factors of agricultural and livestock production for each category of the factors are presented, for the period 2012– 2018, with base year 2015=100.0.

Table 1. Annual cost indices for the factors of agricultural and livestock production: 2012 - 2018
Base year: 2015=100.0

GROUPS	Weights 2015	2012	2013	2014	2015	2016	2017	2018
Cost Index for the factors of production	**10,000.0**	**104.8**	**101.3**	**101.5**	**100.0**	**99.3**	**101.6**	**102.0**
1. Labour remuneration (wages)	3,897.1	104.3	101.7	99.8	100.0	99.8	100.8	101.9
2. Rent remuneration (land rents)	3,249.5	104.4	102.4	100.9	100.0	100.0	101.1	102.3
3. Capital remuneration (capital)	2,853.4	104.4	100.4	103.1	100.0	98.5	102.6	101.8
(a) Loans interest	955.2	106.3	99.6	104.8	100.0	97.7	103.7	102.4
(b) Machinery rents	1,898.2	102.0	101.7	100.2	100.0	99.9	100.7	100.9

Table 2. Annual remuneration indices of utilized land (land rents): 2012 - 2018
Base year: 2015=100.0

	GROUPS	Weights 2015	2012	2013	2014	2015	2016	2017	2018
AA	**Rent remuneration index**	**10,000.0**	**104.4**	**102.4**	**100.9**	**100.0**	**100.0**	**101.1**	**102.3**
1	Cultivation of wheat	4,660.9	101.8	100.5	99.6	100.0	100.6	100.6	102.8
2	Cultivation of cotton	1,831.3	103.6	101.6	101.3	100.0	100.0	99.0	101.8
3	Cultivation of sugarbeet	45.6	100.5	99.4	100.9	100.0	99.3	99.6	105.8
4	Cultivation of alfalfa	1,393.4	107.5	105.4	103.3	100.0	98.6	102.0	101.8
5	Cultivation of rice	417.0	96.4	96.4	94.9	100.0	98.2	100.2	100.2
6	Cultivation of potatoes	138.7	114.9	110.9	103.3	100.0	100.7	103.4	103.8
7	Cultivation of vegetables	415.7	107.9	107.8	99.5	100.0	101.3	103.0	103.4
8	Cultivation of tobacco	129.6	101.4	99.7	99.7	100.0	104.4	105.1	106.5
9	Cultivation of maize	967.8	108.4	105.2	103.3	100.0	99.7	103.3	101.0

Table 3. Annual Labour remuneration index (agricultural wages): 2012 - 2018
Base year: 2015=100.0

Weights 2015	GROUPS	2012	2013	2014	2015	2016	2017	2018
1.000	**Overall Labour remuneration index**	**104.3**	**101.7**	**99.8**	**100.0**	**99.8**	**100.8**	**101.9**
0.685	Labour remuneration for Men	104.5	101.7	99.9	100.0	99.7	100.7	101.8
0.315	Labour remuneration for Women	103.6	101.9	99.1	100.0	100.1	100.9	102.2

AA	Indices per crop kinds	2012	2013	2014	2015	2016	2017	2018
	Labour remuneration for Men	**104.5**	**101.7**	**99.9**	**100.0**	**99.7**	**100.7**	**101.8**
1	Cultivation of cotton	104.6	101.6	100.5	100.0	100.1	102.4	105.0
2	Cultivation of vegetables	107.4	103.7	100.2	100.0	99.2	100.4	100.4
3	Cultivation of tobacco	95.4	97.3	97.3	100.0	101.9	106.2	112.3
4	Citrus trees	115.1	105.0	99.9	100.0	100.0	100.8	97.9
5	Olives trees	106.1	102.5	99.9	100.0	98.6	98.6	99.6
6	Cultivation of vines	104.9	99.9	99.6	100.0	99.9	100.0	100.9
7	Other trees	102.8	99.9	100.2	100.0	99.0	98.9	99.4
8	Animal, sheep-goats	119.1	106.3	102.3	100.0	104.9	109.3	109.9

AA	Indices per crop kinds	2012	2013	2014	2015	2016	2017	2018
	Labour remuneration for Women	**103.6**	**101.9**	**99.1**	**100.0**	**100.1**	**100.9**	**102.2**
1	Cultivation of cotton	109.1	104.9	101.5	100.0	101.5	102.8	106.0
2	Cultivation of vegetables	107.2	104.0	100.3	100.0	98.6	98.8	99.0
3	Cultivation of tobacco	95.4	94.7	94.6	100.0	102.4	107.0	110.5
4	Citrus trees	98.0	96.7	94.8	100.0	106.2	102.9	101.3
5	Olives trees	100.6	97.5	97.3	100.0	98.5	98.5	99.5
6	Cultivation of vines	110.1	105.4	101.0	100.0	100.8	99.7	101.3
7	Other trees	101.5	99.4	98.2	100.0	100.6	100.6	102.6
8	Animal, sheep-goats	120.1	108.0	100.7	100.0	103.7	109.6	109.6

Table 4. Annual Indices of Machinery rents: 2012 - 2018
Base year: 2015=100.0

AA	GROUPS	Weights 2015	2012	2013	2014	2015	2016	2017	2018
	Overall index of Machinery rents	**10,000.0**	**102.0**	**101.7**	**100.2**	**100.0**	**99.9**	**100.7**	**100.9**
1	Cultivation of wheat	2,252.2	104.1	102.1	101.2	100.0	100.2	100.2	101.2
2	Cultivation of cotton	2,489.4	99.7	100.4	99.2	100.0	99.8	99.1	97.8
3	Cultivation of sugarbeet	56.1	97.8	98.9	98.7	100.0	99.1	101.5	100.1
4	Cultivation of alfalfa	1,654.4	102.3	102.5	100.3	100.0	100.5	102.0	102.0
5	Cultivation of rice	492.7	101.3	103.2	100.1	100.0	97.7	100.1	101.6
6	Cultivation of potatoes	264.2	106.1	103.7	102.2	100.0	100.2	100.1	101.5
7	Cultivation of vegetables	678.5	103.5	103.5	102.8	100.0	99.7	102.3	103.1
8	Cultivation of tobacco	348.6	100.7	100.3	97.6	100.0	99.9	99.2	101.5
9	Cultivation of maize	1,091.2	100.4	101.0	100.6	100.0	99.6	99.1	98.8
10	Citrus trees	672.7	101.8	99.5	96.8	100.0	99.3	105.7	107.7