The Effects of the Reformed CAP on the Local Economy in Rural Areas

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Abstract The impacts of the 2004 CAP reform on crop allocation, agricultural production, and the rural economy have been scarcely studied within a regional perspective. In this work, the impact of the CAP reform—and in particular the implementation of cross-compliance—on the region of Eastern Macedonia and Thrace (Greece) is studied with the use of factor analysis and structural equation modeling. Detailed qualitative and quantitative data were obtained through structured questionnaires and in-depth interviews of agronomists working in the local agricultural inputs sector. Results demonstrate that the CAP reform had primarily an adverse impact on both crop allocation and production, as well as on the local economy.

Keywords CAP · Local economy · Eastern Macedonia and Thrace · Factor analysis · Structural equation modeling

1 Introduction

Ever since the Treaty of Rome, the Common Agricultural Policy (CAP) has been reformed on many occasions and the impacts of each reform have been considered in terms of whether the goals, the perspectives, and the plans of the European Union (EU) have been realized. No doubt, the CAP is still one of the central elements for European integration and the most important EU common policy. During this

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period, the initial aims of the EU policies changed from self-sufficiency, adequacy of agricultural products, and market stability to productivity increases and food safety and from there to the adoption of environmental parameters and animal welfare into agricultural production. The main tool for the implementation of all these reforms and changes was the method of calculation, the payment of subsidies, and a series of commitments that arose within this spectrum (Mousis 2008).

The reform known as "Fischler's reform" was launched in 2004 and was the most radical change among all CAP reforms. This reform changed the method of subsidies payment, while it introduced the concept of "rights" and the "decoupling" of subsidies from production. A key outcome of this reform has been that producers did not have to produce any quantities to be eligible for subsidized payments. Instead, subsidies were calculated based on historical data for areas, pastures, and animals for each farm. The subsidies calculation and payment system is known as the Single Farm Payments (SFP). All the conditions required in order for farmers to be eligible for subsidies, including environmental parameters and Codes of Good Agricultural Practices, including animal welfare, are known as "cross-compliance." It should be added that within this general framework each state had marginal options on a number of issues, which were set by the EU's decisions (Hüttel and Margarian 2009).

This CAP reform caused a number of important effects on most of the crops, the cultivation and production methods, and the use of production inputs. These effects furthermore extended to a wider range of subjects, such as transport and product trade and producers' investments. This chapter assesses the impact of the implementation of the CAP reform on the local economy of the agricultural areas of the Region of Eastern Macedonia and Thrace (also known as "Anatoliki Macedonia and Thraki"). In this region, agriculture is one of the main economic activities and accounts for a large share of regional GDP, employment, and income.

The remainder of the chapter is organized as follows: in the following section, the theoretical background is given, followed by the "research methodology section. Next, the study's results are presented, followed by discussion and concluding remarks.

2 Theoretical Background

Researchers in many scientific papers, even before the implementation of this reform, expressed concern that decoupling might cause a reduction in agricultural activity, reduce competitiveness, and then reduce the profitability of companies engaged in the transportation of agricultural products (Conforti et al. 2002). Other researchers expressed the view that there is an influence in farmers' behavior and in the choices and risks they are undertaking in the cultivation procedure (Bhaskar and Begin 2009). It is obvious that the impact of the revision in terms of culture and all

the features regarding the productivity, intensification, and change in the size of farms ultimately affect farmers' income.

In a related scientific paper, the different characteristics of the agricultural households are highlighted for their ability to adapt to and adopt the changing agricultural policies brought about by the CAP reforms (Shucksmith and Herman 2002). This effect on farms is then transferred to the local market as well as in rural areas. Farmers are the main consumers who shape the conditions in the local market and furthermore in real estate, as in reconstruction and investments relating to the agricultural sector. Furthermore, the assessed CAP reform is estimated to affect employment. This is estimated to decrease family work input, as well as demand for personnel, mainly because of decoupling (Fasterding and Rixen 2005).

The impact of both Pillar I (direct payments) and Pillar II (rural development) in Austria was assessed by Schmid et al. (2006) and Schmid and Sinabell (2006), who found that market incomes rose by direct payments and agri-environment payments. Results of scientific studies showed that the impact of the weaknesses of the CAP reform expands in the agricultural employment sector, even extending over the nonagricultural workforce that may be involved in the rural labor market (Corsi and Salvioni 2012). Regarding Greece, Giannakis and Efstratoglou (2011) showed that the reform of the CAP and the payment of subsidies to the SFP system led to the transfer of land from intensive to extensive farming and also that the net production of the redistribution of land has been negative for the rural economy.

It should be noted that in this chapter, the term "local economy" includes the local market consumption, construction activity, the labor integration of agricultural crops, manufacturing facilities and warehouses, purchase of agricultural machinery, equipment and inputs from local suppliers, transportation, processing, and diversification of land value with respect to the purchase and renting of land.

3 Research Methodology

The research methodology includes a survey based on interviews with a questionnaire in the region of Eastern Macedonia and Thrace. The basic characteristics of the region are presented in Table 1.

The questionnaire included four sections. The items in the first section addressed the general CAP consequences on the population of the region, from the agronomists' point of view. The next section recorded the environmental issues of the CAP, and the third section addressed the financial consequences of the CAP. The last section investigated the CAP consequences on the local economy. The answers were given in the form of the five-point Likert scale, where 1 stands for "strongly agree" and 5 denotes "strongly disagree." The sample size was 212 participants who were agronomist scientists, store owners who sell pesticides and fertilizers, and other suppliers involved in input agricultural marketing in Eastern Macedonia and Thrace.

Table 1 Basic characteristics of the region of Eastern Macedonia and Thrace

Total area in km^2	Population (2011 census)	Agricultural area (m^2)	Agricultural area within CAP (m^2)
14,157	608,182	66,419,000	64,411,000

Resource: ELSTAT: National Statistic Authority

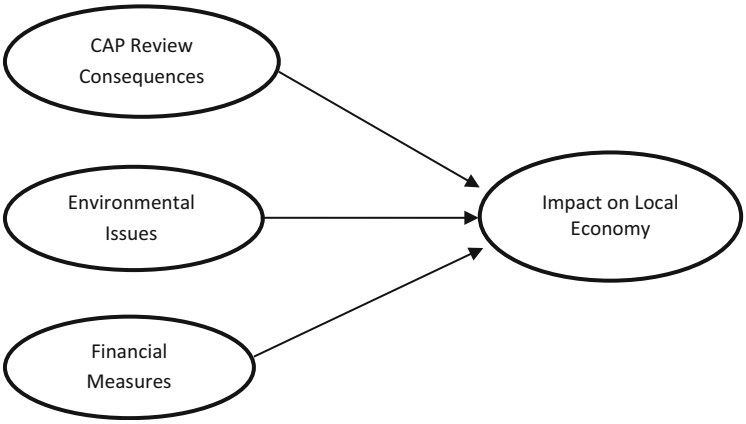

Fig. 1 The structural model under investigation

Agriculturalists were used for the correct completion of the questionnaires, who provided the necessary responses regarding the use of pesticides and fertilizers, which, play an important role in a local economy. The increasing age of farmers makes this problem even worse, since older people find it difficult to adapt to innovative ideas and changes, and so it is difficult in turn to follow the rules of the CAP reform. In most cases, the owners of these stores are Agriculturists themselves. Due to their direct cooperation with farmers, they can provide a broader view of the proper use of fertilizers and pesticides. Moreover, they are residents of the region, which means that they incur the financial consequences that the CAP may have, since they are not farmers but they are also part of the local economy.

Hence, it is important to investigate the role and the degree of CAP reform and of the environmental and financial issues in the local economy. Therefore, the following research hypotheses can be hypothesized:

H1 CAP review consequences have an effect on the local economy.

H2 Environmental issues have an effect on the local economy.

H3 Financial measures have an effect on the local economy.

The response rate of the survey was 65%, taking into consideration also the elimination of questionnaires which were poorly answered or included errors. The basic model under investigation is presented in Fig. 1.

4 Results

Initially, we summarize the basic descriptive statistics which correspond to the two parts of the demographic items of the questionnaire. The first part consists of the participants' demographics. The majority of the participants (41%) operate their store for more than 10 years continuously, mainly men aged between 36 and 45 years (47%). Moreover, most of the participants had graduated from Greek universities (60%). The second part consists of store demographics. The majority of stores (66.1%) were independent businesses, while the remaining 33.9% included stores as part of a broader business range. Regarding turnovers, the majority of the input stores declared between 200,000 and 400,000 € (26%), while 15% declared a number between 600,000 and 1,000,000 €. Finally, most of the stores (39.3%) are active in the wider region, which includes more than one municipality.

In order to determine the validity of the questionnaire structure, a factor analysis was conducted. The purpose of the analysis was the identification of the items that have the most significant impact on CAP reform, environmental issues, financial issues, and the local economy. Orthogonal rotation was used, since the factors are uncorrelated. Then, the observed variables were generated from the average of the respondents' answers to the corresponding variables. In this study, six factor analyses were conducted in order to extract the basic variables for the main analysis. For each one of the factors, reliability was examined with Cronbach's α criterion. A value of Cronbach's α greater than 0.6 indicates high reliability. The factors are presented in Table 2, where eigenvalues, total variance, and Cronbach's α are shown. The full table, including factor loadings, is presented in Appendix. More details on factors for the specific analysis can be found in Markopoulos et al. (2015).

Structural equation modeling (SEM) was then used in order to fit the investigated model described in Fig. 1 and to estimate its coefficients. This analysis is the appropriate method for processing in the case where the relationships lie between latent and observed variables, and between latent variables simultaneously, in order to validate or reject the assumptions made by the researcher (Schumacker and Lomax 2010). For this purpose, the statistical package AMOS 22 (IBM 2013) was used.

In this model, one variable from each group of observed variables that determine the latent variables had a factor loading fixed to the unit, or the variance of each latent variable must be fixed to one. The reason for imposing these constraints is the indeterminacy between the variance of a latent variable and the loadings of the observed variables on that latent variable. Utilizing either of these methods will eliminate the scale indeterminacy problem (Schumacker and Lomax 2010). Thus, the variables that are set to have loadings equal to the unit are "product production" (M1), "application accuracy" (M6), "marketing practices" (M13), and "areas in dependence on agriculture" (M45). The reason for this is that these variables identify to a great scale their respective factors, as is clear from the reliability analysis.

Table 2 Factor analysis results

N. of factor analysis	Factor code	Factor	Eigenvalue	Variance	Cronbach's α
1	M1	Product production	3.134	34.81%	0.801
	M2	Output reduction	1.434	15.93%	–[a]
2	M3	Differentiation	1.223	56.3%	0.609
3	M4	Human resources	3.243	29.98%	0.802
	M5	Farms	2.959	26.89%	0.795
4	M6	Application accuracy	2.676	29.73%	0.843
	M7	Financial consequences	1.915	21.27%	0.749
	M8	Impact	1.636	18.17%	0.589
5	M9	Farm Income from winter cereals	2.567	51.33%	0.893
	M10	Farm Income from summer cereals	1.662	33.23%	0.747
6	M12	Market bodies	2.131	16.39%	0.919
	M13	Marketing practices	1.955	15.03%	0.646
	M14	Marketing problems	1.468	11.29%	–[a]
	M15	Climate impact	1.201	9.23%	–[a]
7	M45	Areas in dependence on agriculture	4.258	32.75%	0.898
	M46	Boarder sectors	2.593	19.53%	0.827
	M47	Land value	2.106	16.19%	0.777

[a]This factor consists of only one item, so Cronbach's α cannot be extracted

The model shown in Fig. 2 can be expressed by the following equations:

$$
\begin{aligned}
&(\text{CAP Review Consequences}) = \lambda_{11}(\text{M1}) + \lambda_{12}(\text{M2}) + \lambda_{13}(\text{M3}) + \lambda_{14}(\text{M4}) + \lambda_{15}(\text{M5})\\
&(\text{Environmental Issues}) = \lambda_{21}(\text{M6}) + \lambda_{22}(\text{M7}) + \lambda_{23}(\text{M8}) + \lambda_{24}(\text{M9}) + \lambda_{25}(\text{M10})\\
&(\text{Financial Measures}) = \lambda_{31}(\text{M12}) + \lambda_{32}(\text{M13}) + \lambda_{33}(\text{M14}) + \lambda_{34}(\text{M15})\\
&(\text{Impact on Local Economy}) = \lambda_{41}(\text{M45}) + \lambda_{42}(\text{M46}) + \lambda_{43}(\text{M47})
\end{aligned}
$$

and

$$
\begin{aligned}
&(\text{Impact on Local Economy}) = \xi_1(\text{CAP Review Consequences})\\
&+\xi_2(\text{Environmental Issues}) + \xi_3(\text{Financial Measures}),
\end{aligned}
$$

where λ_{ij}, $i = 1, 2, 3, 4$, $j = 1, \ldots, 4$, and ξ_i, $i = 1, 2, 3$ are the coefficients to be estimated.

Based on the results of the factor analysis, the full model under investigation is illustrated in Fig. 2.

For the adjustment of the model, the unweighted least squares (ULS) procedure was used, because of the ordinal scale of the items. Therefore, they cannot be treated as quantitative, since their number is small, and consequently, it cannot be regarded that they follow the normal distribution (Schumacker and Lomax 2010). The overall fit of the model is very good, as indicated by the indices presented in Table 3.

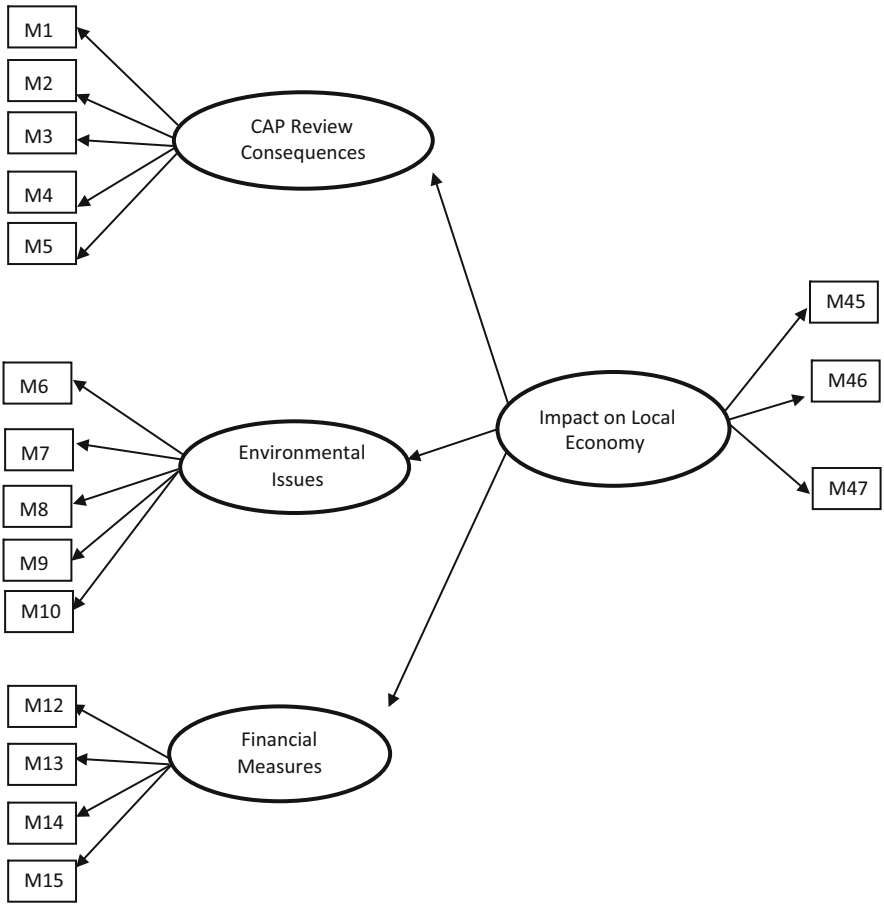

Fig. 2 Structural and measurement model of the research

Table 3 Goodness of model fit

Index	Values	Acceptable values
X^2	218.114	–
Degrees of freedom (df)	115	
X^2/df	1.896	<3
GFI	0.918	>0.9
RMSEA	0.056	0.05–0.08
AGFI	0.892	≥0.9

Table 4 shows the standardized factor loadings of the observed variables for each one of the latent variables of the model. All the coefficients have a significant effect on the corresponding variables at the 5% significance level.

Table 4 Standardized factor loadings

Coefficient	Estimate	Std error	*p*-value
λ_{11}	−0.920	0.233	<0.001
λ_{12}	−0.584	0.129	<0.001
λ_{13}	−0.553	0.311	<0.001
λ_{14}	−0.786	0.326	<0.001
λ_{15}	0.629	0.219	<0.001
λ_{21}	0.725	0.218	<0.001
λ_{22}	−0.240	0.172	0.012
λ_{23}	−0.518	0.122	<0.001
λ_{24}	−0.671	0.117	<0.001
λ_{25}	0.398	0.243	0.028
λ_{31}	0.312	0.017	<0.001
λ_{32}	−0.326	0.109	0.015
λ_{33}	−0.462	0.114	<0.001
λ_{34}	0.421	0.016	<0.001
λ_{41}	0.506	0.013	<0.001
λ_{42}	0.528	0.107	<0.001
λ_{43}	0.332	0.221	<0.001
ξ_1	−0.850	0.233	<0.001
ξ_2	−0.870	0.234	<0.001
ξ_3	0.704	0.208	<0.001

Hence, the equation using the estimated standardized coefficients becomes:

$$\begin{aligned}
(\text{CAP Review Consequences}) &= -0.920(\text{M1}) - 0.584(\text{M2}) - 0.553(\text{M3}) - 0.786(\text{M4}) \\
&\quad +0.629(\text{M5}) \\
(\text{Environmental Issues}) &= 0.725(\text{M6}) - 0.240(\text{M7}) - 0.518(\text{M8}) - 0.671(\text{M9}) \\
&\quad +0.398(\text{M10}) \\
(\text{Financial Measures}) &= 0.312(\text{M12}) - 0.326(\text{M13}) - 0.462(\text{M14}) + 0.421(\text{M15}) \\
(\text{Impact on Local Economy}) &= 0.506(\text{M45}) + 0.528(\text{M46}) + 0.332(\text{M47}) \\
\text{and} & \\
(\text{Impact on Local Economy}) &= -0.850(\text{CAP Review Consequences}) \\
&\quad -0.870(\text{Environmental Issues}) \\
&\quad +0.704(\text{Financial Measures})
\end{aligned} \tag{1}$$

Equation (1) indicates whether or not the hypotheses of the research are verified. It is evident that there is a negative effect from the "CAP Reform Consequences" on the local economy. Moreover, "Environmental Issues" also seem to have a negative impact on the local economy, whereas "Financial Measures" have a positive effect on the local economy.

5 Discussion–Conclusion

The main purpose of the chapter was to investigate the impacts of CAP reform on the local economy of the rural areas of the region of Eastern Macedonia and Thrace. Moreover, some aspects of the CAP reform, such as environmental and financial issues, have also been considered to determine whether or not they affect the local economy of the region. The survey took into consideration the opinions of the agronomists who are responsible scientists at the stores for agricultural inputs, as they are more accurate in estimating the possible effects, due to their cooperation with hundreds of farmers each and their scientific background.

Results demonstrate the negative effect of the CAP reform on the local economy of the rural areas of the region. At this point, the meaning of CAP reform has to do with decoupling and, in general, the different way of calculating the subsidies for each farm. As for the environmental issues, there seems to be a negative effect on the local economy, and this is the result of the implementation of farmer cross-compliance. On the other hand, the factor related to financial measures has a positive effect on the local economy.

The equation created after the econometric processing confirms the existence of a clear influence between the changes in the CAP (the reform) and the local economy. The coefficients indicate that there is a clear effect on both Pillar I (decoupling and cross-compliance/preconditions for the payment of subsidies) and Pillar II (financial measures). According to this point, the three hypotheses described at the beginning of this chapter are accepted and positively confirmed.

Specifically, the effects brought about by the CAP formed three (3) latent variables. The first one represented "decoupling," different calculations, and payment of aid to beneficiaries, while the second represented "cross-compliance" which indicates the conditions for receiving community aid through the SFP system. The third latent represents the financial measures that accompanied the revision (Pillar II). Of the three latent variables, the first two had a negative effect while the third (financial measures) had a positive effect on the latent representing the local economy.

The negative impact of decoupling on the local economy is not easy to interpret, as the payment of the SFP subsidies creates better money liquidity conditions. However, the lower levels of agricultural production (Markopoulos et al. 2015; Markopoulos 2016) and the changes and conversion of the applied agriculture in a less intensive and more extensive way (Giannakis and Efstratoglou 2011) can be the basis of the explanation. A less intensive agriculture reduces the volume of produced products and therefore adversely affects some sectors of the local economy, such as transport. The same conclusion can be reached through the expected reduction of inputs used and less work, which will now be incorporated into a less intensive form of agriculture.

On the other hand, cross-compliance seems to negatively affect the local economy, which was considered a further commitment to the practice of farming. This may be due to the fact that the adoption of environmental measures did not bring the expected benefits to the agricultural environment or to the applied agricultural

practice. Besides, all the factors which involve constraints provoke the reaction of those involved in the production process of agriculture.

Pillar II and particularly the financial measures it includes seem to be the only aspect of the reformed CAP which has a positive impact on the local economy. The financial measures (e.g., projects designed to improve the competitiveness of farms, action plans to improve the age composition by the installation of young farmers) require some consumption and purchase of equipment or the creation of new facilities that obviously impact positively on the local economy. At the same time, additionally, this positively affects production by modernizing farms and increasing their production capacity and competitiveness. This probably happened because financial measures contributed to the design, to the approval, and to the implementation of investments, which have a positive effect on the economy, especially the local economy. Moreover, it's worth mentioning that some of the financial measures help to increase the monetary liquidity of the economy and to create a positive climate for production and therefore for the local economy.

Here it should be noted that, as mentioned in the "Theoretical Background" section (Bhaskar and Beghin 2009), the reform and the CAP formulation affects the behavior of farmers with the two agents exerting a negative influence (decoupling and multiple compliance) and the third a positive one (financial measures).

Given the above conclusions, it is documented that the CAP as a whole, and in particular the changes, affects crop allocation, agricultural production, and the agricultural economy in general. Moreover, these effects are further extended over the local economy in rural areas. It can be accepted that the effects on purely agricultural issues are more direct and clearer and may be studied more easily, but beyond this, the CAP effects extend throughout the local economy on rural areas. Thereby the need for further study of the CAP effects in the local economy is confirmed via both subsidies and the monetary liquidity of farmers to develop, through the effects on crops, the inputs market, the changes in the value of land, as well as the impact on the psychology of farmers.

In conclusion, this study reveals significant impacts on the local economy of the region of Eastern Macedonia and Thrace and the implementation of the CAP reform that can be used as a guide to future reforms.

Appendix

Code	Factor	Items	Loadings
M1	Product production	Decoupling of aids changes crop synthesis in the region	0.599
		Decoupling of aids results in the increase of non-cultivated land in the region	0.551
		Decoupling of aids results in the decrease of product quality	0.580

(continued)

Code	Factor	Items	Loadings
		Decoupling of aids provides a significant negotiating advantage to farmers	0.751
		Decoupling of aids results in the adjustment of farms in the conditions of free market and competition	0.830
		Decoupling of aids has negative impacts on the marketing and processing of products	0.578
		Decoupling of aids has been accepted by local farmers	0.721
M2	Output reduction	Decoupling of aids results in production decrease	0.542
M4	Human resources	Grant of aids launches the non-agricultural use of money, taking resources from the productive process of the farm	0.661
		Grant of aids reduces production	0.680
		Grant of aids reduces intensive farming that requires high inputs	0.758
		Grant of aids reduces farmers' interest in risk taking	0.707
		Grant of aids is perceived as a non-farm social aid rather than as an agricultural community aid	0.650
		Grant of aids results in intense price fluctuations	0.645
M5	Farms	Grant of aids ensures conditions of stability and limited risk for farms	0.816
		Grant of aids results in better farm organization and programming	0.815
		Grant of aids results in better economic farm management	0.795
		Grant of aids results in attracting young farmers	0.636
		Grant of aids results in the increase of farm size	0.519
M6	Application accuracy	C–C was successfully applied to Greek farming	0.829
		C–C followed the necessary controls prior to implementation	0.888
		The relative bodies have been consistent regarding the announcement and implementation of C–C	0.863
		C–C appears to apply only to documents held concerning the CAP while they are not applied in practice	0.609
M7	Financial consequences	C–C has negative financial impacts in the short-term	0.887
		C–C has negative economic impacts on the farm	0.885
M8	Impact	C–C in the long-term has positive impacts on production and solving farm problems	0.838
		The implementation of C–C by some producers causes unfair competition and comparative disadvantage	0.600
		The non-implementation of C–C may result in the imposition of sanctions on our country by the EU	0.701
M9	Farm income from winter cereals	Durum wheat	0.942
		Soft wheat	0.867
		Barley	0.766

(continued)

Code	Factor	Items	Loadings
M10	Farm income from summer cereals	Corn	0.658
		Rice	0.964
M12	Cereals market bodies	Participation of NDP in collection and trade of cereals has fallen over the last eight years	0.934
		Participation of private traders in the collection and trading of cereals has increased over the last eight years	0.922
M13	Marketing practices	A significant number of farmers store the cereals they produce and market their own in times of higher demand	0.626
		Farmers in the region try to produce the quantities they need on their own farms	0.854
		There is evidence of 'concerted practices' among cereal merchants	0.608
M14	Marketing problems	The involvement of a large number of cereal traders in the region negatively affects "economies of scale"	0.503
M15	Climate impact	Climate change affects the production and quality of winter cereals	0.874
M45	Areas in dependence on agriculture	Diffusion of impacts of the CAP on other sectors of the local economy related to product processing	0.823
		Diffusion of impacts of the CAP on other sectors of the local economy concerned manufacturing	0.778
		Diffusion of impacts of the CAP on other sectors of the local economy related to product transfer	0.781
		Diffusion of impacts of the CAP on other sectors of the local economy concerned manufacture of packaging materials	0.892
		Diffusion of impacts of the CAP on other sectors of the local economy related to labour	0.801
		Diffusion of impacts of the CAP on other sectors of the local economy related to construction of storage infrastructure	0.668
M46	Broader sectors	Diffusion of impacts of the CAP on other sectors of the local economy covered the market of agricultural machinery, accessories etc.	0.553
		Diffusion of impacts of the CAP on other sectors of the local economy related to consumption	0.778
		Diffusion of impacts of the CAP on other sectors of the local economy covered standard of living	0.882
		Diffusion of impacts of the CAP on other sectors of the local economy related to construction activity in the area	0.742
M47	Land value	Diffusion of impacts of the CAP on other sectors of the local economy related to land purchase	0.772
		Diffusion of impacts of the CAP on other sectors of the local economy covered land rental	0.874

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