

The cooperative industries of the poultry farm sector in Greece (2001-2020)

Konstantinos Papadopoulos¹

Konstantinos Karanatsis²

¹PhD Candidate, Department of Economics, University of Ioannina, email: k.papado@uoi.gr, ORCID: 0009-0007-8845-593X

²Associate Professor, Department of Economics, University of Ioannina, email: kkaranat@uoi.gr, ORCID: 0009-0007-7606-7526

Abstract: The cooperative idea is not only an economic and social necessity, but also a necessary and sufficient condition in the direction of exploiting the comparative advantages that the country has in the production of quality agricultural products. Agricultural cooperatives emerge as a distinct organizational model of entrepreneurship (Brandano et al. 2018). They are the vehicle for the agricultural sector to claim a better position in international competition. The purpose of this article is to demonstrate, on the one hand, from the literature review, the importance of agricultural cooperatives in local development and more broadly in a sustainable form of economic development and on the other hand, through empirical research in the financial statements of poultry cooperatives in Greece, to reflect their overall return on asset (ROA), gross profit margin ratio, to compare them with investor-owned firms in the sector and to investigate the contribution, through the multiple regression model estimation, of the factors: assets, long-term liabilities and equity in sales. The results show that two of the three cooperatives show equal or better gross profit margin performance than investor-owned firms in the sector for the years 2013-2020, while the return on asset (ROA) of one poultry cooperative significantly exceeds the average of IOFs in the sector for the years 2010-2020 and of the other for the years 2016-2020, respectively. At the same time, a statistically significant correlation emerged between the independent asset variables and long-term liabilities in sales.

Keywords: Agricultural cooperatives, profitability ROA, gross profit margin, local economic development, sustainability.

JEL Classification: C24, O13, P13, Q13, Q14

1. Introduction

Cooperatives form collective entities, which are made up voluntarily and aim at the fulfillment of financial, social and cultural goals for each member, through equal cooperation, common actions and activities and the solidarity of partners. Common actions and activities are signs of a democratically led business. According to the international labor organization (ILO), the cooperative constitutes an autonomous union of persons aiming at the fulfillment of financial, social and cultural needs of its members, through common ownership and a democratically managed business. Apart from creating financial profit, the cooperative - as a socioeconomic organization-cultivates solidarity, understanding and reciprocity, traits that are considered necessary not only in the agricultural sector but in society as a whole (Papageorgiou, 1997).

Cooperatives are differentiated from other legal entities of solely profitable interest, like companies, because they aim at a balance between financial and social effectiveness.

The singular organization and action status of cooperatives produced a special legislative frame, which manifested itself in the middle of the 19th century, during the same period that the industrialization of European countries took place and the contradictions associated with capitalist production relationships appeared.

The legislative certification of cooperatives in Greece took place in 1915 through Law 602 (Government Gazette 308 A/03-06-1915) concerning agricultural and urban cooperatives. Later, the legislative framework was divided into:

- The one concerning the institution and function of agricultural cooperatives, which are governed by the Law 921/1979, the Law 1541/1985 and, lately Law 4673/2020, as the latter was codified and implemented through the modification of Law 5087/2024.
- And the one that pertains to urban cooperatives: supply and consumer ones, which are governed by the provisions of Law 1667/1986.

Agricultural cooperatives, which are the focus of the present article, form collective private businesses functioning on the basis of private economy principles and through the scope of free competition. They are

organized and funded, are accountable to and represented by their members at a national and international level (Iliopoulos, 2017). Regarding the fulfillment of their goals, they are able to constitute legal entities and form partnerships with other legal entities as well as consumer or various type cooperatives and also to institute franchises or offices at home or abroad. The members of the agricultural cooperatives may be physical entities that are occupied in any sector of the agricultural economy, or other cooperative or even other legal entities of a solely agricultural description. The model of agricultural cooperatives is considered successful for the reasons listed below: solidarity philosophy, equality of vote, co-responsibility, collective decision-making (Dias and Teles, 2018).

Agricultural cooperatives have a special financial and social imprint. Historically, they have formed an important branch of the social economy and contributed to financial development, produced income and favored the development of financial activities. The creation of agricultural cooperatives diminishes the fragmentation of production, increases the negotiation ability towards customers and suppliers and achieves economies of scale, due to the fact that big buyers, who are at an advantageous position compared to single farmers, are a characteristic feature of the agricultural markets. In many European countries, agricultural cooperatives manage the greatest part of agricultural production, supporting the development of agricultural income (Kontogeorgos and Sergaki, 2015), contribute to the enhancement of effectiveness of financial activities (Bijman, 2018) and form an important business model (Maghsoudi & Davodi, 2011).

A decade of fiscal crisis in the Eurozone and Greece has led to the formation of a new financial and social status. The decrease of gross domestic product and fixed capital (Melas, 2021) the increase of public debt and of unemployment and the shrinking of the market raise the issue of sustainability of small businesses. The extremely competitive business environment leads to the limitation of small business units, therefore, cooperatives offer a solution to the crisis described above, particularly so in periods of inward or outward crisis (Birchall, 2013).

As sustainable and collective businesses, cooperatives offer an alternative business model, thus contributing to a sustainable development, apart from the creation of employment potential (Aris et al., 2018).

The enhancement of financial power, the rational management of resources and the strategic thought contribute to the successful management of agricultural cooperatives. The only realistic way to achieve economies of scale is the widening of participation in the agro culinary sector (Pliakoura, Kontogeorgos & Beligiannis, 2019).

This paper investigates: 1) the profitability of cooperatives in the poultry sector, in return on asset (ROA) and gross profit margin compares it with investor-owned firms 2) examines the contribution of the factors: assets, long-term liabilities and equity to sales and 3) aims from the literature review, to highlight the importance of agricultural cooperatives. Our data comes from the financial statements of poultry cooperatives in Greece for the period from 2001 to 2020. The research contributes to the relevant literature (Parliament et al 1990; Hardesty & Salgia 2004; D' Amato et al. 2022). The structure of the paper is as follows: The first part introduces the topic of the paper, the second part highlights the conclusions from the international literature review, the third part presents the industry, methodology and empirical data. Next, the empirical results are presented, while the article concludes with the presentation of the conclusions and limitations of the research.

2. Literature review

Cooperatives constitute one of the most important forms of business activity in the agricultural sector in Spain in order for the smaller scale farmers to gain access to greater comparative advantages. Furthermore, due to their core role in the development and enlargement of the previously mentioned sector, investments on cooperatives are considered sustainable. By analyzing the preferences of two categories of investors, namely the owners and employees of cooperatives, we have come to the conclusion that gain is a primary goal, while control, meaning the right to vote, is a secondary one (Sangouino and Caro, 2022).

The cooperative business constitutes a form of community policy for development, particularly so in communities of limited resources. The communal development is viewed as a process that motivates the use of resources and enlarges the ability of the residents to cooperate for the improvement of their social and financial standards of living. Financial and social wellbeing springs from the social interactions and the development of trust between the members of the community. Formal and informal unions are able to motivate assets and enhance the social relationships that are crucial to local development. Cooperatives have repeatedly been proven to be useful for the promotion of the interests of the less powerful members of a

community, while they influence the market forces and local hirings, and contribute to sustainable financial development. Moreover, the capital, by remaining in the local community, enhances the existing enterprises (Majee and Hoyt, 2011).

The business nature, and more specifically the financial impact, of agricultural cooperatives has been analyzed in several studies (Benos et al., 2018). Their role is becoming increasingly important as far as the support of farmers during the period of economic crisis is concerned. They create profits for their members and contribute greatly to the transition to sustainability. The new generation of members is oriented towards financial effectiveness (Dobay, 2021). Cooperative businesses have been proven to be remarkably strenuous during the economic crisis. They constitute a sustainable collective form of business. The previously mentioned business model is able to modulate a future for everybody (Benos et al., 2018).

In market economies, they play various roles: they internalize external effects, function as innovation and social entrepreneurship workshops and are able to flourish in low mobility (workforce wise) sectors, taking into account the failures of the market, the oligopolistic markets and labor-intensive industries. Moreover they include lower information asymmetries (Valentinov, 2007). The entrance of cooperatives into the market pushes the prices nearer to the competitive level, and private buyers are forced to pay higher prices to the producers, thus contributing to social wellbeing (Novkovic, 2008). They are an answer to the failures of the market, the loss of shares and the all-increasing power of retailers (Rebelo & Caldas, 2015).

Cooperatives are liable to pressures for the implementation of new management models as well as new models of ownership rights, similar to those forms of businesses that increase financial motives and the ability of capital raising (Tortia, Valendinov & Iliopoulos, 2013). They play an increasingly important role in the balance between financial, social and environmental concerns. During the last years, social responsibility and accountability have been included in the policy of cooperatives (Castila-Polo, Hernandez & Galliardo-Vasquez, 2017). They constitute a special sector in a national economy, while at the same time they facilitate the creation of employment as well as the financial and social development (Dogarawa, 2010). In their article Mazzarol et al (2014), Iliopoulos and Valendinov (2017) have noted, cooperatives have a twofold nature: they constitute a) a business and b) a social group made up by the members of the cooperative. Therefore, it is crucial that balance between effectiveness and democracy is maintained (Grove, 1985).

The processing of agricultural products in rural areas constitutes a policy for financial development. The cooperative's facilities offer to producers a chance to incorporate themselves into them, to gain profits from the processing and marketing of their products and furthermore, to enable new employment posts and economic effects in regions that have been through an era of economic stagnation (Leistritz, 2004). The conventional farming that is practiced through cooperatives increases the income and productivity of farmers, decreases the cost of agricultural activities and provides negotiating power to farmers. What is more, they help farmers to pay low transaction costs, to control the monopolies and as a result, they enhance social well-being (Sokchea & Culas, 2015). There seems to be a strong motive for the merging of agricultural cooperatives and cost control, so that they may profit from economies of scale (Pokharela & Featherstone, 2019), as cost poses a substantial impediment to their antagonistic position.

The creation of viable collective organizations is a long-term process, especially so when it comes to human resources. The ability to cooperate constitutes a crucial developmental goal (Pool & Donovan, 2014). Cooperatives are able to offer assistance in dealing with the challenges that present themselves in unemployment and innovation. They are in a position to create employment in the long run, while their role is crucial in periods of economic crisis and high unemployment (Smith & Rothbaum, 2013). At the same time, they are an example of suitable organizational structures for survival during the crisis, as well as mechanisms for the enhancement of effectiveness of financial activities (Bijman, 2018).

The cooperative sector leads to the unification of the producers' role, to the enhancement of financial effectiveness, to inexpensive influx, to more effective technology and finally, to the development of the agricultural sector and as a result, of the national economy as well (Bercu et al., 2014). The fact that agricultural cooperatives are based on democratic values, on clarity and on cooperative spirit is not opposed to financial sustainability and profitability (Bartual-Figueras and Turno-Garuz, 2019). Due to the fact that they operate in a conventional agricultural market and they compete with other for-profit businesses, they are obliged to be interested in their profitability, as this determines their ability to engage themselves in investments (Malgorzata, 2018).

In order to survive in the new, intensely competitive environment, the agricultural cooperatives have to face the new challenges. There are 10 basic success factors. Among these, the most crucial ones are balance between social and financial goals, collective management, interaction cost management, danger and instability management, technology adoption, sustainable development and social responsibility (Junior & Wander, 2021). Contemporary worldwide challenges cannot be faced by minorities nor by individuals, therefore, the creation and support of cooperatives is deemed necessary. Education, cooperation awareness, facility improvement, financial support and exploration of new markets constitute basic priorities (Afanaseva et al., 2021).

3. Research methodology and empirical data

The empirical research is carried out in the sector of cooperative poultry enterprises, which are active in the Greek economy. Due to the fact that no research has been conducted, it is important to investigate the overall return on asset (ROA), the gross profit margin ratio and then compare them with investor - owned firms (Lerman & Parliament, 1990; Hardesty & Salgia 2004; D'Amato et, al 2022). In the poultry sector in Greece, there are a total of three agricultural cooperatives.

S/N	Cooperative Name	Year of establishment
1	Agricultural cooperative of Megara poultry farmers, Agrosyn	1939
2	Agricultural poultry cooperative PINDOS	1958
3	Agricultural Poultry cooperative of Arta	1966

Secondary data from the annual financial statements for the period 2001-2020 are used. Due to the fact that agricultural cooperatives are obliged to publish their financial statements, based on the current cooperative legislation (article 25 of Law 4673/2020) from the year 2020 onwards, the financial statements of the above-mentioned period that have been prepared according to the Greek General Accounting Plan until 31/12/2014 and according to the Greek Accounting Models (Law 4308/2014) from 1/1/2015 to the present day were requested and sent by email.

The variables that are being researched in a financial perspective for the three cooperatives that form the body of our work are: 1) sales, 2) net earnings in association with gross revenue, 3) the total assets, 4) equity and 5) long-term liabilities (Lerman & Parliament, 1990). Long-term liabilities are considered to be the ones whose due date falls before the end of the next use from the date of their formation (Sakellis, 1999).

Financial analysis constitutes a process of extracting of financial information from the financial statements (Niarchos, 2004). It contributes to the evaluation of the financial situation of an entity and is able to pinpoint weak points that need auditing in case corrective measures need to be taken, as well as strong points that could be enhanced to the benefit of the enterprise (Brigham, 1986).

Based on the above-mentioned data from the financial statements, we calculated the ratios mentioned below: 1) the return on assets (ROA) ratio, which measures the profitability of assets, so that one could ascertain whether and to what degree the poultry farm cooperatives utilize them effectively, so as to produce profit (Sing K., et al., 2019). The above-mentioned index manifests the global effectiveness of an entity as an individual financial unit. It is a financial indicator that expresses the degree to which efficient use of assets or total funds is made. The higher the index, the more effectively the entity manages its assets, therefore, the more effectively it utilizes the invested capital to generate profits.

The Return on assets ratio is the result of the division of the net earnings by the total assets $ROA = [\text{Net earnings} / \text{Total assets}] \times 100$.

2) The gross profit margin ratio, which is calculated by dividing the gross profit, from the income statement, by the sales: $\text{Gross profit margin ratio} = [\text{Gross profit} / \text{Sales}] \times 100$.

The effectiveness of an entity is of particular interest, as it indicates its ability to produce profit from its sales and furthermore it sheds light on the economic policy of the state (Kafousis, 1991).

A high index is equivalent to higher liquidity for management expenses, expenses for research and development, sales and financial expenses, and from this viewpoint it contributes to the enhancement of net earnings.

A Multiple Linear Regression analysis is being furthermore conducted (Simos, 2009, Xalkos, 2006) investigating whether and to what extent the factors: assets, long-term liabilities and equity affect the sales. The main objective of the analysis is to capture the relationship between the independent, explanatory variables of the model and the dependent variable.

The empirical model developed takes the form of equation (1):

$$\text{Sales} = \beta_0 + \beta_1 \text{Assets} + \beta_2 \text{Long-term Liabilities} + \beta_3 \text{Equity} + \epsilon_i \quad (1)$$

The independent variables of our example aim at researching the following three hypotheses:

H1: There is a positive relationship between the level of assets and sales.

H2: The increase in long-term debt liabilities contributes to the increase in sales.

H3: The increase in equity contributes to the increase in sales.

In the last stage of our analysis, we replace with estimate a double log version of equation (1):

$$\ln(\text{Sales}) = \beta_0 + \beta_1 \ln(\text{Assets}) + \beta_2 \ln(\text{Long-term Liabilities}) + \beta_3 \ln(\text{Equity}) + \epsilon_i \quad (2)$$

4. Empirical research results

Based on the financial statements of the agricultural cooperatives of the poultry farm sector in Greece, we calculated the profitability ratio on total assets, which is an indicator of total efficacy or of the utilization of assets in order to produce profit.

Table 2: ROA ratio of agricultural poultry cooperatives 2001 - 2020

Years	Agricultural poultry cooperative of Megara	Agricultural poultry cooperative PINDOS	Agricultural poultry cooperative of Arta
2001	1,79%	2,01%	1,36%
2002	0,96%	1,76%	-12,29%
2003	-0,21%	0,23%	-2,97%
2004	-0,79%	0,30%	0,22%
2005	-3,02%	0,01%	0,05%
2006	-4,56%	-6,68%	-11,14%
2007	-1,88%	0,01%	0,15%
2008	-0,38%	0,07%	0,07%
2009	-1,90%	0,71%	0,10%
2010	-3,39%	0,35%	-4,09%
2011	-5,02%	0,34%	-5,44%
2012	-4,67%	0,01%	-4,24%
2013	-2,68%	0,05%	-11,84%
2014	1,16%	1,13%	-4,21%
2015	-0,69%	2,55%	-3,95%
2016	0,14%	0,99%	-5,02%
2017	4,51%	2,77%	-6,71%
2018	2,46%	2,14%	-14,85%
2019	5,17%	2,29%	-10,09%
2020	2,34%	1,05%	-13,87%

The economic crisis in the Greek economy started in November 2009 (Varoufakis, 2011), from table 2 it can be seen that since 2010 the ROA ratio has been decreasing for all 3 cooperatives, while the lowest ROA ratio is

shown in the case of the Arta cooperative, where the high loan commitments compress profit margins, given the fact that financial expenses in general are increased. In this sense, we can see here a reflection of the national economy, in the sense that the rise in borrowing cost and the inability to get refinancing from banks increase the operating costs and deprive cooperatives of resources that might be directed towards increasing sales, thus enhancing profit margins. Despite the facts mentioned above, the Arta cooperative presented an increase in sales and total assets until 2011, while from 2012 to 2020 the decrease in sales fluctuated between 15% and 30%. The Pindos agricultural cooperative shows positive return on asset rate (ROA) during the whole of the time period mentioned above, with the exception of the year 2006. Compared to available data from studies of ICAPCRIF from 2010 and onwards the ROA values are higher than the average one for the industries of the poultry farm sector. The Megara cooperative from 2014 and onwards shows an improvement in the ROA ratio, while from 2016 onwards it achieves values remarkably higher than the average respective indicator of investor-owned firms of the poultry farm sector. Despite the effects of the financial crisis, it can be safely argued that poultry farm cooperatives have shown resilience regarding the return on asset (ROA), while at the same time there is certainly room for improvement. We also calculated the gross profit margin ratio. As we can see from table 3, the Megara and Arta cooperatives were influenced by the financial crisis and consequently the decrease in demand resulting from the decrease in income and the GDP at 26,4%. The mitigation of the crisis effects on the Greek economy from 2015 onwards marks the improvement of the gross profit margin for the Megara cooperative, as can be seen in table 3. The Arta cooperative showed a rise initially in the years 2007 and 2011, that is to say before the intensity of the effects of the financial crisis had begun to be felt and subsequently a slowdown, resulting from the decrease in sales calculated from 15% to 30%. The Pindos agricultural cooperative fluctuated between 10% and 12,5%, presenting a relative stability during the whole period from 2008 to 2020, something that can be proved by the fact that it continued to increase sales with a respective rise in the cost of production and the products sold. By comparing the data described above with the respective ones from investor- owned firms of the same sector, for the period 2013-2020, we can reach the conclusion that the Megara and Pindos cooperatives performed equally well or better than the respective investor-owned firms.

Table 3: Gross profit margin ratio of agricultural poultry cooperatives 2001 – 2020

Years	Agricultural Poultry Cooperative of Megara	Agricultural poultry cooperative PINDOS	Agricultural Poultry cooperative of Arta
2001	5,51%	10,16%	8,67%
2002	2,14%	6,31%	4,40%
2003	3,86%	5,99%	7,28%
2004	3,19%	7,65%	8,76%
2005	2,35%	6,54%	11,10%
2006	0,02%	5,09%	3,55%
2007	1,68%	8,18%	9,85%
2008	3,48%	9,47%	10,40%
2009	3,96%	12,32%	14,51%
2010	4,05%	11,35%	11,35%
2011	3,09%	11,15%	12,02%
2012	7,18%	10,76%	10,83%
2013	9,94%	10,21%	8,64%
2014	8,00%	11,29%	9,43%
2015	12,60%	11,65%	8,60%
2016	13,57%	12,50%	9,49%
2017	13,76%	11,20%	7,76%
2018	12,71%	10,61%	6,35%
2019	15,79%	9,67%	6,19%
2020	10,87%	9,85%	4,06%

In table 4, we present the descriptive statistics of the variables of the model: i) sales, ii) the total of assets on which equity stocks or capital from other sources have been invested, iii) long-term liabilities to credit institutions and iv) equity of the considered agricultural cooperatives of the poultry industry in Greece. As we can conclude from the table show above, there seems to be a difference in scale and dynamic between the three agricultural cooperatives that operate in the poultry farm sector. The highest sales point of the smallest, scale wise, cooperative during the whole period under examination, namely from 2001 to 2020, rises up to 7.241.378,00 euros while the lowest sales point falls to 2.875,654,40 euros and the minimal assets amount to 3.012.804,40 euros. At the same time, the highest sales point of the leader cooperative of the branch rises up to 270.110.378 euros and their assets amount to 155.903.197 euros. The value of the standard deviation for each one of the variables confirms the difference of the values compared to the mean point as well as the difference in scale between the cooperatives themselves.

Table 4: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Sales	60	77668403	76988794	2875654.4	270110378
Assets	60	57297973	52472876	3012804.4	155903197
Long-term Liabilities	60	10257231	11009699	0	39389453
Equity	60	9330102.3	15240031	-34376417	41532398

A Multiple Linear Regression analysis was then carried out with the aim of investigating whether and to what extent the factors: i) assets, ii) long-term liabilities and iii) equity, affect the sales of agricultural cooperatives.

Table 5: Multiple Regression equation (1) Results

Numbers of obs =	60					
	Coef.	Std. Err.	t-Statistic	P>t	[95% Conf.	Interval
Sales						
Assets	1.076076	.1091988	9.85	0.000***	.8573244	1.294827
Long-term Liabilities	1.273895	.4673596	2.73	0.009***	.337661	2.210128
Equity	.47716	.2644252	1.80	0.077*	-.0525474	1.006867
Constant	-1507151	4149002	-0.36	0.718	-9818600	6804298
R- squared	0,9282	R ²	0,9243			
F-statistic	241,2					
Prob>(F-statistic)	0,0000					

Notes: *** Significant at the 0.01 level, *Significant at the 0.10 level

From the results presented in table 5 we can conclude that:

- The statistical significance of the regression as a whole is high, since p-value of F is to 0.00. This implies that our model is a functional one, which in turn means that the effect of the independent variables on sales is statistically significant.
- The model adjusts satisfactorily to real data, given the fact that the model evaluator, that is to say the coefficient of determination tends towards 1, and indeed R-squared =0.9282 and Adj R-squared=0.9243. Consequently, the variation of the independent variables explains the variability of the dependent variable at a rate of 92.43%.
- We can also observe that the p-value of assets can be depicted by the equation p-value=0.000 which implies a statistically significant effect of assets on sales. The same is true for long-term liabilities, where p-value=0.009. Therefore, the effect of assets and long-term liabilities proves to be statistically significant for the cooperatives under examination.
- As far as the equity capital is concerned, we it is statistical significant only at the 10-percent level, since p-value = 0.077.
- In conclusion, we could argue that if assets rise, by 1 million euros, sales will likewise rise to the amount of 1.076 million euros. Likewise, if long-term liabilities rise by one euros, all other things the same, they will contribute to the rise of sales to the amount of 1.274 euros. Consequently, it is confirmed that for the agricultural cooperatives under examination H1 and H2 are valid, whereas the third hypothesis H3 is statistically significant at the 10% level.

In the last stage of the analysis, table 6 shows the change that a percentage change of 1% of the independent variables of the model will bring to sales.

Table 6: Logarithmic multiple regression results

Numbers of obs =	46					
	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval
log_Sales						
log_Asset	1.503503	.1699659	8.85	0.000***	1.160498	1.846508
log_Long term Liabilities	-.2061271	.1200753	-1.72	0.093	-.448449	.0361948
log_Equity	-.2839478	.0707682	-4.01	0.000	-.4267638	-.1411317
Constant	-.7750656	.6046782	-1.28	0.207	-1.995.356	.4452244
R- squared	0,9679	R ²	0,9657			
F-statistic	422,77					
Prob>(F-statistic)	0,0000					

Notes *** Significant at the 0.01 level.

From the table above, it becomes clear that a ceteris paribus 1-percent increase in assets will increase sales of the cooperatives to the amount of 1.503 per cent. The level of statistical significance is p-value<0.01.

The model is satisfactorily adjustable to real data, given that the coefficient of determination tends to 1, and indeed R squared=0.9679 and Adj R squared =0.9657. Consequently, the variability of the assets independent variable depicts the variability of the dependent variable. Therefore, we can safely confirm that H1 is accepted. On the other hand, long-term liabilities and cooperative capital do not seem to predict the performance of sales, since a rise in these variables leads to the decrease of sales.

In conclusion, a rise of assets enhances sales, creating the potential for higher profitability. If indeed profits increase, the return on assets (ROA) ratio concerning the agricultural cooperatives of the poultry farm sector will likewise be improved.

5. CONCLUSIONS

The goal of the present study has been on one hand the highlighting of the importance of the agricultural cooperatives as a successful model of entrepreneurship and sustainable financial development, which balances financial, social and environmental issues, and on the other hand the framing of the review of the international literature with empirical data from agricultural cooperatives panels for the time period between 2001 and 2020. Based on that, we conducted our research for the return on assets, the gross profit margin ratio, as well as the degree to which sales were influenced by i) assets, ii) long – term liabilities and iii) equity.

We came to the conclusion that the financial crisis, which was mainly expressed through a decrease in GDP, a rise in loan cost as well as a decrease in investments, affected the return on assets (ROA) of each of the cooperatives we studied to a different degree. The Pindos cooperative performed ROA ratio above the average of investor – owned firms of the same sector for the time period between 2010 and 2020, the Megara cooperative showed improvement from 2014 and had corresponding

performance for the period 2016-2020, while the Arta cooperative showed a decrease in sales and profits, which in its turn affected its return on assets ratio. With reference to the gross profit margin ratio, it was concluded that the poultry cooperatives of Megara and Pindos showed an improvement or even better performance than investor - owned firms in the sector for the period 2013-2020, while the poultry cooperative of Arta moved to low levels, due to the reduction of sales.

As far as the degree of contribution of assets on sales is concerned, their effect on sales has been proven to be statistically significant. The same is true in the event of its percentage change, given the fact that a marginal increase in assets results in a rise in sales of 1.503 per cent confirming hypothesis H1. The hypothesis H2 has also been proven to be statistically significant the model multiple regression.

In conclusion, the institution of agricultural cooperatives can guarantee the utilization of the comparative advantages that our country has the ability to offer in the agricultural sector, far from bureaucracy, exploitation from political parties and the inefficacy of auditing mechanisms that led to a decrease of cooperative conscience, posing impediments in the past. The formation of cooperatives, which are based on entrepreneurship models, can constitute the gateway for the rise in national production, extroversion and the decrease in imports, thus creating positive effects on the balance of current transactions of the economy.

Finally, agricultural cooperatives can contribute to what we call development with social justice, which can lead to the enhanced prosperity. Limitations of the research is the fact that our analysis concerns only one sector of agricultural cooperatives, it could be extended to other sectors of cooperatives in the future, while other measures or performance indicators could be used methodologically.

6. References

- Afanaseva, O. Elmov, V. Ivanov, E. and Makushev, A. (2021). Factors that facilitate development of small agricultural cooperative farm alliances. IOP Conference Series: Earth and Environmental Science, 935. DOI 10.1088/1755-1315/935/1/012045
- Aris, N.A., Marzuki, M.M., Othman, R., Safawi A. R. & Norashikin H. I. (2018). Designing indicators for cooperative sustainability: the Malaysian perspective. *Social Responsibility Journal*, 14(1), 226-248. <https://doi.org/10.1108/SRJ-01-2017-0015>
- Bartual - Figueras, M.T. and Turno - Garuz, J. (2019). Competitive Strategies in Agricultural Cooperatives: The Case of a Rice Cooperative, Catalonia, Spain. *The International Journal of Business and Management*, 7(6). DOI: 10.24940/theijbm/2019/v7/i6/BM1905-054
- Benos, T., Kalogeras, N., Wetzels, M., de Ruyter, K. & Pennings, J.M.E. (2018). Harnessing a Currency Matrix for Performance Measurement in Cooperatives: A Multi-Phased Study. *Sustainability*. MDPI, Open Access Journal, 10(12) 4536, 1-38. <https://doi.org/10.3390/su10124536>
- Bercu, F. et al (2014). Analysis of the modern agricultural cooperatives activity in Romania. *Romanian agricultural Research*, 31, 367-375.
- Bijman, J. (2018). Exploring the Sustainability of the Cooperative Model in Dairy: The Case of the Netherlands. *Sustainability*, 10(7), 2498,1-15. doi:10.3390/su10072498
- Brandano, M.G., Vannini, M. & Detotto, C. (2018). Comparative Efficiency of agricultural cooperatives and conventional firms in a sample of Quasi-Twin companies. *Annals of Public and Cooperative Economics* 90(1), 53–76. <https://doi.org/10.1111/apce.12220>
- Birchall, J. (2013). The Potential of Cooperatives during the Current Recession; theorizing comparative advantage. *Journal of Entrepreneurial and Organizational Diversity*, 2, 1-22. DOI:10.5947/jeod.2013.001
- Castila-Polo F., Hernandez, M.I.S. & Galliaro- Vasquez, D. (2017). Assessing the Influence of Social Responsibility on Reputation: An Empirical Case - Study in Agricultural Cooperatives in Spain. *Journal of Agricultural and Environmental Ethics*, 30(1),1-22. DOI:10.1007/s10806-017-9656-9
- D'Amato, A., Festa, G., Dhir, A. and Rossi, M. (2022). Cooperatives' performance relative to investor-owned firms: a non-distorted approach for the wine sector. *British Food Journal*, 124(13), 35-52. <https://doi.org/10.1108/BFJ-03-2021-0275>
- Dias, M.D.O. & Teles, A. (2018). Agriculture Cooperatives in Brazil and The Importance for the Economic Development. *International Journal of Business Research and Management*, 9(2), 72-81.
- Dobay, K.M. (2021). Agricultural cooperatives in the North-East development region of Romania: Economic perspectives. *The Research Institute for Agricultural Economy and Rural Development*, 192-199.
- Dogarawa, A.B. (2010). The Role of Cooperative Societies in Economic Development. *Munich Personal RePEc Archive*, 1-22. <http://dx.doi.org/10.2139/ssrn.1622149>
- Fulton, J. (2004). Understanding Cooperative Behavior: The Prisoners Dilemma Approach, στο Merret, C and Walzer, N. *Cooperatives and Local Development: Theory and Applications for the 21st Century*, 1th Edition, New York: Routledge. doi:10.4324/9781315290294
- Grove, F. (1985). What is Cooperative? The Philosophy of Cooperation and its Relationship to Cooperative Structure and Operations, Madison: UWCC Occasional paper No 6.
- Halkos, G. (2006). *Econometrics: Theory and Practice*. Athens: V. Giourdas Publications - Publishing.
- Hardesty, S.D. & Salgia, V.D. (2004). Comparative Financial Performance of Agricultural Cooperatives and Investor-Owned Firms. *Rural Cooperatives Center, Department of Agricultural and Resource Economics, University of California, Davis*, 1-28. <https://doi.org/10.22004/ag.econ.31797>
- ICAP GRIF Hellas. Annual Balance Sheet Data for the Period 2010-2022 and Financial Analysis of the Greek Meat and Poultry Industry, Athens.
- Iliopoulos C. (2017), "Agricultural cooperatives in Greece and now what?" <https://www.ypaithros.gr/pagkosmia-hmera-synetiarismon-konstantinos-iliopoulos>.
- Iliopoulos, C. & Valentinov, V. (2017). Member preference heterogeneity and system -lifeworld dichotomy in cooperatives: An exploratory case study, *Journal of Organizational Change Management*, 30(7), 1063-1080. <https://doi.org/10.1108/JOCM-12-2016-0262>
- Junior, O. D. P. O., & Wander, A. E., (2021). Factors for the success of agricultural cooperatives in Brazil. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 122(1), 27-42. <https://doi.org/10.17170/kobra-202102113202>
- Kafousis, G. (1991). *Analysis and critical investigation of financial statement*. Athens: Private Edition.
- Kontogeorgos A. & Sergaki P. (2015). Principles of the Management of Agricultural Cooperatives Challenges and prospects. *Greek Academic Electronic Textbooks and Aids*. <http://dx.doi.org/10.57713/kallipos-640>

- Leistriz, L. (2004). Understanding Cooperative Behavior: The Prisoners' Dilemma Approach, Merret, C and Walzer, N. Cooperatives and Local Development: Theory and Applications for the 21st Century, 1th Edition, New York: Routledge. doi.org/10.4324/9781315290294
- Lerman, Z. & Parliament, C. (1990). Comparative performance of cooperatives and investor-owned firms in US food industries. *Agribusiness*, 6, 527-540. [https://doi.org/10.1002/1520-6297\(199011\)6:6<527::AID-AGR2720060602>3.0.CO;2-R](https://doi.org/10.1002/1520-6297(199011)6:6<527::AID-AGR2720060602>3.0.CO;2-R)
- Lerman, Z. & Parliament, C. (1991). Size and industry effects in the performance of agricultural cooperatives. *Agricultural Economics*, 6(1), 15-29. [https://doi.org/10.1016/0169-5150\(91\)90013-B](https://doi.org/10.1016/0169-5150(91)90013-B)
- Lopez, A and Marcuello, C. (2006). Agricultural cooperatives and economic efficiency. *New Medit*, 5(3), 16-22. doi:http://newmedit.iamb.it/edizioni_new_medit,229,229,2006,19,71
- Maghsoudi, T., & Davodi, H. (2011). Entrepreneurship Development Strategies in Agriculture Cooperatives in Iran, *American-Eurasian J. Agric. & Environ. Sci.*, 10 (2), 283-289.
- Majee, W. and Hoyt, A. (2011). Cooperatives and community development: A perspective on the use of cooperatives in development. *Journal of Community Practice*, 19(1), 48–61. <https://doi.org/10.1080/10705422.2011.550260>
- Małgorzata, M. (2018). Profitability of agricultural cooperatives selected methodical aspects of measurement and analysis. *Journal of Agribusiness and Rural Development*, 49(3), 279–286. <http://dx.doi.org/10.17306/J.JARD.2018.00417>
- Mazzarol, T., Clark, D., Reboud, S. & Mamouni-Limnios, E. (2014). Conclusions and lessons learnt, in Mazzarol, T., Clark, D., Mamouni-Limnios, E., & Reboud, S.(Eds.), *Research handbook on sustainable co-operative enterprise. Case studies of organizational resilience in the co-operative business model*, 515-558. Northampton, Massachusetts, USA: Edward Elgar Publishing Inc.
- Melas, K. (2021). The reduction of the fixed capital of the Greek economy continued for the 11th year (2010-2020). <https://edromos.gr/i-meiosi-tou-pagiou-kefalaiou-tis-ellinikis-oikonomias-synechistike-gia-11o-chrono-2010-2020/?amp>
- Niarchos, N. (2004). *Financial Analysis of Financial Statements*. Athens: Stamoulis Publications.
- Novkovic, S. (2008). Defining the co-operative difference. *The Journal of Socio-Economics*, 37(6), 2168-2177. doi:10.1016/j.socec.2008.02.009
- Papageorgiou, K. (1997). *Agricultural Cooperatives*. Athens: Publisher: Eugenides Foundation.
- Pliakoura, A., Kontogeorgos A. & Beligiannis, G. (2019). The Agricultural Cooperative Model of Entrepreneurship through International Bibliography. <https://www.researchgate>.
- Pokharela, K.P. and Featherstone A.M. (2019). Estimating multiproduct and product-specific scale economies for agricultural cooperatives. *The journal of the International Association of Agricultural Economists*, 50(3), 279–289. <https://doi.org/10.1111/agec.12483>
- Poole, N. & Donovan, J. (2014). Building cooperative capacity: The specialty coffee sector in Nicaragua. *Journal of Agribusiness in Developing and Emerging Economies*, 4(2),133-156. <https://doi.org/10.1108/JADEE-01-2013-0002>
- Rebello, J & Caldas, J.(2015). The Economic Role of the Portuguese Agricultural Cooperatives. *Brazilian Journal of Rural Economy and Sociology (Revista de Economia e Sociologia Rural-RESR)*, 53(1), 5091-5102. <https://doi.org/10.22004/ag.econ.212444>
- Sakellis, E. (1999). *The Accountant's Pandektis*. Athens: Vrykous Publications.
- Sanguino, A.S.M. and Caro, C.D. (2022). The Agricultural Cooperative as an Instrument for Economic Development: An Approach from Spanish Investors Preferences through a Choice Experiment. *Journal Agronomy*, 12(3), 560, 1-10. <https://doi.org/10.3390/agronomy12030560>
- Sergaki, P., & Semos, A. (2006). The Greek unions of agricultural cooperatives as efficient enterprises. *Agricultural Economics Review*, 7(2), 15–27. <https://doi.org/10.22004/ag.econ.44110>
- Simos, Th. (2009). *Techniques of econometrics and time series analysis*. 1st edition Athens: Pataki Publications.
- Sing, K, Misra, M, Kumar, M and Tiwari, V. (2019). A study on the determinants of financial performance of U.S. Agricultural cooperatives. *Journal of Business Economics and Management*, 20(4), 633–647. <https://doi.org/10.3846/jbem.2019.9858>
- Smith, C.S. & Rothbaum, J. (2013). Cooperatives in a Global Economy: Key Economic Issues, Recent Trends, and Potential for Development. IZA Policy Paper No. 68, 1-26, online: <http://ftp.iza.org/pp68.pdf>.
- Sokchea, A. & Culas, R. J. (2015). Impact of Contract Farming with Farmer Organizations on Farmers' Income: A Case Study of Reasmey Stung Sen Agricultural Development Cooperative in Cambodia. *Australasian Agribusiness Review*, University of Melbourne, Melbourne School of Land and Environment, 23, 1-11. DOI: 10.22004/ag.econ.262469
- Tortia, E., Valentinov, V. & Iliopoulos, C. (2013). Agricultural cooperatives. *Journal of Entrepreneurial and Organizational Diversity*, 2(1), 23-36. <https://doi.org/10.5947/jeod.2013.0002>
- Valentinov, V. (2007). Why are cooperatives important in agriculture? An organizational economics perspective. *Journal of Institutional Economics*, 3(1), 55–69. doi:10.1017/S1744137406000555
- Varoufakis, Y. et al. (2011). The economic crisis in Greece and Europe in 2011. *Observatory of Economic and Social Developments*. G.C.W.G. Labor Institute. Study 17, 1-306.
- Weston, J.F & Brigham, E.F. (1986). *Basic principles of financial management and policy*, Athens: Papazisi Publications.