

TRAKIA UNIVERSITY – STARA ZAGORA

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**IMPACT OF GRANT FINANCING ON EFFICIENCY IN THE
AGRICULTURAL SECTOR**

ABSTRACT

of a dissertation for awarding an educational and scientific degree "PhD" in a
scientific specialty

"Economics and Management (Agriculture)"

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STRUCTURE AND SCOPE OF THE DEVELOPMENT

The developed thesis consists of 191 pages of main text and 6 pages of appendices. The material is illustrated by 10 figures and 29 tables. The structure of the development consists of an introduction, an exposition in three chapters, a conclusion and a list of the literature used. The number of literary information sources used is 245, of which 93 Bulgarian, 148 foreign language and 4 internet sites.

The dissertation work was discussed and referred for defense by the Department of "Industrial Business and Entrepreneurship" at Trakia University, Stara Zagora with a protocol dated 20.02.2023.

The public defense of the dissertation work will take place on 28.04.2023. from 1:00 p.m. in hall 3A of the SF, Trakia University – Stara Zagora in the open Meeting of the scientific jury, determined by order No. 554/22.02.2023 of the Rector of TrU - Stara Zagora.

Defense materials are available in the "Scientific" department of the Faculty of Economics, Trakia University - Stara Zagora and online at <https://trakia-uni.bg/>.

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1. GENERAL CHARACTERISTICS OF THE DISSERTATION

Relevance of the topic

The state has been intervening in the free market economy for centuries, with ongoing debate about the necessity and effects of the policies implemented. In modern economies, financial mechanisms and instruments for intervention are developing and improving at a rapid pace with a view to realizing the goals of state policy to support economic development, increase competitiveness and ensure food security. The role of the state in providing financial support is manifested to the greatest extent when directing financial resources to agriculture. The agricultural sector (AS) is traditionally one of the most financed economic sectors in the countries' economies, a policy we also observe when forming the financial framework of the EU's Common Agricultural Policy.

AS is a significant and driving force in the development of the economy of any country, it guarantees food on a national and global scale. It is characterized by a number of specific features that have an impact on the competitiveness of the sector and the income of agricultural producers.

¹ Of particular importance are the dependence of AS on natural and climatic factors and the presence of a time lag between production and the realization of the production, respectively the receipt of cash flows and the realization of profit. Despite the importance of agriculture to the food supply of any country, the incomes received by agricultural producers (AP) are lower than those received from non-economic activities (Thies and Porche, 2008).

AS is significant for the economy of our country, with an average annual number of employed persons of 3,121.7 thousand and creating 4% of the total GDP for 2020. At the same time, the GVA realized by the AS

¹ In this dissertation, we have chosen the concept of "agricultural enterprise" as a combination of "agricultural producer" and "farmer" with a clear understanding that they have a separate formal definition according to the current legislation in the country.

compared to other economic sectors is several times lower (6.3 compared to Services and 17.7 compared to Industry), and in the last 5 years a steady downward trend has been observed - "in real terms, it shrinking by 3.3% on an annual basis" (Agrarian Report 2021). The predominant number and size of enterprises in the AS - micro- and small enterprises² - have insufficient financial resources to finance their investments and continue to face difficulties in accessing external financing due to the higher risk in the sector. As a result, the policy of non-remunerated state support³ retains its key role for the prosperity and development of agriculture in Bulgaria.

Among the more important arguments that justify to a large extent the need for financial support from the state in the modern economy, we can point out the economic uncertainty, the significance of the AS in the country's economy, the impact of agricultural activity on the environment, the predominantly low and uneven received cash flows in the sector. Farmers continue to be highly dependent on non-remunerated state and European support received in the form of various economic levers.

2. Object and subject of the research

The subject of the scientific research is the non-reimbursed state financing as a significant factor for supporting the activity and improving the financial performance of agricultural enterprises.

The object of the scientific research in the dissertation are agricultural enterprises (small, medium and large) on the territory of Bulgaria with different specializations (subsectors).

² The dissertation uses the definition of small and medium-sized enterprises according to the Law on Small and Medium-sized Enterprises, Art. 3, para. 1-3 (promulgated SG No. 82 of 16.10.2009, amended and supplemented).

³ For the purposes of the dissertation, the author considers state grant support as the grant funds received in the form of state aid from agricultural producers. In the analysis of the research, we use the terms "state intervention" and "state grant funding/support" as synonyms.

3. Research thesis

The research **thesis** of the dissertation is that non-reimbursed government funding helps to improve the financial performance of agricultural enterprises and helps to increase their competitiveness. The financial support of enterprises in the AS in the form of targeted financial lines for the purchase of FTA favors the increase of both investment and innovation activity. At the same time, the effect of state grant funding is manifested to varying degrees on individual branches (plant breeding, animal breeding and combined farms) and the size of the private sector.

In order to prove the well-founded thesis of the dissertation work, 3 **hypotheses** were put forward, which were investigated within the framework of the dissertation:

- The provision of grants has a positive effect on the efficiency of agricultural enterprises, as expressed by the results of the activity, measured by the indicators of profitability and productivity.
- Agricultural enterprises that receive grant support and are characterized by higher investment activity are also characterized by higher innovation activity.
- The effect of the provision of grant support is manifested to a greater extent in the case of larger agricultural producers, who are more productive and profitable than small and medium-sized enterprises.

For the empirical study, we apply a regression model with fixed effects and logistic regression, as the most widely applicable in the study of financial support in agriculture and among similar studies of foreign authors studied.

4. Aim and tasks of the study

The main **aim** of this dissertation is to investigate and evaluate the effect that the state, through its policy on free financing of enterprises from the AC, has on the efficiency of agricultural enterprises, expressed through indicators of profitability and productivity.

To achieve the intended goal, it is necessary to solve the following **tasks**:

➤ Research and generalization of main theoretical propositions related to the nature, characteristics and development of state support in the AS. Derivation and synthesis of arguments for and against state intervention.

➤ Development of a methodological toolkit of scientific research through which to examine and evaluate the influence of the state policy on the provision of grants on the efficiency of agricultural enterprises.

➤ To analyze and evaluate the role of grant funding by examining:

✓ the effect in enterprises distinguished by size, age and subsector;

✓ has an impact on the investment and innovation activity of enterprises in the AS by performing a comparative analysis of agricultural producers who received state free support and those who did not. Formulation of the main results of the conducted scientific research.

➤ Drawing conclusions based on the results obtained from the conducted scientific research through the applied econometric models. Conducting an analysis of the state policy on providing free financing to producers in the AS.

5. Dissertation limitations

The study of agricultural finance in its entirety is a wide-ranging and debatable topic that goes beyond the scope and objectives of the dissertation. The present study focuses on the financial resources provided solely from the national budget. The official data necessary for conducting the empirical research were obtained from the financial reports of the AP. Given their aggregated nature, we track and analyze the received grant support through the realized revenues from enterprise financing.

The current dissertation does not examine the influence of the level (amount of financial resources) of funding from the state, due to the wide variety of groups of state aid provided in the agrarian sector. Government grant funding is presented solely as a binary variable that examines the presence or absence of government support.

In the dissertation work, the object of study is small, medium and large APs. Micro-enterprises are excluded from the scope of this study, mainly because of the capital constraints inherent in this group. They operate primarily with their own funds, carrying out activities primarily with the aim of providing household income. Micro-enterprises are subject to specific state support, providing access to micro-financing (Ershova, 2018) for start-up capital and social inclusion.

For the purposes of the dissertation, the efficiency of agricultural enterprises is presented as the ratio between the used resources and the achieved result of the activity (as the result increases compared to the used resources, the efficiency also increases) - it focuses on the extent to which the invested funds are returned in the form of a financial result. In the empirical study, only financial indicators and evaluation measures are used, which does not imply the study of the efficiency of the activity, measured by the qualitative indicators - to what extent a given goal or task is fulfilled.

I. STRUCTURE AND CONTENT OF THE DISSERTATION

The dissertation contains an introduction, an exposition in three chapters and a conclusion. It is in a volume of 192 standard text pages. 245 literary information sources were used. The text includes 29 tables and 10 figures. There are appendices to the dissertation in the volume of 6 pages, which contain 1 table.

The structure of the exhibition is as follows:

Contens

List of graphics images

List of abbreviations used

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1. FIRST CHAPTER. THEORETICAL ASPECTS OF STATE INTERVENTION IN THE AGRICULTURAL SECTOR

1.1. Nature and characteristics of state aid

1.2. Modern forms of state support in the agricultural sector

1.3. "For" and "against" state intervention in the economy and the agricultural sector

Conclusions

2. SECOND CHAPTER. THEORETICAL-METHODOLOGICAL FRAMEWORK OF THE INFLUENCE OF STATE NON-REMUNERATED SUPPORT ON THE EFFICIENCY OF AGRICULTURAL ENTERPRISES

2.1. Directions and hypotheses regarding the effect of grant funding on the financial performance of agricultural enterprises

2.2. Defining the factors of the studied dependence between the grant support and the financial results of the farmers

2.2.1. Performance of the activity, measured by the financial indicators profitability and productivity

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2.3. Models for defining the impact of grant funding on the efficiency of agricultural producers.

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3. THIRD CHAPTER. EMPIRICAL RESEARCH AND EVALUATION OF GOVERNMENT GRANTS ON PERFORMANCE

3.1. Analysis of state funding in Bulgaria

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3.2. Descriptive characteristics and variance analysis of differences in the results of the activity of agricultural enterprises

3.3. Results of the empirical study of the effect of the use of grant funding

3.3.1. A regression model with fixed effects

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CONCLUSION

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APPLICATIONS

Appendix 1. Examples of the most applicable instruments and schemes of the forms of state support in the AS in Bulgaria

II. MAIN CONTENT OF THE DISSERTATION PAPER

1. Introduction

The introduction justifies the relevance of the researched topic, as well as the need for its analysis, evaluation and improvement. The research thesis is formulated and the purpose and main tasks of the research, as well as its subject and object, are presented. The applied methods and approaches in the research are presented.

2. First chapter. Theoretical aspects of state intervention in the agricultural sector

In the **first chapter**, the theoretical aspects of state intervention in the agrarian sector are presented, the essence and characteristics of state aid are examined, the modern forms of state support in the agrarian sector are described, and attention is paid to the discussion question "for" and "against" state intervention in the economy and the agricultural sector.

In the **first paragraph** of the first chapter, a brief historical overview of the development of state support is made. The normative regulation of the state financial support is summarized, theoretical concepts related to the definition of the state grant and the principles that are applied in the provision of the state aid are disclosed..

The state has intervened in the free market economy for centuries, and its role in modern economies continues to be defining. The confirmation of this statement can be observed in different historical periods. Over the years, one can only trace the differences that stand out in the strength and form of its manifestation.

According to Mladenov (2017)⁴, for the first time formal support from the state can be determined during the period of so-called "protectionism" from the 16th to the 19th century, both in Europe and in America. The views and theories of this economic policy are mainly

⁴ Mladenov, Jr. 2017. Economic Justification of State Aid. Collection of lectures - State aid and the national court., pp. 14-32.

applied in relation to foreign policy - the import of foreign goods is limited by certain methods (protective tariffs, restrictive quotas, subsidies⁵, reduction of the tax burden and others), and exports are encouraged and supported of local goods.

Next, in a historical aspect, the supremacy of the theory of free competition proposed by Adam Smith in his work "The Wealth of Nations" is observed. In his work, Smith describes state support in the form of export premiums - "premiums are often demanded and sometimes given for the export of the products of individual branches of local industry ... in this way the commercial system intends to enrich the whole country" (Smith, 2013)⁶.

An important historical stage in the understanding of the role of the state is the acceptance of the fact that the two extreme manifestations of state intervention - denial of state support and full state control do not find practical application. At the end of the 19th century, the state assumed the role of an economic mediator. In his work, Peter Drucker points out that the US was the first to accept the role of the state and the government took a policy to guide and support business (Drucker, 2000)⁷.

In the literature, state support has been studied from different aspects. Shoileva (2009)⁸ examines the mechanisms for state financial support of the film and audiovisual industry in Europe. Hristova (2018)⁹ has studied the impact of state support on entrepreneurship in Bulgaria over the years. In 2016, Terziev and colleagues (2016)¹⁰ examined state

⁵ In the present study, the term "subsidies" is taken as a synonym for financial resources provided free of charge by the state, according to item 6 of IAS 20 Accounting for grants provided by the state and disclosure of state aid.

⁶ Smith, Adam. 2013. The Wealth of Nations. IC "Rata". Sofia. V-858, page 477.

⁷ Drucker, P. 2000. The Post-Capitalist Society. LIK Publishing House, Sofia, III-239, p. 133.

⁸ Shoileva, Anna. 2009. Financial support mechanisms for the film and audiovisual industry in Europe: characteristics, features, differences. Problems of Art, no. 1, pp. 23-29.

⁹ Hristova, V. 2018. Support for entrepreneurship in Bulgaria over the centuries - some aspects. Notices of the center for economic-historical studies, no. 1, pp. 151-164.

¹⁰ Terziev, V., N. Bencheva, T. Stoeva, M. Tepavicharova and Ek. Arabic. 2016. Institutional Support to Social Entrepreneurship. YEARBOOK OF THE UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKY", Volume 59, St. IV, Humanities and Economics, pp. 64-70.

support for social entrepreneurship in Bulgaria. Nikolova (2018)¹¹ assesses the consequences of government intervention for the implementation and production of renewable energy. Arabadzhiev (2005)¹² examines the relationship between state aid and regional politics. Based on empirical data from Polish enterprises, Lyskawa (2011)¹³ investigates state support aimed at AS expressed through insurance.

Gradually, over the years, the interest of scientific researchers is directed towards studying the impact of state support on enterprises by measuring the results of their activity. A number of studies indicate that subsidized enterprises realize more investment projects, others argue that in reality the effects of intertemporal substitution (a reduction in the cost of capital to the consumer relative to the cost of labor) prevail. The influence of state support is also examined in terms of employment in enterprises. A topical topic in recent years is the influence of state non-remunerated support on the innovation activity of enterprises.

Normative regulation of state financial support

For the first time, the formal concept of government grants was introduced in Article 16, Section A. Subsidies in the General Agreement on Tariffs and Trade (GATT). Grant funding is defined as "the provision or maintenance of any subsidy, including any form of income or price support".

Currently, a normatively regulated definition of state aid is contained in Art. 107, paragraph 1 of the Treaty on the Functioning of the European Union (TFEU) (former Article 87 TEU) - "any aid provided by a Member State or through the resources of a Member State, in whatever form, which infringes or threatens to distort competition by favoring certain undertakings or the production of certain goods".

¹¹ Nikolova, R. 2018. Assessment of the impact of mechanisms to support the development of RES in Bulgaria. Yearbook of the Faculty of Economics of the University of St. Kliment Ohridski", no. 1, pp. 123-144.

¹² Arabadzhiev, Hr. 2005. State aid in support of regional policy. Economics and Management, no. 3, pp. 32-35.

¹³ Lyskawa, Kr. 2011. Application of insurance – based support of agriculture by the state – the Polish experience and the EU guidelines. e-Journal VFU. Administration, Management and Economics.

The state aid law also discloses the principles that apply to the provision of state aid - necessity, expediency, proportionality and efficiency, transparency, balance, comparability and incentive effect.

In the **second paragraph** of the first chapter, heterogeneous forms of state support are described, classified according to different characteristics, and the author's classification is presented in the form of a table.

In the conducted literature review, as a more significant classification, the one whose sign is the manner of manifestation of the state intervention and presents the state financial support as direct and indirect is distinguished. In the case of direct state support, the aid from the state is direct and easily recognizable - there is a real transfer of funds to the specific enterprise, while in the case of indirect support it is carried out through third parties, various means or instruments, and is not so obvious - it is not per person direct transfer of funds from a public body to the enterprise, the economic benefit is enjoyed indirectly.

In an attempt to systematize and classify state support in Bulgaria, a summary of the forms of manifestation is proposed, keeping the main classification in the literature of direct and indirect intervention:

Table 1. Modern forms of state support

Modern forms of state support				
Direct forms			Indirect forms	
Grants	Refundable Funds	Preferences	Provision of funds	Provide services
Direct subsidy	Loan under reduced and preferential conditions	Tax reliefs: Forgiveness/write-off, reduction or rescheduling of obligations to the state, including of taxes, fees, social security	Financial support to enterprises involved in environmental projects outside their core business	Consulting services

Subsidy of interest payments	State guarantees	Provision of goods/services by the state/municipality under preferential conditions for acquisition by enterprises		Legislation to protect or guarantee market share
Forgiveness and rescheduling of financial obligations		Acquisition or sale of state/municipal land or buildings at prices higher or lower than market prices		Public-private partnerships and contracts not open to public tender;
Provision of financial resources by the state/municipality in a difficult situation		Accelerated mode of depreciation		Infrastructure projects aimed at individual or group users
		Increasing the state share in the capital of a commercial company		Безплатна телевизионна реклама
				Supporting the preparation of public enterprises for privatization

Source: author's development

Next, table 2 examines the variety of instruments of manifestation for intervention in the Bulgarian economy, which are aimed at supporting the development of the AS:

Direct support (provision of financial means)						Indirect support (lack of provision of financial means)
1. Direct subsidies						1. Tax reliefs and preferences
Investment aid	Compensatory aid	Aid aimed at ensuring the use of quality seed material in crop production and maintaining a high level of breeding activity in livestock production	Aid aimed at increasing the quality of food and raw materials of animal origin by paying particular attention to animal welfare	Assistance for participation in an exhibition	Minimum aid (de minimis)	2. Aid for investments in agricultural holdings through the concession of the corporate tax.
2. Direct payment schemes (Targeted subsidies for individual sectors)						3. Aid in the form of a discount on the value of excise duty on gas oil used in primary agricultural production
Crop production		Livestock		Crop and/or Livestock		4. Import and export quotas (tariff quotas and preferential regimes)

3. Loans under reduced conditions			5. Warranties
Short-term lending	Investment lending		
	Scheme for crediting with DFZ funds to persons with approved projects under the "National Beekeeping Program"	DFZ credit scheme for investments in agriculture	Crediting scheme for state aid projects "Investments for the construction of commercial premises and the purchase of commercial equipment for farmers making direct deliveries of small quantities of raw materials and food from farm animals"
4. Grants			

Source: author's development

In the third paragraph of the first, the discussion question "for" and "against" state intervention is considered. More significant arguments in support, which are presented in the dissertation work, are: supplementing market self-regulation, overcoming market defects, stabilizing and improving the financial performance of agricultural enterprises. Among the arguments against, the following are described as common: the possible deformation and disruption of market competition, distortion in the provision of support to agricultural producers, uneven receipt of subsidies mainly by large enterprises, while small and medium-sized enterprises remain disadvantaged.

Based on the literary analysis and the theoretical aspects of the state intervention in the agrarian sector, the following conclusions were drawn:

➤ There is no uniform classification of the forms of state support in the economic literature. Several more important categories are distinguished, the most significant being the distinction of state support according to the sign of its manifestation - direct and indirect. In this point of the dissertation, the author makes a proposal for classifying the instruments of state intervention in the AS depending on the way of providing support to agricultural producers.

➤ The European Union introduces some basic rules through its Competition Policy with the intention of preventing the occurrence of distortion of the economic market and violation of the competitive principle in the provision of grant support. State support is limited by the normative regulations, the aim of which is to avoid privileging a part of the beneficiaries. The long-term provision of the funds could lead to inefficient and unproductive activities in the AS and thus miss the emergence of new more efficient and innovative industries with growth potential. It is possible to eliminate competitive abuses and to realize an open and competitive market.

➤ There is scientific evidence that state intervention in the AS does not manifest itself unambiguously. Grant financial support is received mainly from large and large enterprises, while SMEs remain

disadvantaged. This happens due to the fact that the allocation of state financial resources is associated with economic losses and complex actions, the implementation of which is tied to incurring high costs. It is necessary to improve the tools and improve access to state support.

➤ The specificity of the sector continues to determine the high importance of state support in agriculture, through which important barriers such as insufficient loan resources directed at agricultural producers from commercial banks are overcome; barriers of a financial nature, expressed through scarce initial capital, related to the implementation of innovative technologies and digitalization; small, insufficient savings capacity and limited opportunities for self-financing of businesses in rural areas.

➤ With the development of the economy over the years, the economic market in agriculture also develops, this necessitates improvement and progress in the instruments of state intervention. Discussions continue on the topic of the influence of state grant support on the innovative activity of enterprises, the effect of the received financial means on efficiency and productivity and the transformation of agriculture towards digitalization. There is scientific evidence that funded businesses experience higher productivity growth, and are more profitable and efficient than businesses that did not receive.

➤ It can be summarized that the need for state and European support in the AS is determined by the fact that agricultural producers receive low and uneven cash flows, their activity is affected by natural-climatic factors and reflects on the environment. The provided financial resources are the main instrument of the agricultural policy of Bulgaria in the form of various economic levers. They aim to stabilize and improve the financial performance of enterprises.

➤ In the literature, there are scientific arguments in favor of the free market without the need for state intervention in the economy, sometimes seen as unnecessary intervention. According to some authors, the market with its "invisible hand" can handle every single task and every defect that occurs. But based on the presence of market

failures over time, state intervention has proven to be an inevitable and necessary measure. These failures can only be corrected through structural policies that actually provoke intervention in certain sectors and industries, as well as some groups of agricultural producers. On this basis, we justify our opinion that, regardless of the fact that the provision of state support in the form of financial grants is possible to deform the market, we believe that without it, APs would not be able to cope and improve the financial results of their activities.

➤ In the current economic conditions of uncertainty, accelerated rates of agricultural development, the introduction of innovations and the transformation of agriculture towards digitalization, we believe that the key role of state support needs to be preserved and continued. The low-tech development of the sector is a consequence in no small measure of the limited initial capital of most agricultural producers. By providing grant support and improving access to the credit market, sustainability of agricultural production and market can be achieved. With a view to preserving market principles, it is imperative that the state maintain its orientation towards the effect of improving the overall financial performance of agricultural enterprises, aimed at the realization of sustainable financial results and competitiveness.

3. Theoretical-methodological framework of the influence of state non-remunerated support on the efficiency of agricultural enterprises

The **second chapter** contains a theoretical-methodological framework of the influence of state non-remunerated support on the efficiency of agricultural enterprises. It presents the directions and hypotheses regarding the effect of grant funding on the financial performance of agricultural enterprises, defines the factors of the investigated dependence between grant support and the financial results of agricultural producers, and presents the models for defining the impact of grant funding on the efficiency of agricultural producers .

In the **first paragraph** of the second chapter, based on a comprehensive study of the economic literature, the following directions are summarized.

First of all, the research is aimed at determining the presence or absence of dependence between the receipt of non-grant financial support and the overall financial performance of the PA. Upon establishing the existing dependency, the research is deepened to trace its direction and strength. Based on this direction, the first hypothesis of the present study is put forward:

Hypothesis 1: The provision of grants has a positive effect on the performance of agricultural enterprises as measured by indicators of profitability and productivity.

At the next stage, it is monitored to what extent the state non-reimbursed support achieves its goals in terms of increasing the investment activity of agricultural enterprises, given that the funding is targeted. It is assumed that enterprises that receive free support and are characterized by higher investment activity are also characterized by high innovation activity. An argument for this is that investment-active PAs are more inclined to undertake innovative activities, due to their greater propensity for higher-risk decisions. Given this dependence, the investment-innovation relationship is investigated and characterized. On this basis, the second hypothesis in the empirical study is put forward:

Hypothesis 2: Agricultural enterprises that receive grant support and are characterized by higher investment activity are also characterized by higher innovation activity.

The third direction of the research aims to establish the existence of the dependence between the size of agricultural enterprises and their overall financial performance. It is assumed that large agricultural producers, due to their greater capital capabilities, including after receiving grant support, realize higher financial results from their activities compared to small and medium-sized producers. It is investigated whether the provision of state financial resources has a

stronger positive impact on large private enterprises, respectively whether they are more efficient compared to small and medium-sized enterprises of the AS, expressed through profitability and productivity indicators.

As a sub-task in the empirical research, the aim is to investigate whether there is a relationship between the age of the enterprises, expressed through years of activity, and the financial results of their activity. Upon proving the existence of this dependence, additional studies are conducted for its characterization. Accordingly, the agricultural producers who have been operating for many years are monitored to see if they are more efficient, respectively with higher productivity and profitability.

In view of the set third direction of the research, the following hypotheses are derived:

Hypothesis 3: The effect of the provision of grant support is manifested to a greater extent in larger agricultural producers, who have higher productivity and profitability compared to small and medium-sized producers.

Hypothesis 3.1.: Agricultural enterprises that have been operating for many years realize higher productivity and profitability compared to enterprises that have recently started their activity.

In the second paragraph of the second chapter, the factors of the studied dependence between the free support and the financial results of the farmers are defined, namely the efficiency of the activity, measured by the financial indicators profitability and productivity.

First of all, the return on assets indicator is chosen as the most comprehensive measure of profitability, it is the most frequently used indicator in economic research to determine financial efficiency. The indicator is suitable for the present study, since the goal is to examine the general increase in the financial efficiency of enterprises and specifically the ability of agricultural enterprises to generate income from their assets, respectively, the return on the total assets invested in the activity of the agricultural enterprise is tracked.

At the next stage, the productivity indicator was selected, expressed as a logarithm of the ratio of net sales revenue (NSR) and the average annual number of employed personnel in the enterprises at a given time. The indicator derived in this way reflects staff efforts isolated from market changes.

The focus of the study is on the free receipt of state support by farmers and its effect, which is why "grant financing" is introduced as an indicator of the free financial means provided by the state to farmers. In the empirical study, government support is represented by an alternative variable that takes a value equal to 1 if the agricultural enterprise receives government funding and 0 if it reports no funding income.

Due to the fact that the independent variable "free financing" explains only one part of the economic results of the activity of agricultural enterprises, the control variables are introduced in the study, since they are also important factors that influence the efficiency and economic results of the activity - innovation activity, investment in real assets, capital structure, size and age of the enterprise. Table 3 summarizes and defines the described variables of the empirical study:

Table 3. Definition of variables.

Variables	Indicator/notation	Formula	Unit of measure	Definition
Зависими променливи				
Profitability	ROA	$\frac{EBIT}{Assets}$	BGN thousand	Return on assets
Labor productivity	P	$\frac{net\ sales}{employees}$	-	NPP to staff ratio
Независима променлива				
Free financing	grants_1_0		1;0	Income from financing;

	log_grants		-	Logarithm of funding income
Control variables				
Innovation activity	rdactivity	$\frac{\textit{intangible costs}}{\textit{Assets}}$	%	Relative share of LIA costs to assets in the enterprise
Investments in real assets	FTA (Fixed tangible assets)	$\frac{\textit{FTA}}{\textit{Assets}}$	-	Relative share of FTA to assets in the enterprise
Enterprise size	size_log_assets	-	-	Logarithm of total assets
Age of the enterprise	age_group	-	-	Years of activity of the enterprise from the date of its establishment (groups)
Capital structure	leverage	$\frac{\textit{debt}}{\textit{equity}}$	-	The relative share of the obligations to the equity

Source: own development

In the third paragraph of the second chapter, the models for researching the impact of grant funding on the efficiency of agricultural producers are defined.

In the present dissertation, the empirical research is carried out on the basis of panel data, which represent a set of data presented most often in a two-dimensional matrix. In the present case, one dimension is temporal and presents data for the studied agricultural enterprises at a certain time period T, and the other is spatial and includes data for the various APs (FTA, LIA, EQUITY, average annual staff, etc.) at the same moment N, i.e. in the two-dimensional matrix there are N.T observations.

The most commonly applied regression models for tracking dependencies similar to those of the present study are those with fixed and random effects. The theory assumes that when the units are randomly selected, the random-effects model is appropriate, and when the units are the majority (almost) of the population, the fixed-effects model is more appropriate. In order to be able to make the right choice of which model is suitable for a given set of data, it is necessary to conduct a statistical test. In the present study, it was chosen to apply the Hausman test.

The regression equation of the fixed effects model in the present study with dependent variables profitability and productivity has the following form:

$$\begin{aligned}
 Y (ROA, P) &= \beta_0 + \beta_1 \cdot \log_grants + rdactivity + \beta_2 \cdot FTA_activity \\
 &+ \beta_3 \cdot size_log_assets + \beta_4 \cdot age_group + \beta_5 \cdot leverage \\
 &+ \gamma + \varepsilon
 \end{aligned}$$

where:

Y is the dependent variable, for the purposes of the study it is assumed that these are the values of the financial results of the enterprises' activities (profitability - ROA and productivity - P);

β_0 is constant;

log_grants – logarithm of the state grant received;

rdactivity – the ratio of the amount of funds that the enterprises have invested in the LIA for the current year (includes development products, concessions, patents, licenses, trademarks, software) on the total amount of assets of the enterprises for the same period of time;

FTA_activity – the ratio of FTA to the total amount of assets in enterprises;

size_log_assets – amount of AP, expressed as a logarithm of the total amount of assets;

age_group – grouping of APs according to the years of activity from the date of their creation;

leverage – the ratio of liabilities (short-term and long-term) of enterprises to their equity;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ – the model parameters;

γ – fixed effects term;

ε – random component.

Logistic regression is a method that uses an alternative dependent variable to describe the relationship between the probability of an outcome event, measured on a dichotomous scale, and one or more factor variables. The variable Y (state support) reflects the probability that enterprises receive state support by taking a value equal to 1 or a value equal to 0 if agricultural enterprises do not receive state support.

The logistic regression equation in the present study has the following form:

$$Y \left| \frac{grants_{1_0} = 1}{grants_{1_0} = 0} = \right. \\ = \beta_0 + \beta_1 \cdot ROA + \beta_1 \cdot P + \beta_3 \cdot rdactivity \\ + \beta_4 \cdot FTA_activity + \beta_3 \cdot size_log_assets \\ + \beta_4 \cdot i. age_group + \beta_5 \cdot leverage + \gamma + \varepsilon$$

where:

β_0 is constant;

grants_{1_0} – an alternative variable to take a value equal to 1 if the enterprise received government support and 0 if it did not;

ROA – profitability of enterprises;

P – productivity of enterprises;

rdactivity – the ratio of the amount of funds that the enterprises have invested in the LIA for the current year (includes development products, concessions, patents, licenses, trademarks, software) on the total amount of assets of the enterprises for the same period of time;

FTA_activity – the ratio of FTA to the total amount of assets in enterprises;

size_log_assets – amount of AP, expressed as a logarithm of the total amount of assets;

i.age_group – grouping of APs according to the years of activity from the date of their creation

leverage – the ratio of liabilities (short-term and long-term) of enterprises to their equity;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ – the model parameters;

γ – fixed effects term;

ε – random component.

In the **fourth paragraph** of the second chapter, the data and methodology of the empirical research are described.

In the present study, company data of 494 enterprises from the AS in 2012 were used, which for the ten-year study period decreased by 43 - 451 AP. In the sample from 2012, 335 are the enterprises that develop their activity in the Plant Breeding subsector, 73 in the Animal Breeding subsector, 37 have a combined activity - crop and livestock farms and the remaining 49 are representatives of Forestry and Fisheries (described as other activities in the empirical study), respectively, in 2021 the number of agricultural producers is 324 - Plant breeding, 49 - Livestock breeding, 37 - combined activity and 41 other activities. The sample includes small, medium and large enterprises, respectively, with a number of employees 10-49 for small, 50-249 for medium and over 250 for large, according to the Law on SMEs. As we indicated earlier, we exclude micro-enterprises from the scope of investigated enterprises in the present study. As an important argument, we pointed out the capital restrictions inherent in this group in a significant part of the enterprises. Agricultural micro-enterprises also include units that operate mainly with their own funds and carry out their activities to provide income for the family.

When forming the sample of enterprises, we were guided by two main principles - that it should be large enough to be representative of the general population and that individual enterprises fall into the sample randomly. The dissertation presents the number of enterprises in the country at the beginning and end of the researched period 2012-2021, and the enterprises studied in total represent 28% of the total population. We consider that a relative share of covered enterprises of 28% of the general population for both years provides a sufficient sample size to ensure representativeness of the data. No selection criteria were applied in the selection of the enterprises, the selection was made through a certain number of units. The method of stratified random sampling was used to collect the data. This method was chosen in order to have representatives of small, medium and large enterprises in the sample, which will provide us with both representativeness and greater opportunities for analysis.

Within the framework of the specified time span of ten years for the purposes of the analysis, the enterprises are grouped into several categories depending on the factors we are investigating. On the basis of the grouping indicator "received state free support", we divide the agricultural producers into two groups - those who received state financial funds and those who did not. According to the *economic sub-sector* in which they carry out their activity, we examine plant-breeding, animal-breeding and plant-breeding-livestock agricultural enterprises. According to the *years of activity* of AP since their establishment, we divide them into four groups - up to 10 years, between 11 and 15 years, between 16 and 20 years and over 21 years. *Farmer size* is the last grouping feature applied in the current empirical study, by which we represent APs as small, medium and large.

The specific methodology by which the scientific research is carried out is presented in Figure 1, in which the object and the subject, the variables and the econometric models of the empirical research are systematically reflected:

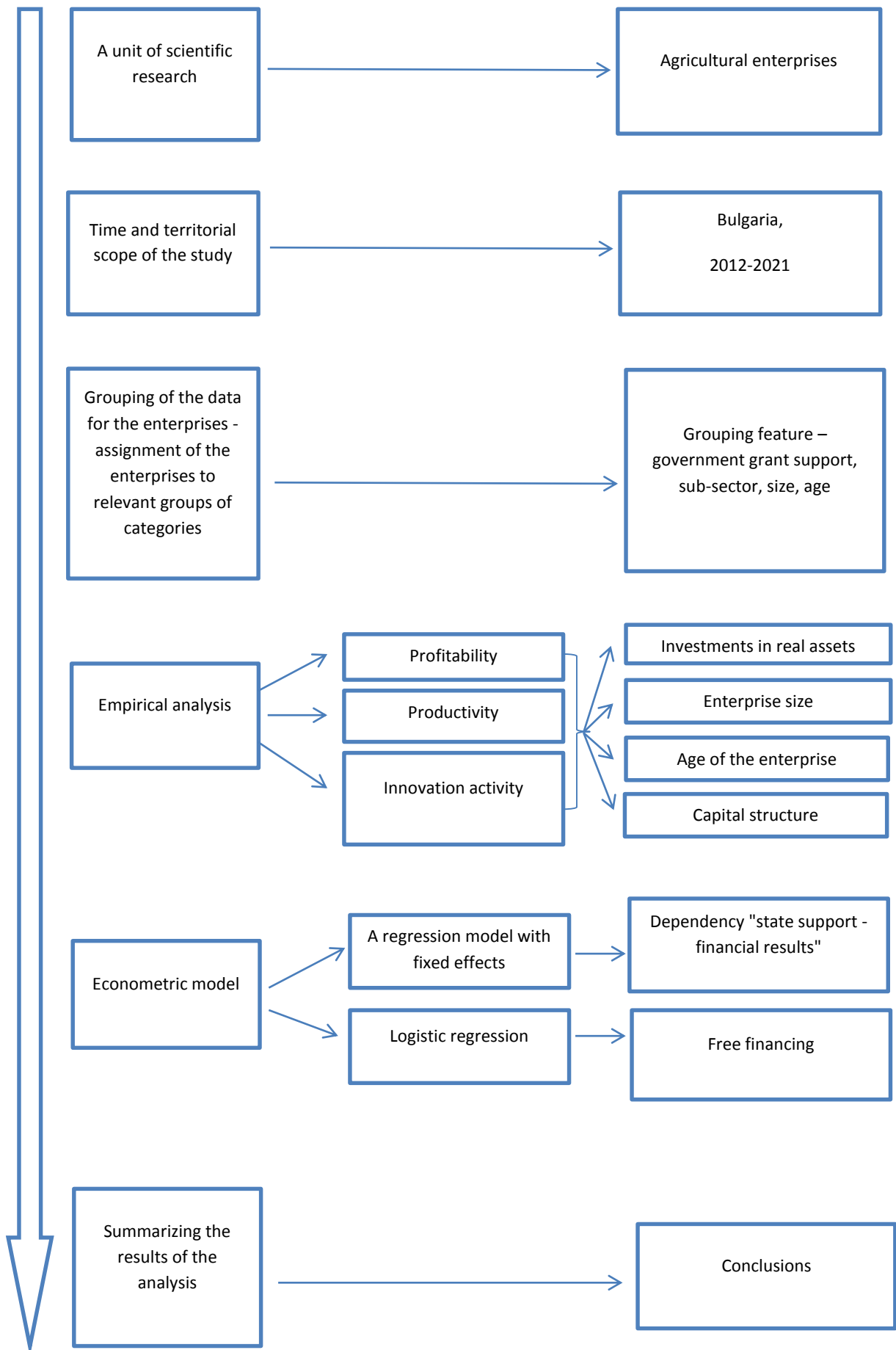


Figure 1. Methodology of empirical research

On the basis of the derived theoretical-methodological framework of the influence of state free support on the efficiency of agricultural enterprises, the following conclusions were drawn:

➤ In economic circles, it continues to be a debatable issue regarding the effects of state policy, due to its widespread application. Given that AS is heavily supported with grant funding, the focus of this dissertation is the impact of this support on the overall financial performance of agricultural enterprises. For this purpose, two econometric models of the change in the financial results of the activity of the private sector and the factors that determine this change are compiled.

➤ As the most comprehensive measure of profitability and the most frequently used indicator in economic research to determine financial efficiency, the ROA indicator is applied. With ROA, we examine the general increase in the financial efficiency of enterprises and specifically the ability of agricultural enterprises to generate income from their assets, respectively, the return on the total assets invested in the activity of the farm is tracked. For performance research, we use a partial indicator, i.e. the joint action of other factors affecting the indicator is expressed. This is indicative of determining the actual state of the investigated agricultural enterprises for the respective year. A number of authors consider innovation as one of the long-term factors of economic development. By researching the innovation activity of the PA, we report the intensity of input costs for investments in innovation activities and thus aim to reflect the degree of efforts made for the introduction of innovations.

➤ A key variable in the study of agricultural development derived from the economic literature is grant funding. We choose it as the independent variable of the present empirical study because it focuses on the receipt of government support and its impact on the

overall financial performance of farmers. Next, we introduce control variables, as a result of which 'grant financing' explains only one part of the overall financial performance of agricultural enterprises, and they are also important factors influencing efficiency. The applied control variables have been used by a number of authors in similar studies: Investment in real assets, Size, Age and Capital structure.

➤ The regression model with fixed effects is proven to be a widely applicable model in various areas of economic scientific literature in the study of panel data. In most cases, its significance is justified by removing additional factor variables within the study object that may influence or bias the predictor variables or outcomes, so that the net effect of the predictors on the performance of enterprises can be assessed. from AS, expressed through the indicators of profitability, productivity and innovation activity.

➤ The logistic regression model is widely applicable in the economic international scientific literature. We apply it because the target variable in the present empirical study is binary (presence/absence of government support) and the influence between the categorical variable Grant Funding and the quantitative variables Innovation Activity, Investment in Real Assets, Size, Age and Capital Structure of the enterprise is investigated.

4. Third chapter. Empirical research and evaluation of government grants on performance

In the **third chapter**, an analysis of the development of state support in the country is made, following 3 consecutive periods that examine Bulgaria at different moments of its state - before its membership in the EU and the first two periods after its accession. A dispersion analysis of the differences in the results of the activity of the agricultural enterprises was performed and the results of the empirical study of the effect of using the grant financing were described.

In the first paragraph of the third chapter, a critical analysis of the development of state non-remunerated support in Bulgaria is made. In the analysis conducted, an upgrade and development of the provided support is observed, expressed through the provision of new financial instruments and the improvement of already notified schemes. The role of the state in supporting enterprises is strengthened.

In the second paragraph of the third chapter, descriptive characteristics and dispersion analysis of the differences in the results of the activity of agricultural enterprises are presented.

The database of agricultural enterprises, which is used for the present study, contains representatives of a large part of the legal-organizational forms of enterprises from the AS in Bulgaria. With the highest number in 2021 are limited liability companies (143 units), followed by sole proprietorships with limited liability (1134 units) and sole traders (118 units). There are fewer representatives of joint-stock companies, sole-joint joint-stock companies, collective companies and others. The predominant part of the agricultural enterprises are engaged in crop-growing activity - 324 AP or 72%, followed by animal breeding and combined, respectively - 49 enterprises - 11% and 37 - 8%.

For the purposes of the analysis, to represent the sample, the change in variance, standard deviation, mean, minimum and maximum value of the variables in the empirical study for the entire ten-year period is considered (table 4):

Table 4. Summary data of the variables in the empirical study.

Variable	Dispersion	Mean	Std. dev.	Min	Max	Observations
ROA	overall	.118088	.5550891	.0001098	28,20	N = 4717
	between		.2571439	.0007029	4.979505	n = 553
	within		.5092664	-4.860478	25.06479	T-bar = 8.52984
P	overall	116.8415	124.3542	.4347826	3475	N = 4639
	between		140.5468	6.712268	2574	n = 552
	within		72.3872	-821.4878	2498.411	T-bar = 8.40399
grants	overall	615.8547	836.827	0	11827	N = 4707
	between		736.0201	0	6631.667	n = 553
	within		374.1739	-3882.812	9596.655	T-bar = 8.51175
FTA_activity	overall	.5046244	.2159064	0	1	N = 4717
	between		.2062841	.0014929	.9706229	n = 553
	within		.0895646	-.122718	.9916248	T-bar = 8.52984
rdactivity	overall	.0021506	.0249658	-.2012882	.5	N = 4717
	between		.0166781	-.1645097	.286792	n = 553
	within		.019177	-.1178144	.4521506	T-bar = 8.52984
leverage	overall	3.740785	60.57505	0	2692	N = 4718
	between		54.69983	.0097976	1158.5	n = 553
	within		53.18151	-392.2887	2416.136	bar = 8.53165
size_log_assets	overall	8.296141	1.139431	1.609438	12.39623	N = 4717
	between		1.131045	4.451024	11.84719	n = 553
	within		.2818522	2.337245	9.753881	T-bar = 8.52984
age	overall	17.46518	5.570375	3	31	N = 4738
	between		4.936111	6	28.25	n = 553
	within		2.788794	11.63184	23.0366	T-bar = 8.56781

In the **third paragraph** of the third chapter, the results of the empirical study of the effect of using non-reimbursed state funding based on the applied econometric models in the dissertation are presented.

First, to confirm the choice of fixed versus random effects model, it is necessary to perform the Hausman statistical test. The results are conclusive and prove that the correct choice is the fixed effects model for both dependent variables – profitability and productivity.

The *first conducted regression model with fixed effects, with profitability as a dependent variable*, proves the existence of a dependence, both between the realized efficiency of agricultural producers and the state free support, as well as with the investment

activity, size and age of the studied enterprises in the AS. In the conducted model, innovation activity and capital structure of agricultural producers are not statistically significant indicators and do not affect their efficiency.

The second conducted regression model with fixed effects, with productivity as the dependent variable, proves the existence of a relationship between the productivity of agricultural producers and the dependent variables – state grant support, size and age of enterprises.

On the basis of the results obtained from the conducted regression models and additional empirical studies, the truth of Hypothesis 2 in this dissertation is proven, namely that farmers who receive grant support in the form of financial resources and are characterized by higher investment activity are characterized by higher innovation activity.

With the third conducted model, the logistic regression, it is proven that farmers who realize higher financial results of the activity, expressed through the indicators of profitability and productivity, are more likely to receive state gratuitous support. The results of the conducted logistic regression show that agricultural enterprises that are at the beginning of their activity are more likely to apply for and receive state free support. In the first years of the establishment of the enterprises, the state aid is most significant and useful, because after that, during the years of activity, the private enterprises manage to become more profitable and look for other opportunities for external financing.

Based on the research work carried out in the third chapter of the dissertation, the following conclusions can be drawn:

➤ For the period 2000-2006, Bulgaria's macroeconomic indicators show an upward trend, which indicates the beginning of the recovery period for the country after the last economic crisis (1996-

1997). The additional European funds that the state receives help its faster economic and financial strengthening. The support received by the AS has increased over the years, but the share of the sector in the country's GDP is gradually decreasing. A major factor in this situation is the uneven distribution of funds – the majority is received by the small number of large farmers, while small and medium-sized ones remain unfinanced.

➤ During the first program period of Bulgaria's membership in the EU, the stability of its macroeconomic indicators was preserved, with the exception of 2009, when the economic and financial crisis occurred. The non-reimbursed financial support to the AS continues with the aim of increasing the competitiveness of the sector. During the period, funds are provided under already implemented schemes from the pre-accession period and under newly developed and notified state aid schemes to support agricultural producers.

➤ During the second program period, the rate of growth of the country's macroeconomic indicators continues to hold. An exception has been observed in the last year, due to the onset of the COVID-19 pandemic and the negative consequences it had on the economy, both globally and nationally. At the beginning of the period, the provision of state aid in the AS in the manner in which it has been applied until now is suspended. New schemes have been developed and notified to direct the limited state funds to the most needy sub-sectors and activities in the most favorable way. The main purpose of the state grant-in-aid support is to cover priority and sensitive sectors that are not covered by EU funds.

➤ After carrying out the analysis with a regression model with fixed effects, it was found that the provided grant support has a positive effect on the financial results of the activity of the AP, expressed through the profitability indicator. On the basis of the obtained result, the Hypothesis 1 stated in the second chapter is proved.

➤ Agricultural enterprises that receive state support in the form of grants and are characterized by higher investment activity are also

characterized by higher innovation activity. Based on the conducted regression models and derived additional empirical studies, the obtained results prove this statement and the Hypothesis 2 presented in this dissertation is accepted.

➤ On the basis of the dispersion analysis carried out in the dissertation work, the presence of a statistically significant dependence between the provided non-reimbursed financial support of the AP and their amount is proven. The obtained results show that the financial results of the activity are higher for small agricultural producers than for larger ones and the positive effect of the provided state support is expressed to a greater extent. Based on the obtained results, Hypothesis 3 in the dissertation is rejected.

➤ Next, after conducting a study related to the influence of the years of activity (age) and the financial results of the activities of the enterprises in the AS, it was proved that the employees who carry out their work for a longer period of time have a higher productivity and profitability relative to younger farmers. Based on this statement, Hypothesis 3.1 of the dissertation is accepted.

III. CONCLUSION

The agricultural sector is a key sector in the Bulgarian economy. It is being modernized, albeit slowly, as agricultural enterprises develop and consolidate. At the same time, the main challenges they face continue to be the difficulties caused by the specifics of the sector itself. The uncertainty and variability of natural factors has a strong impact, which can lead to a production shock and thus affect the prices of products (a large part of production is of products whose demand is inelastic to prices and incomes), which in turn provoke volatility in pension income and this adversely affecting investment decision-making.

AS is essential for the sustenance of any country, but the incomes realized by agricultural producers are lower compared to the incomes received in other sectors. Also, the predominant units in the sector are micro and small enterprises. They have insufficient financial means to make the necessary investments in the enterprise's activity process, and their access to external financing is in many cases severely limited. This predetermines the key role of state intervention in preserving the prosperity and development of the AS in the country. By promoting the sustainable development of AP by providing grants to enterprises, the economic development of rural areas will be supported and it will help to increase the competitiveness of the AS as a whole.

Several main categories of state support are identified in the literature, but there is no unified classification. The most significant category stands out according to the sign of its manifestation - direct and indirect. In this dissertation, an author's classification is proposed to present the modern forms of state support. The direct forms are represented as free financial means, funds subject to reimbursement and preferences, and the indirect forms are the provision of financial means and the provision of services.

In the essence of the conducted empirical research, evidence of a positive influence of non-reimbursed state support on the financial

results of the activity of the private sector, expressed through the indicators of profitability and productivity, is found. We also found that agricultural producers who received grant-in-aid from the state and are characterized by higher investment activity are also characterized by higher innovation activity.

The existence of a statistically significant dependence between the amount of the AP and the non-reimbursed financial support provided by the state is substantiated on the basis of dispersion analysis. It is established that smalls realize higher financial results from their activities compared to larger ones and the positive effect of the provided state support is expressed in them to a greater extent. Based on the results obtained, there is no evidence that the effect of the provision of state support is manifested to a greater extent in the case of larger farmers, who have higher productivity and profitability compared to small and medium-sized producers.

In the conducted empirical research on the influence of the years of activity and the financial results of the activities of the enterprises in the AS, it was argued that APs who have been working for a longer period of time realize higher productivity and profitability compared to more recently established agricultural producers .

Based on the results obtained from the logistic regression, it is established that it is more likely that the farmers who realize higher financial results from the activity and are at the beginning of their activity will receive state free support. It is believed that 3 years after receiving the state grant-in-aid support, APs manage to realize a positive effect of their innovation activity.

State intervention has a positive effect on the financial performance of agricultural enterprises. The financial resources that are provided to enterprises from the AS have continuously increased over the years, which is proof and a strong argument for the real need for this support and the need for it to continue in the future under the current economic conditions of uncertainty and accelerated rates of development of agriculture.

IV. MAIN CONTRIBUTIONS IN THE DISSERTATION

1. A critical review and systematization of significant theoretical views on the discussion question of the need for state intervention in the economy in general and in the agrarian sector in particular was made;

2. A methodical approach has been improved and a methodological toolkit has been developed for research and evaluation of the impact of the provided financial resources on the efficiency of agricultural enterprises in Bulgaria. There is a possibility that the methodological toolkit can be applied in relation to other policies and financial instruments for support in the agricultural sector;

3. An author's classification of the forms of state support in the agrarian sector has been derived and systematized based on a broad review of modern forms of state support;

4. The author's empirical research was carried out, and two econometric models were successfully adapted and applied - a regression model with fixed effects and a logistic regression. On this basis, the relationship between state gratuitous support and investment activity, capital structure, employed personnel, years of activity of enterprises is described. Corresponding impact assessments are derived;

5. Dependencies between the receipt of grant financial assistance and the ability of agricultural enterprises to realize sustainable financial results and higher income per employee have been revealed. The interrelationship "investment - innovation activity" is substantiated, proving that investment-active agricultural producers who received free financial support from the state are characterized by higher innovation activity.

V. DISSERTATION RELATED PUBLICATIONS

1. Dimitrina Stoyancheva and Darina Stoyanova. Growth and innovation activity of Agricultural and Food processing firms in Bulgaria. Proceedngs of 37th International Scientific Conference on Economic and Social Development – "Socio Economic Problems of Sustainable Development" - Baku, 14-15 February 2019, p. 1312-1320. (ISSN: 1849-7535), indexed in Web of Science;

2. Darina Stoyanova. 2019. The need for state intervention in the economy and in particular in the Agricultural sector – arguments for and against. Trakia Journal of Science, Vol. 17, Suppl. 1, pp. 440-444. (ISSN 1313-7069 (print); ISSN 1313-3551 (online));

3. Darina Stoyanova and Dimitrina Stoyancheva. Influence of state grants upon effectiveness of the enterprises in the agricultural sector. Trakia journal of sciences, 607-613.

Citations noted:

Darina Stoyanova. 2019. The need for state intervention in the economy and in particular in the Agricultural sector – arguments for and against. Trakia Journal of Science, Vol. 17, Suppl. 1, pp. 440-444. (ISSN 1313-7069 (print); ISSN 1313-3551 (online))

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