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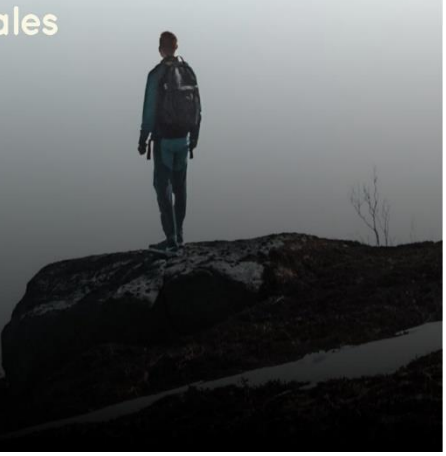

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SOCIOECONOMIC OPTIMIZATION OF CREDIT SUBSIDIES FOR AGRARIAN BUSINESS DEVELOPMENT PROJECTS

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Abstract

In modern agricultural business, an important role is assigned to social and economic criteria of effectiveness of decision-making aimed at regulating the development of agricultural business and the food market. Socio-economic assessment of projects for development of grain production entities with the participation of the state through subsidizing the lending process is necessary for improvement of functioning and growth dynamics of small, medium, and large-sized businesses. The social and economic criteria recommended by the authors are designed to encourage creating of new jobs, improve the standard of living of agribusiness participants and rural residents, and reduce social tension. It is noted that today there is a need in increase of investment activity, including improving quality of credit instruments that are being used. In this regard, the proposed method for determining the optimal level and limits of economic efficiency of credit subsidies for grain business development projects is important for the economy of the agro-industrial complex. All of the above indicates relevance of the research topic chosen by the author. The purpose of the author's research was to develop a methodology for clarifying the quality indicators of credit security aimed at final performance. Scientific developments of domestic and foreign branch experts have been held for methodological basis of the research. For the information base, the author is using references and normative materials, periodical publications, data from Internet sources, logical techniques, and their own calculations. The research methods applied in the article are the following: abstract, monographic, comparative, computational, econometric, and economic. The results of using the method recommended by the author have showed the optimal level of compensation for the Bank credit rate under the current market conditions of 2.6% (with the current refinancing rate of 4.25%). This value will be the most profitable decision for the policy of state support, since it provides the most effective combination of factors of the tax burden (budget revenues), investment activity, the benefits of running a grain business, and achieving social and economic goals.

Keywords

Credit instruments – Subsidies – Social and economic efficiency

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Introduction

Social and economic criteria for evaluating efficiency are playing a major role in decision-making processes for regulating agricultural production and product market. This statement fully applies to projects for operating small, medium and large-sized grain businesses that are being implemented with the participation of the state through subsidizing credit rates for industry development projects. Social criteria are aimed to create jobs, improve the well-being of agricultural business participants living in rural areas, and reducing social tension[1]. Therefore, determining the optimal level and the limits of economic efficiency of credit subsidization for grain business development projects is important for the economy of the agro-industrial complex[1].

Growing capitalization of the modern agricultural economy has lost the ability to be regulated by the mechanism of market competition. In the practice of modern market management, resource balancing factors are failing to work properly: they show low efficiency, especially in the segment of agricultural business. Production and selling of agricultural products are carried out by a business of perfect competition with a weak influence on market prices with weaker opportunities compared to participants in other industries. Agricultural producers have little influence on the process of regulating the development of their business; they experience a constant lack of resources for organizing their simple and expanded reproduction, and implementing innovative opportunities[2]. All of the above indicates the need in using new policy methods to improve economic instruments for regulating development.

State support for the development of agrarian sector in 2019 has reached around $3.9 billion, in 2018 – $3.3 billion, in 2017 – $2.8 billion. Under the state support programs in 2018, 77 Federal subjects of the Russian Federation of the agro-industrial complex were provided with assistance in the amount of 27 billion rubles, or $346.2 million, in order to compensate for investment lending expenses. Then, for the first time, there was applied an innovation that aimed at concessional lending to agricultural producers at a rate of 5%, while simplifying the provision process as much as possible. This allowed producers of products and services in the agro-industrial complex to significantly reduce the time for obtaining such services, while 50 billion rubles were allocated for this form of support, which in turn eased the burden of lending for participants of this program.

But these volumes were clearly not enough, not everyone could then and later use the opportunity to get relatively "cheap" credit money. This was not enough to create sufficient favorable conditions for development of the agricultural industry in a highly competitive environment with advanced western benchmarking. In the medium run, such development requires a higher level of state participation, which would exceed the previous and current levels. The lack of practice of model optimization for management decision-making in the field of subsidies with the participation of the state leads to a decrease in the efficiency of the agricultural and grain business. It is necessary to continue improving the procedure for practical credit regulation of the process of investment renewal of fixed assets of the agro-industrial complex, taking into account current market conditions.

[1] Antulio N. Bomfim, Understanding Credit Derivatives and Related Instruments (Englewood Cliffs: Academic Press Advanced Finance, 2014), 415.
[2] E. Castle; M. Becker y A. Nelson, Farm business management. The Decision-Making Process. 3rd ed. (New York: Macmillan Publishing Company, 1987), 401.

Investment performance indicators aimed at the final social and economic results in the field of agriculture and grain business in relation to the regions of Russia were considered in their scientific works by V. Birman[3], O. Prichina and G. Klyushnikov[4], L. Kormakov[5], and others[6]. The purpose of our scientific solution was the need to prepare a methodology for improving the quality of credit security indicators aimed at the final result, which, in practice, is in demand. Based on this goal, the task of developing a methodological approach for determining the optimal level of state budget credit subsidies for investment projects was determined and solved.

Methods

The methodology of this study is based on scientific results obtained by foreign and Russian experts. The informational base was built on references and normative indicators, published materials of open scientific periodicals, information from the world's Internet network, logical techniques, and author's calculations. The study has implemented abstract, comparative, monographic, and computational methods and techniques of econometric modeling. Scientific novelty is represented by the method of minimizing the credit rate for subsidizing industry investment projects with the participation of the state, with social factors taken into account.

Results

Currently, the state program of support, including subsidizing the credit rate of agricultural investment projects for the Krasnodar territory, is structured according to subprograms. The state support program for the year of 2019 provided by Central Federal government's and local budgeting in the amount of 8295,2 million rubles, was implemented on 8065.1 million rubles, or, in other words, 97.2% of the dotation was spent. Sources and amounts of Funding for the state program of the Krasnodar territory are shown in Table 1 the data show the sources and amounts of collateral[7].

Since 2014, the amount of state support funding has been significantly reduced due to the well-known sequestration of federal spending, and so far, even without taking annual inflation into account, it has not reached the level of 2013. This lag has reached 23.1% by 2017, while capital investment transfers to legal entities, individual entrepreneurs and other market participants at the expense of regional budgeting funds were growing significantly. The 2019 subprogram was planned to provide subsidies for partial reimbursement of interest payments from Federal and regional sources in the amount of 926.1 million rubles, including 729.2 million rubles from the federal budget and regional – 196.9 million rubles. In the fiscal year of 2018, 915.2 million rubles (98.8% of the planned amount) were disbursed.

[3] V. F. Birman, Fundamentals of strategic management of the grain product subcomplex development (Zernograd: ACHGAU, 2015), 259.

[4] O. S. Prichina y G. M. Klyushnikov, Modeling of budget regulation of credit relations in the region. Scientific work of NCSTU. The economic series. Vol. 1. Stavropol (2015): 47–55.

[5] L. F. Kormakov, "Investments in the agro-industrial complex: directions, priorities, efficiency assessment", Economy of agricultural and processing enterprises. num 3 (1996): 8–12.

[6] A. V. Tolmachev; A. A. Kholyapin y V. A. Varfalameev, Improvement of economic investment tools (Moscow: Ripoll, 2008).

[7] On the implementation of the state program of the Krasnodar territory for the development of agricultural products and regulation of agricultural products markets, (2020). Available at: http://www.dsh.krasnodar.ru

The volume of financial support for the 2019 subprogram of stimulating the lending process subsidizing investment renewal of fixed assets of the agro-industrial complex was sequestered as before. As a result, the agro-industrial complex of the region has received significantly less funding, only 787.4 million rubles.

Indicators	2013	2017	2018	2019
Federal budget	6317,6	4431,7	3642,6	4091,6
including subsidies for: legalentities (LE) and sole proprietors (SP)	6063,6	4367,9	3589,5	4008,2
municipalities	117,0	63,8	53,1	83,4
other participants	136,9	–	–	–
Regional budget	3374,3	3019,3	4105,2	3973,5
including subsidies for: LE and SP	1264,0	1492,6	2038,2	2330,5
municipalities	117,6	168,7	105,2	135,0
other participants	326,0	1357,9	1962,0	1508,0
local budgets	29,3	–	–	–
additional supply	1637,1	–	–	–
Total:	9691,9	7451,0	7747,8	8065,1

Table 1
State financial support for the agro-industrial complex's development process in the Krasnodar territory, million rubles

Practice shows that subsidizing bank loan rates is an important area of state funding for the support of the implementation of investment projects, including in the grain business[8]. Joint monitoring with V. Varfolomeev[9] and G. Chernykh[10] allowed us to study investment practice in at least 37 investment projects of grain business enterprises in the Southern and North-Caucasian regions of our country. These enterprises have used credit preferences for concessional lending with the amount of funds raised totaling 474.6 million rubles. At the same time, the amount of subsidies allocated for the purpose of compensating the credit rate in the production of raw materials, products, and their processing has amounted to 27.8 million rubles. Due to this state program, the research objects have implemented leasing operations, updated the machine and tractor fleet, built and reconstructed production and processing facilities.

According to our estimates, the practice of implementing investment projects on agricultural farms in the designated regions has shown an increase in tax revenues from 6% to 10%. It should be noted that regional and especially Federal governments systematically reduce the amount of funding for investment subsidy programs. The practice of permanent adjustment of state support programs is carried out systematically from the time of their adoption. By 2022 (the end of the current support Program), it is planned to implement and complete 37 investment projects, including 21 leasing projects aimed at modernizing processes in the production and processing sectors, while the remaining 16 are being implemented for the development of innovative products.

[8] E. Aerts y M. Aymard, Structures and Dynamics of Agricultural Exploitations: Ownership, Investment, Credit, Markets (New–York: University of Michigan, 2010), 571.
[9] V. A. Varfolomeev, Economic problems of functioning and development of the regional grain-product subcomplex of the AIC: autoref. dis. Cand. Econ. Sciences. Stavropol: NCSTU (2010): 18–19.
[10] G. V. Chernykh, Improving economic conditions of investment in the agro-industrial complex: autoref. dis. Cand. Econ. Sciences (Stavropol: SKGTU, 2010).

According to our rough estimate, ensuring the employment of each new employee and creating a workplace for them in the grain business today requires attracting more than 2 million rubles of investment. The implementation of our proposals will help preserve jobs and create new employment. Updating fixed assets and strengthening other areas of production development always have resource restrictions on regional and Federal availability[11].

A long-term study of the practice of implementing budget compensation for the lending process in the process of implementing investment projects has shown a positive effect of production, budget and social regulation. This practice largely solves the problems of eliminating the resource financial deficit, brings significant social and economic benefits to the rural population, agricultural production enterprises and grain businesses by reducing the credit burden and increasing tax revenues. Experts V. Varfolomeev[9], G. Chernykh[10], N. Antulio[11], F. Fabozzi[12], K. Hibschweiler, M. Kopin[13] and others[14] adhere to this approach in their research. This methodology allowed us to model the process of constructing a logic for determining the final indicators of social and budgetary efficiency by compensating for the share of Bank interest. Thus, it is possible to analyze the state of credit relations and determine the optimal parameters of compensation opportunities that are most favorable for both parties. We will perform a mathematical formalization of the procedure for determining the optimal levels of budget compensation for the loan rate.

The function of credit demand in the market depending on the cost of credit money *p* and the level of the interest rate *c* is taken as

$$f(c, p) = a + bc + cp^2, \quad (1)$$

where *a* and *b* – the indices of the loan terms;

p – credit fee level, thousand rubles.

The budget compensation for interest payment *c* can vary in the range from zero to one, determining the amount of costs for credit services *p:*

$$p' = p - pc = (1-c)\,p \quad (2)$$

After some simplifications, it will be possible to track changes in the demand function depending on the reduction of interest rates. The decision to determine the volume of lending will shift the demand variable to the right sector of the figure by a step Δd and will indicate an increase in the request for loans. In this case, the credit market will be characterized by an increment of transaction amounts with a decrease in the credit fee *p* and will be called the lender market. This market is characterized by an increase in volumes with each decrease in the payment *p* for credit money.

[11] Antulio N. Bomfim, Understanding Credit Derivatives and Related Instruments (Englewood Cliffs: Academic Press Advanced Finance**,** 2014), 415.

[12] J. Fabozzi Frank, Credit Union Investment Management (New-York: Macmillan Publishing Company, 2003), 631.

[13] M. Hibschweiler y M. Kopin, Investment Taxation: Practical Tax Strategies for Financial Instruments. (Chicago: Hardcover**,** 2003), 350.

[14] T. Karier, Investment tax credit reconsidered: Business tax incentives and investment (Cambridge: Unknown Binding, 2014) y Liaw K. Thomas, Investment Banking and Investment Opportunities.A Comprehensive Guide for Finance Professionals (Tokyo: Graw-Hill, 2015).

Motivation forms the financial size of demand, and the size of the area on the demand graph carries the value of the representation of it. It is clear that compensation will help increase the number of credit consumers, because compensation increases the credit capabilities of the parties.

Business entities increase their ability to use loans through state compensation of financial resources allocated to banks. The size of the area of the graphic polygon shows the amount of public funds allocated for this purposes.

Due to the financial means of compensating part of credit payments, the volume of operations will increase by an amount Δd . These investment volumes are directed to the renewal of fixed assets, which in turn expands the production sphere of the agro-industrial complex. This will increase the base of tax revenues and the regional and Federal budgets themselves. In practical work, the parameter of the growth rate of regional budget fees *(*ΔB*)* and the total amount of realized investment (*I*) are usually known. Let's denote this specific value: $g=\Delta B/I$

The increase in payments to all budget levels is described by the following equation:

$$B_1(c) = g \cdot \Delta f(c, p) \tag{3}$$

Variable parameters of the second degree of the considered dependence are capable of accepting rather small values. With this in mind, the function under study can be transformed into a linear relationship. At the same time, budget expenditures to compensate for the credit interest rate will take the form of:

$$B_2(c) = cpf(p') = cpf(1-c)p\,. \tag{4}$$

The function will show the net regional final budget result:

$$B_O(c) = B_1(c) - B_2(c) = g\Delta f(c) - cpf(1-c)p \tag{5}$$

Variable environmental conditions, constantly changing market conditions form functions of demand values *f(p)*, parametric relations *p, g, c* – they are able to form the function $B_0(c)$ positive. This means that measures to regulate credit agreements may well have a positive budget result. It should be understood that the maximum efficiency of the function $B_0(c)$ will be given by the parameters *c* in the range of values from zero to one. This makes it possible to calculate the level of compensation for the Bank rate c_1 at which credit preferences will gain maximum values.

$$B_O(c_1) = \max B_O(c) \tag{6}$$

Then we should investigate the demand function for bank credit lines of the form $f(p) = a - pb_1$ where components *a* and *b* will take positive values. Based on the results of this transformation, the function can take the following forms:

$$f(p') = a - (p - pc)b \tag{7}$$

$$\Delta f(p) = a - (p - pc)b - a - pb \tag{8}$$

$$\Delta f(p) = a - pb + pbc - a - pb \tag{9}$$

$$\Delta f(p) = p \cdot c \cdot b \tag{10}$$

$B_1(c) = g \cdot p \cdot c \cdot b$ – increase in budget revenues from taxes and other payments.
$B_2(c) = cp[a - (p - p \cdot c)b]$ – budget expenses for compensation of part of the loan interest rate.

The difference in functionals is described by the equation:

$$B_0(c) = B_1(c) - B_2(c) = pcgb - pca + p^2cb - p^2c^2b \tag{11}$$

where $B_0(c)$ – fiscal impact of subsidizing of credit rates

With a step-by-step review of the function $f(p,c)$ starting from p next to the variable c, we can build a process for accepting values $c_{\max}$ that maximize the amount of budget tax collections. The next step is to select the value c^* at which the functional $B_0(c)$ takes the maximum value:

$$B_0^{\max}(c) = pgb - p\alpha + p^2b - 2p^2bc = 0 \tag{12}$$

From here we get:

$$C^* = \frac{1}{2}\left(1 + \frac{g}{p} - \frac{a}{pb}\right) = \frac{1}{2}\left(\frac{pb}{pb} + \frac{gb}{pb} - \frac{a}{pb}\right) \tag{13}$$

After conversion:

$$C^* = \frac{1}{2}\left(\frac{pb + gb - g}{pb}\right) \tag{14}$$

The analysis of the parameters of the obtained equation (14), taking into account some restrictions in the form of the demand function components or the size of the market capacity $f(p)$, will allow us to obtain conclusions that are important for practice.

The ratio $\frac{a}{b}$ shows the value of the credit fee level when the credit fee equals zero: $f(p)=a-pb=0$, when $p=\frac{a}{b}$. We are taking the notation $\frac{a}{b}=p_{\max}$, and transforming the relation (14) into the following form:

$$C^{*}=\frac{1}{2}\left(1+\frac{g}{p}-\frac{p_{\max}}{p}\right)=\frac{1}{2}\left(1+\frac{g-p_{\max}}{p}\right) \quad (15)$$

or:

$$C_{\max}=\frac{1}{2}\left(\frac{g-p_{\max}+p}{p}\right) \quad (16)$$

The final dependency is described by the formula:

$$C_{max} = (g - p_{max} + p) / 2p \quad (17)$$

Next, we will show the results of the practice of Bank subsidizing credit rates for investment projects in the South of Russia that contribute to investment activity through the system of lending to commercial banks (table 2).

Indicator	In agriculture	In other areas of agriculture	Total
Number of investment projects, units	14	17	31
Increase in sales, million RUB.	173,6	308,7	482,3
Volume of interest rate subsidies, million RUB.	14,4	13,4	27,8
Loan program volumes, million rubles including for RUB of subsidies, RUB.	193,7 9,48	280,9 21,0	474,6 17,1
Volume of tax revenue growth, million rubles	9,7	24,7	34,4
Amount of tax increment per credit RUB, RUB	0,050	0,088	0,072
Tax increment, RUB/ per RUB of subsidies	0,67	1,86	1,24
Return on subsidies, years	1,5	0,5	0,8
Social efficiency, new jobs	127	261	388

Table 2

Socio-economic efficiency of optimizing credit subsidies, 2015-2018

Using this methodological approach will allow you to conduct a targeted analysis of credit relations and determine optimal parameters of compensation for commercial loans. The state budget efficiency of application of the considered methodology for optimizing credit subsidies for investment projects for enterprises of the agro-industrial complex according to *31* practical examples will amount to *6.6 (34.4-27.8)* million rubles.

The volume of subsidiary lending at the interest rate in the case of an optimal solution will amount to *474.6* million rubles. At the same time, the expenditure part of budgeting for all sources of credit interest financing is determined by the value *B1(C) = 27.8* million rubles in the case of the ratio *g = 1.237(34.4/27.8).* Interest compensation for lending at c_{max}, when tax revenues reach their maximum values, is determined by the level of *2.6% (1.237/2 0.0425)* at the current Russian Central Bank refinancing rate of *4.25%.* Considered in this research measures of stimulating investment policy include – in addition to full compensation – the refinancing rate by state subsidies and a certain share of bank interest. This example shows the correctness of the practice of compensating interest on bank investment loans for development at an annual rate of less than 4.25%. The current practice of using elements of this tool is showing a good positive production and social efficiency, which stimulates investment activity in the grain and other agricultural industries. Under the current market conditions, the optimal amount of budget compensation for the Bank credit rate for agricultural investment projects should be set at 2.6% or lower. Due to the creation of new jobs, the budget burden will tend to decrease, and the c_{max} values will also decrease. In the future, it is possible to improve the tools for interest-based subsidies, taking into account the discount of future financial flows.

Conclusion

In recent years, the volume of state support is subject to high volatility, and it is more likely to decrease than to increase. In order to save budgets at all levels, the initial program for the development of the agricultural sector is sequestered annually. Regional agricultural state management has insufficient influence on the policy of supporting the process of updating the fixed assets of agricultural production by providing guarantees and subsidies. The practice of providing medium- and long-term loans with state participation is implemented by credit organizations only under reliable guarantees. The agricultural economy and the grain industry need a higher level of state support for investment and strengthening the practice of using medium- and long-term credit funds. Development of modern methodological tools for subsidizing the bank rate, including in the refinanced part, is a very relevant direction in the process of regulating the development of the agricultural and grain business. The recommended tools are able to ensure high efficiency and return on state budget funds invested in the agricultural development. Our calculations show that the current optimal level of state compensation for the bank interest rate should be 2.6%, which will serve as a fairly effective way to support the agro-industrial complex, because it provides an optimal correlation of tax revenues (tax burden), high social efficiency, investment activity, and the benefits of conducting agricultural business. The proposed method of optimizing the indicator of the level of credit subsidies for projects of state program planning for the development of regional agribusiness can successfully solve the task set by science and practice to achieve social and economic goals.

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