

Translated Article<sup>†</sup>

## MODELING THE EFFICIENCY OF INVESTMENT IN AGRICULTURAL BUSINESS



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### Abstract

**Importance** The article discusses how agricultural business can be made more lucrative for investors since there are not appropriate mechanisms to support investment decision-making. Financial measures are not enough to stimulate investing activities of agricultural producers, while the organizational and economic mechanism for creating the favorable investment climate got outdated. Key investment maneuvers are intended to find appropriate ways for outlining a strategy.

**Objectives** The research systematizes available research tools to evaluate the efficiency of investment, substantiate and devise strategic models for supporting investment decisions in agricultural business.

**Methods** The research is based on a financial management technique to evaluate the Economic Value Added (EVA) in agricultural business. We supplemented the technique with respective econometric models for measuring the efficiency of investment.

**Results** The research presents our model showing how the yield spread functionally depends on capital invested in agricultural business. We refer to the Penza oblast to perform all model and analytical computations, which reveal the existing motivation for capital investment and potential for raising the efficiency of agricultural investment.

**Conclusions and Relevance** There should be tools to substantiate the efficiency of possible investment and visualize the return on investment in the agricultural business so that the agricultural policy could be properly adjusted.

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Russia has been attempting to depart from the natural resource export paradigm of its national economic development for the recent years. Under

the current socio-economic circumstances and restrictions, it is the right time to abandon the *oil-for-food* rule. To put this idea in practice, rather than simply declare it, the RF Government makes a lot of efforts to raise additional finance and create the favorable climate for the agricultural sector. Following this initiative, first of all, the RF

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Government amended the legislative framework for investment management.

General metrics of capital expenditures and investing activities were updated, with the agroindustrial complex (AIC) being conferred a legal status. Russia has implemented the Priority National Project *The Development of Agroindustrial Complex*, adopted Federal Law of December 29, 2006 № 264-ФЗ

*On the Development of Agriculture*, enacted the Food Security Doctrine, articulated two national programs for agricultural development and regulation of agricultural food markets, materials and food within 2008–2012 and 2013–2020.

Drawing upon the improved legislative grounds, the government is able to expand and reassure its guarantees to agricultural producers. This mobilized budgetary allotments to agriculture, increased credit resources and attracted private investment. In the Penza oblast, the total investment demonstrated 2.7-fold increase in 2015 as compared with 2010 (Fig. 1).

Internal sources of finance for agricultural production grew 2.3 times within 2011–2015, while borrowed sources tripled.

However, this proved to be insufficient. The existing volume of financial resources and applicable tools are only capable of kick-starting the stagnating agricultural economy, ensuring only a 3-percent growth without contributing to extended reproduction of labor tools, objects and resources. A considerable part of agricultural land is still idle. Fiscal limitations necessitate additional financial injections, new sources of funding, which require to apply organizational and economic tools for making agricultural business more lucrative for investors.

If market prices are simply raised, it will cause a food catastrophe. Thus, it cannot be regarded as an alternative option. The banking sector is already involved into the finance of agricultural production through governmental guarantees for subsidizing the interest rate. The other investors demonstrate their reluctance due to high investment risks in the sector. Many of them prefer keeping their funds as bank deposits, government and corporate securities, handling them in financial markets, etc.

To ignite the consumer demand and put investors' focus on the real production sector, central banks outside Russia and national governments introduced the negative interest rate on loans and deposits.

The Russian regions have their own experience in luring investments into the agricultural economy through investment sites for agriculture. They help investors understand the current situation in the food market.

An investment site constitutes a free land plot or a plot with buildings, facilities and utilities, which is provided for investment projects.

We should also mention the program, which was launched in 2014 and designated to support investment projects implemented in Russia. The program was intended to raise the volume of loans extended to the real economy on long-term and beneficial terms. It can be viewed from positive perspectives, considering financial premises it creates for investors. However, there are still organizational and economic issues.

Investment sites in different regions differ considerably in terms of natural and economic aspects, thus having unequal productive capabilities. A would-be investor have no access to such information, being unable to realistically understand competitive profile of different investment sites. Due to this reason, it is not always clear which type of agricultural production will be financially and economically effective, and what food is in high demand inside and outside the regional market.

We analyzed the agrifood policy using the technique of the Organisation for Economic Co-operation and Development (OECD) to outline agricultural profiles of regions. In some cases, the demand for certain types of agricultural products does not always go with their effective production in the regions. The same is true about the supply since highly effective types of products are not always needed in some regions.

As one of the optimal and sensible options, investors may search for reasonable and sound recommendations on projects, which are worth being implemented on certain investment sites, in terms of market efficiency and social relevance,

provided investors have some governmental guarantees to protect their income.

Such projects should be launched by regional ministries for agriculture. In the case of some investment sites, it is reasonable to prepare alternative projects and justify cash flows, specifying internal financial resources needed, types and volume of the State aid, amount of loan facilities.

Ordinary approaches to investment project feasibility studies should be supplemented with financial management techniques, which would technically streamline investment decision-making processes.

Discounted Cash Flow method (DCF method) may appear to be one of the main techniques to evaluate agricultural business. It is impossible to evaluate the present value of future cash flows without the discount rate. Economically, the Rate of Return on Capital Employed (*ROCE*), which investors expect, serves as the discount rate concerning investment targets, which are comparable in terms of risk exposure.

The discount rate can also be defined as the value of capital raised from different sources. Cash flows from invested capital are subject to the discount rate that equals the sum of weighted average cost of capital and borrowings, with equity-to-debt ratios of the capital being regarded as percentages (*WACC*). The metric is used to gauge Economic Value Added (*EVA*).

*EVA* represents a method to measure the corporate financial position through real income. What *EVA* fundamentally means is that corporate capital shall work as effective as possible to ensure *ROCE* the investor or other shareholder require.

*EVA* arises if the return on investment turns to be higher for a certain period of time than the rate of return expected by the investor.

The *EVA* analysis methodology comprises several steps and includes some indicators (*Table 1*).

The indicators were measured with the software application, *Automated System for Comprehensive Financial, Economic and Managerial Analysis of Business*.

Several interim iterations are performed to appraise the equity.

1. Risk-free rate of return constitutes a rate on time deposits adjusted for a 12-month inflation.
2. The average return on shares in the stock market is a difference between the market risk premium and risk-free rate of return.
3. The risk of corporate investment in sectoral entities (a beta of listed firms) is assessed through the rating of the borrower's financial position. The assessed beta shall be adjusted for the ratio reflecting the extent to which the return on shares of the agricultural companies fluctuate in comparison with the general stock market return.
4. The risk of investment in small business is assessed through the selling cost of corporate assets and current loan liabilities and payables, when the adjusted liquidity ratio is measured (*Table 2*).

The nominal risk-free rate turned out to be lower than the inflation. In today's Russia, the nominal risk-free rate based on the government bonds yield cannot be used in the DCF method. However, the negative risk-free rate is unacceptable for *WACC* computations.

It is very risky to invest in shares of the Russian entities nationwide since the risk premium exceeds the return on shares in the stock market.

Agricultural businesses pertain to the second class of creditworthiness. Therefore, the risk of investment can be assessed as moderate in terms of the market. Beta is considered to equal 0.82.

According to statistical data, the general return on agricultural companies' shares ranges with the amplitude of 1.

Total beta of goods producers in the Penza oblast is 0.91 in 2015. Privacy premium accounts for 75 percent of the risk-free rate, being equal to 2.53 percent.

Thus, as the analysis shows, the risk of investment in agriculture of the Penza oblast can be assessed as high, being equal to 0.35.

At the final step of the analysis, we evaluate the *EVA* metrics (*Table 3*).

As per *Table 3*, *WACC* of agricultural businesses in the Penza oblast equals the average return on shares in the stock market, i.e. the return can be considered as medium in the sector from perspectives of owners.

For the analyzable period, the cost of debt held by agricultural business considerably exceeds the cost of equity. It means it is a reasonable measure to secure loans for the sector.

*WACC* is rather low, signifying an increase in the corporate value over time.

Generally, during the analyzable period, the capital employed and its return grow, which is a positive trend.

The following reasoning should be behind the interpretation of *EVA* metrics. Positive *EVA* signifies an increase in the market value in comparison with the carrying amount of net assets and motivates owners to continue business investment. Negative *EVA* decreases the market value of the entity and loss of owners' investment as they do not derive an alternative yield.

Researches based on the Penza oblast data reveal that the market value of agricultural entities has increased for the recent years as compared with the carrying amount of assets, and identified a respective positive trend. In 2013, equity owners did not manage to recover their invested capital in 2013 due to the loss of return. In 2014 and 2015 they were motivated to make additional investments in agricultural business.

The yield spread reflects the portion of *EVA*, which was gained per ruble of the capital employed. It shows how much the market value of the entity rises if additional contributions are made. In the Penza oblast, each ruble invested in 2014 and 2015 boosted the market value of business by over 2.3 kopecks. This provides grounds to justify a certain amount of financial injections into the real sector of agriculture provided the business has a specific value (*Fig. 2*).

We analyzed the trend in the *ROCE* spread by scrutinizing 220 agricultural enterprises of the Penza oblast. As a result of the trend analysis, we captured the power law dependence of the market value on the capital employed. There is a 98-percent probability that each ruble invested will result in the higher market value. The elasticity of the model proves that a 1-percent increase in the capital employed makes the market value go up by 1.04 percent.

Summarizing results of the research, we conclude that a variety of tools and mechanisms are used in today's Russia to manage the investment attractiveness of the agricultural sector. We should emphasize positive changes and trends that have already been observed in this sector. Successful developments primarily proceed from budgetary allotments and the involvement of the banking sector secured with certain governmental guarantees. However, the measures have not yet lured other investors and streamed their private funds into agricultural business.

The framework of investment and financial management is the most appropriate tool to justify the feasibility of possible investments, payback of the capital employed.

**Table 1****The methodology for Economic Value Added analysis**

Metric	Calculation method
The cost of debt ( $Rd$ )	$\frac{IP}{D} \cdot 100$ , where $IP$ stands for interests payable (Form 2 Line 2330); $D$ is borrowed capital (Form 1 Line 1410 + Form 1 Line 1510)
Debt-to-capital ratio ( $D/E$ )	$\frac{D}{A}$ , where $A$ is balance (Form 1 Line 1700)
The cost of equity ( $PCK$ )	$R + bt \cdot (Rm - R) + x + y + f$ , where $R$ is the risk-free rate of return; $bt$ is the risk of investing corporate money through the rating of the borrower's financial position; $Rm$ is the average return on shares in the stock market; $x$ is the risk of putting money into the sector; $y$ is the privacy premium; $f$ is the country risk premium
Equity-to-capital ratio ( $dCK$ )	$\frac{SC}{A}$ , where $SC$ is the share capital (Form 1 Line 1310)
Weighted Average Cost of Capital ( $WACC$ )	$Rd \cdot D/E + PCK \cdot dCK$
Capital Employed ( $CE$ )	$A - AP$ , where $AP$ are accounts payable
Return on Capital Employed ( $ROCE$ )	$\frac{NP}{CE} \cdot 100\%$ , where $NP$ is net profit
Economic Value Added ( $EVA$ )	$(ROCE - WACC) \cdot \frac{CE}{100\%}$
Yield spread ( $Spread$ )	$\frac{EVA}{CE} \cdot 100$ or $ROCE - WACC$

Source: Authoring

**Table 2****Analysis of the cost-of-equity factors in relation to agricultural enterprises of the Penza oblast, 2013–2015**

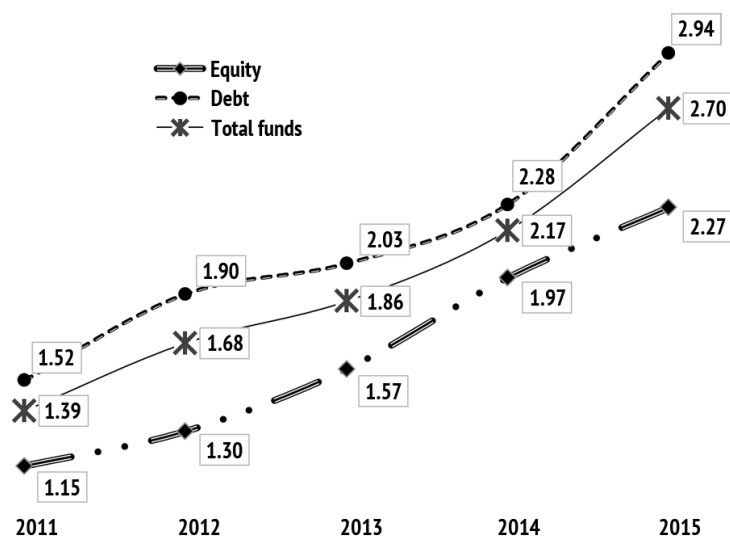
Metrics	2013	2014	2015
Risk-free rate of return	2.17	0.09	3.37
Market risk premium	8.05	7.4	7.4
Average return on equity market	5.88	7.31	4.03
Risk of putting corporate capital into agricultural enterprises	0.91	0.81	0.91
Adjusted liquidity ratio	1.253	1.432	1.265
Risk of putting money into small business	0.35	0.32	0.35
Privacy premium	1.63	0.07	2.53

Source: Authoring

**Table 3****Assessment of Economic Value Added metrics in the agricultural business of the Penza oblast**

Metrics	2013	2014	2015
The cost of debt	7.886	7.297	10.415
Debt-to-capital ratio	0.547	0.521	0.524
The cost of equity	9.35	8.83	9.78
Equity-to-capital ratio	0.096	0.11	0.082
Weighted Average Cost of Capital ( <i>WACC</i> )	5.101	4.748	6.564
Capital Employed	44,882,280	50,872,846	61,113,795
Return on Capital Employed	1.158	7.101	8.882
Economic Value Added	-1,769,637	1,197,172	1,416,337
Spread on the yield of capital employed, kopecks / RUB	-3.94	2.35	2.32

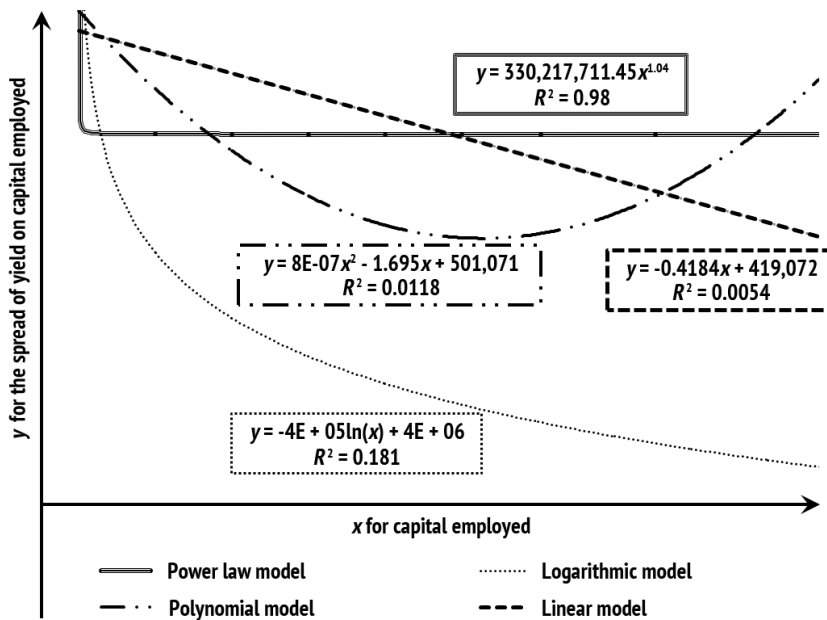
Source: Authoring

**Figure 1****The growth rate of investments in agriculture of the Penza oblast in 2011–2015 against 2010, percent**

Source: Authoring

Figure 2

Models of the correlation between the yield spread and capital invested in the agricultural business



Source: Authoring

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