

AGRO-INDUSTRIAL COMPANIES' CAPITAL COST AND STRUCTURE ВАРТІСТЬ ТА СТРУКТУРА КАПІТАЛУ АГРОПРОМИСЛОВИХ КОМПАНІЙ

The article presents a study on the assessment of the structure and cost of capital of enterprises in the agrarian sector of the Ukrainian economy. It was found that the problem of optimising the capital structure in order to minimise its cost and ensure financial stability and competitiveness is one of the important issues in which a significant number of stakeholders are interested for enterprises of the agricultural sector, which is one of the key sectors of the national economy. The research was conducted using the following methods: the method of economic and statistical analysis and synthesis (for collecting and processing aggregated information on the capital structure of agro-industrial enterprises, calculating the cost of capital and its elements); the method of graphics and scientific comparisons (for visualising the analysis conducted and identifying trends in dynamics); the method of theoretical generalisation (for substantiating the results of the research conducted and formulating conclusions and proposals for further research). The dynamics of investment in enterprises of the agricultural sector of the economy were studied and the dependence between the increase of investment in the agricultural sector and the growth of the positive difference of the return on capital of enterprises of the agricultural sector compared to the total return on capital of the economy as a whole was revealed. It was found that the expected cost of equity capital is significantly higher than the expected cost of debt capital, with the country risk premium accounting for a large part of the difference. The heterogeneity of changes in the capital structure of the companies studied as a result of changes in the indicator of the expected rate of the cost of equity capital was revealed, which is related to the presence of a consistently cheaper alternative in the form of loan financing and the strategic vision of a particular company to ensure its own financial stability. It is suggested that in establishing cost guidelines for optimising the capital structure and minimising its cost, in addition to changes in the components of the cost of capital, the impact of such changes on the financial stability and solvency of the company should also be taken into account, as a basis for further research in this direction.

Key words: agricultural sector, cost of capital, capital structure, cost of debt financing, return on capital.

У статті представлено дослідження щодо оцінки структури та вартості капіталу підприємств аграрного сектора економіки України. Визначено, що проблема формування оптимізації структури капіталу для мінімізації його вартості та забезпечення фінансової стійкості та конкурентоздатності є для підприємств аграрного сектора, як одною з ключових в національній економіці, є одним із важливих питань в якому зацікавлена значна кількість стейкхолдерів. Для проведення дослідження були використані такі методи: метод економічного та статистичного аналізу і синтезу (для збору та обробки агрегованої інформації про структуру капіталу агропромислових компаній, розрахунку вартості капіталу та її елементів); графічний метод та метод наукових порівнянь (для візуалізації проведеного аналізу та виявлення трендів в динаміці); метод теоретичного узагальнення (для обґрунтування результатів проведеного дослідження та формулювання висновків та пропозицій щодо подальших досліджень). Досліджено динаміку інвестицій в підприємства аграрного сектора економіки та виявлено залежність між збільшенням інвестицій в аграрний сектор та зростанням позитивної різниці в дохідності капіталу підприємств аграрного сектора в порівнянні з загальною дохідністю капіталу по економіці загалом. Встановлено, що очікувана вартість власного капіталу значною мірою перевищує очікувану вартість позикового фінансування, значну частку у формуванні різниці відіграє премія за ризик країни. Виявлено неоднорідність зміни структури капіталу досліджуваних компаній в результаті зміни показника очікуваної ставки вартості власного капіталу, що пов'язано з наявністю стабільно більш дешевої альтернативи у вигляді позикового фінансування та стратегічного бачення конкретної компанії щодо забезпечення власної фінансової стійкості. Запропоновано під час формування вартісних орієнтирів по оптимізації структури капіталу та мінімізації його вартості враховувати, окрім змін у складових частинах вартості капіталу, також вплив від таких змін на фінансову стійкість та платоспроможність компанії, що є базою для подальших досліджень в цьому напрямку.

Ключові слова: аграрний сектор, вартість капіталу, структура капіталу, вартість позикового фінансування, рентабельність капіталу.

UDC 336.647/.648

DOI: <https://doi.org/10.32782/bses.81-16>

Vorobei Ruslan

Postgraduate Student
at the Department of Finance,
National University of Life
and Environmental Sciences of Ukraine

Problem statement. In the context of continuing challenges both for the economy as a whole and for one of its key sectors – agricultural production – there is a need to critically review and rethink the resource allocation of agro-industrial companies and possible directions for increasing their competitiveness and financial stability.

In addition to factors that are difficult or impossible to control, such as the amount and quality of fertile soil, climatic conditions for growing agricultural crops, the availability and sufficiency of labour, access to international markets for selling products, the efficiency of the agricultural sector is also

significantly influenced by such developed factors of production as modern agricultural machinery and technologies, infrastructure for storing and transporting manufactured products, and human capital. The organisation of the appropriate level of provision of resources and their effective allocation, ensuring the efficiency of the agricultural sector of the economy, increasing the capitalisation of agro-industrial enterprises – their competitiveness and financial stability, can be achieved by attracting significant amounts of capital investment. With this in mind, the current state of the cost of capital and the level of capitalisation of agro-industrial

enterprises is a relevant problem that requires further research.

Analysis of recent research and publications.

Basic theoretical and methodological approaches to the study of capital and capitalisation processes, especially in the field of agriculture, are formed and reflected in the researches and works of many famous foreign scientists and philosophers. Modigliani & Miller (1958) conducted a thorough study of the formation of capital structure and its costs. Chadha & Sharma (2015) in their study analysed the main determinants of capital structure for selected manufacturing firms and empirically found that such variables as size, profitability, business risk and some others are significantly correlated with the financial leverage of the firm or the main determinants of capital structure in the sample studied. Frank & Shen (2016), in their paper, examined the effect of weighted average cost of capital (WACC) on firm investment using data from selected US firms for the period 1955 to 2011. Vo (2021) developed a theoretical model of financing that jointly determines a firm's cost of capital and capital structure.

The scientific work of Andriichuk (2007) is devoted to the study of the processes of capitalisation of the agricultural sector. Didukh (2015) assessed the financial condition and capital structure of leading agro-industrial enterprises of Ukraine. Mohylnyi & Khodakivska (2017) studied the influence of large agricultural enterprises on the development of the agricultural sector of the economy. Aleskerova et al. (2020) conducted an analysis to identify trends in attracting investments to the agrarian sector of Ukraine. Davydenko et al. (2022) in their study evaluated the dynamics of capital investments and analysed the reasons for changes in the volume of capital investments.

Therefore, it can be stated that the scientific efforts of both the world and domestic academic communities have resulted in a substantial fundamental basis for evaluation of capital investments and optimisation of capital structure. However, despite the sufficient research of the selected topic, some aspects of capital structure and its cost elements in the agricultural sector of the domestic economy remain insufficiently studied and require further research.

Purpose of the research. The purpose of the article is to study and determine the impact of the cost and capital structure on the efficiency and capitalisation of individual enterprises and the agricultural sector of the Ukrainian economy as a whole, with the aim of defining conceptual approaches to their optimisation.

Materials and methods of the research. The following materials were used in the article: data from the State Statistical Service (to collect generalised data on the economic performance of the domestic agricultural sector, investment amounts and grouped data on the capital structure of enterprises) [12], data

on risk-free yields (yields on 7-year US Treasury bonds) [13], data on the returns of the most diversified investment portfolio (S&P 500) [14], data on the country risk premium and total beta by industry sector for emerging markets [14].

The following methods were used: the method of economic and statistical analysis and synthesis (to collect and process aggregated information on the capital structure of agricultural enterprises, to calculate the cost of capital and its elements); the graphic method and the method of scientific comparison (to visualise the conducted analysis and to observe the indicators in dynamics); the method of theoretical generalisation (to substantiate the results of the conducted research and to formulate conclusions and proposals for further research).

Research results and discussion. Capital is the fundamental basis of sustainable development and a resource for ensuring the competitiveness of both individual agro-industrial enterprises and products of the agricultural sector of the country's economy in general on the world agricultural market. The property of capital to change dynamically, its ability to grow as a result of capitalisation of the results of activity, requires quality management decisions on the choice of sources and forms of attracting resources, optimisation of the financing structure based on the assessment of the cost of capital.

Andriychuk defines capitalisation of agriculture as "the accumulation of capital in the sector in order to increase its productivity by capitalising the own income of agricultural producers, injecting capital from other sectors of the economy; attracting foreign direct investment; and moving capital within the sector from less efficient owners to more efficient ones" [5].

The cost of capital and individual components in its structure is determined by applying several of the most common approaches or combinations thereof:

Weighted Average Cost of Capital (WACC) model [10].

The formula for calculating the cost of capital under the above model is as follows:

$$WACC_s = C_e \frac{E}{TA} + (1 - CIT) C_d \frac{D}{TA},$$

WACC_s – weighted average cost of capital;

C_e – expected cost of capital;

E – equity amount;

TA – total assets amount;

CIT – corporate income tax (%);

C_d – expected cost of debt;

D – amount of liabilities.

This model calculates the average return on invested funds expected by the company's stakeholders. The value of the indicator directly depends on the expected profitability of individual components of total capital, such as borrowed and equity resources, as well as on their weight in the overall capital structure.

A model for assessing the profitability of capital assets (CAPM) [11].

$$CAPM(R_a) = i + \beta(R_m - i + CRP),$$

CAPM (Ra) – expected return on capital assets at market equilibrium;

i – risk-free interest rate in the capital market (average annual yield on 7-year US Treasury bonds);

β – the level of maximum risk inherent in the asset;

Rm – expected average return on the most diversified investment portfolio (average annual return on the S&P 500);

CRP – country risk premium.

Dividend growth model (Gordon model) [11].

$$C_e = \frac{D1}{S} + g,$$

Ce – cost of equity;

D1 – projected amount of dividends for the next year;

S – current share price;

g – the amount of dividend growth;

The willingness of investors to invest in a particular enterprise or industry usually depends directly on the

efficiency of the use of modern capital. Figure 1 shows the dynamics of profitability of own capital in the agro-industrial sector and in the national economy in general, as well as the share of capital investments in agriculture in the total amount of capital investments in the national economy by year.

As shown in the figure, the level of return on equity in the agricultural industry was higher than the overall level of return on equity in the national economy throughout the period analysed. It is indicative that even during the 2013–2015 crisis, the agricultural industry remained profitable, while the economy as a whole was unprofitable. This is mainly due to the export orientation of a significant number of agricultural enterprises, which led to an increase in the share of capital investment from 9% in 2014 to 14% in 2016 and 2017. In 2018–2021, the difference in the level of profitability in the agricultural industry will decrease slightly, the excess will be from 1% to 11%, and the share of capital investments in the agricultural industry will be at the level of 9–11% [12].

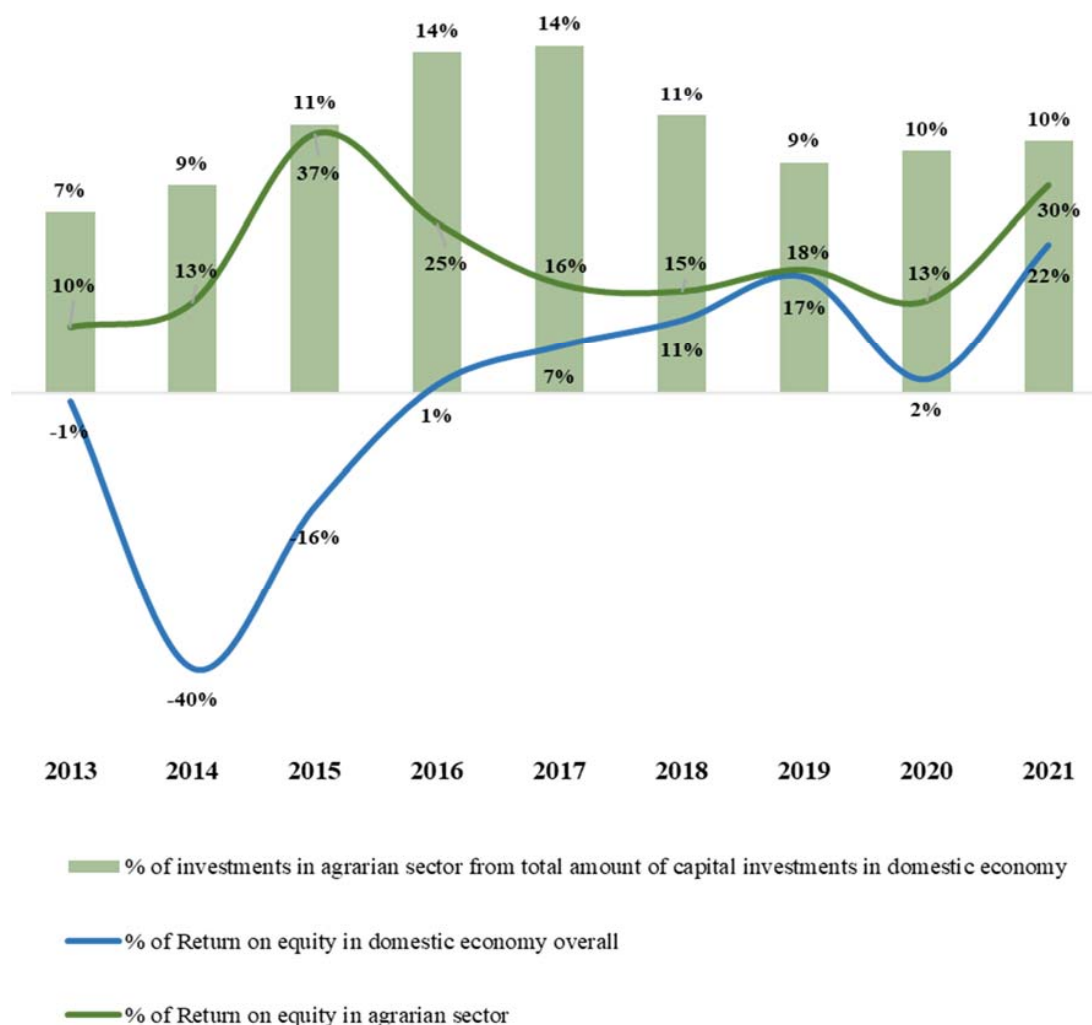


Fig. 1. The dynamics of investments in the agricultural sector and the level of profitability of the advanced capital of agricultural enterprises and the national economy as a whole in 2013–2021

Source: compiled by the author based on data from the State Statistics Service

The equity of large agro-industrial enterprises accounts for about 20% of the consolidated amount of equity in the agricultural sector, while the number of such enterprises accounts for only 0.1% of the total [12]. As this concentration of capital should reflect the main trends in the sector, the capital structure of large agro-industrial enterprises is compared with the general capital structure of large enterprises in the national economy in Figure 2.

Equity capital in the national economy as a whole was at the level of 33% to 45% during 2013–2021, while in agricultural enterprises equity capital occupied between 41% and 59% of the structure of financing sources during the period. This, in particular, may indicate a higher expected return on advanced capital than in the economy as a whole, which is confirmed in Fig. 1. Also noteworthy is the lower share of long-term liabilities and the relatively variable share of current liabilities in the capital structure of large agricultural companies, which was 11–13% higher

than the share in the national economy as a whole in 2016–2017 and 9–16% lower in 2018–2021, offset by an increase in equity.

In order to study the cost of capital of large agro-industrial companies, taking into account their relatively small number, the necessary indicators are calculated and the financing structure is examined using the example of summarised data from the annual accounts of two large agro-industrial companies operating in different areas of the agricultural sector of the economy. The main activity of company A is related to crop production, while that of company B is related to livestock production.

The cost of debt capital of the companies studied was calculated on the basis of the actual indicators of their public financial statements, the cost of debt capital was calculated as the ratio of financial expenses to the sum of long-term and current liabilities, the results of the calculations are presented in Table 1.

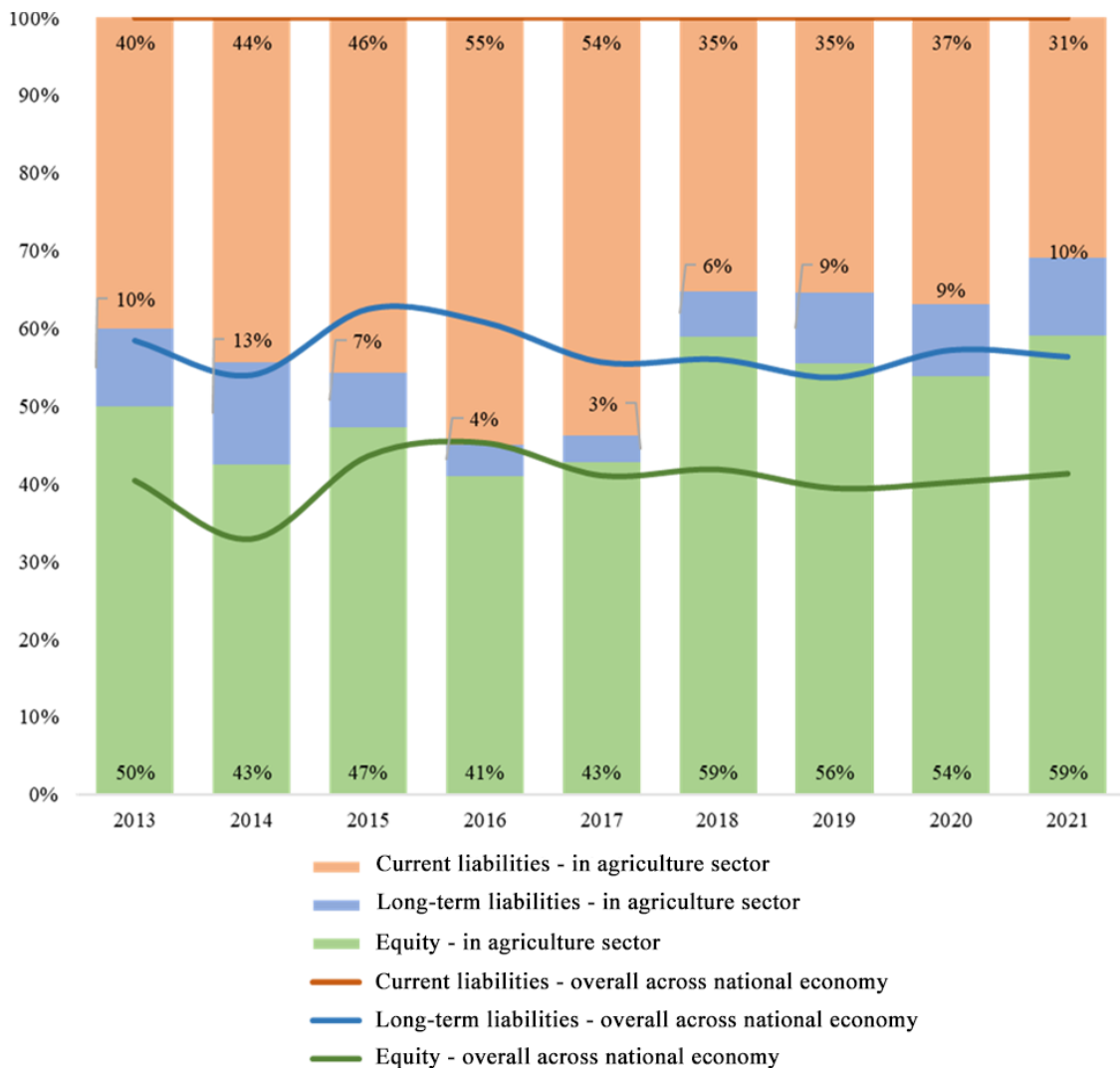


Fig. 2. The capital structure of agricultural enterprises in comparison with the overall capital structure of enterprises in the national economy in 2013–2021

Source: compiled by the author on the basis of data from the State Statistics Service

As can be seen from the calculations, the cost of borrowed capital of the companies studied ranged from 5.4% to 9.3% in 2013–2021. To calculate the weighted average cost of capital, consider the second necessary component – the CAPM cost of equity, since Company A and Company B operate in the same country and sector, the calculations of the

expected cost of equity for both are shown in Table 2. It can be observed that the expected cost of capital of the companies studied is a rather dynamically changing value, with the minimum value of the expected cost of capital observed in 2018 and amounting to 4.9%, and the maximum value in 2013 and 38.3%.

Table 1

Dynamics of the capital structure and cost of debt of selected companies in 2013–2021

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	2021
Company A									
Current liabilities, million UAH	6570	8948	12094	13753	8900	16503	16810	16823	28429
Long-term liabilities, million UAH	2883	3483	2623	3240	15066	15157	21646	35034	30764
Financial expenses, million UAH	549	988	1373	1396	1845	2053	2795	4371	3202
Cost of debt, %	5,8	8,0	9,3	8,2	7,7	6,5	7,3	8,4	5,4
Company B									
Current liabilities, million UAH	3085	5517	8549	10250	5871	8051	14324	10046	12012
Long-term liabilities, million UAH	8872	12582	22957	26446	29562	32916	39612	46188	46118
Financial expenses, million UAH	868	1344	2320	2716	2821	3604	3538	3625	3812
Cost of debt, %	7,3	7,4	7,4	7,4	8,0	8,8	6,6	6,4	6,6

Source: compiled by the author on the basis of financial statements

Table 2

Dynamics of the value of equity capital of individual companies in 2013–2021

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	2021
Risk-free rate, % [13]	1.8	2.1	1.9	1.6	2.2	2.8	2.0	0.7	1.2
Annual return S&P 500, % [14]	32.2	13.5	1.4	11.8	21.6	-4.2	31.2	18.0	28.5
Maximum risk for asset type (β for companies of agrarian sector of economy on emerging markets) [15]	0.68	0.72	0.82	0.70	0.77	0.63	0.64	0.78	0.79
Country risk premium, % [15]	9.0	11.3	15.0	15.7	14.2	10.4	10.4	7.4	6.3
CAPM (R_a)	38.3	18.4	13.8	19.7	28.1	4.9	27.3	20.2	27.7

Source: compiled by the author on the basis of data from the above sources

Table 3

Dynamics of the weighted average cost of capital of selected companies for 2013–2021

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	2021
Company A									
Equity capital, million UAH	10617	13218	20052	26465	30816	32367	35609	43465	54522
Liabilities, million UAH	9453	12431	14717	16993	23966	31660	38456	51857	59193
Share of equity, %	52,9	51,5	57,7	60,9	56,3	50,6	48,1	45,6	47,9
Share of liabilities, %	47,1	48,5	42,3	39,1	43,7	49,4	51,9	54,4	52,1
Cost of equity, %	38,3	18,4	13,8	19,7	28,1	4,9	27,3	20,2	27,7
Cost of debt, %	5,8	8,0	9,3	8,2	7,7	6,5	7,3	8,4	5,4
WACC	22,5	12,6	11,2	14,6	18,6	5,1	16,2	13,0	15,6
Company B									
Equity capital, million UAH	9604	8461	13524	18064	22405	29297	34356	34745	41274
Liabilities, million UAH	11956	18098	31506	36696	35433	40967	53936	56235	58130
Share of equity, %	44,5	31,9	30,0	33,0	38,7	41,7	38,9	38,2	41,5
Share of liabilities, %	55,5	68,1	70,0	67,0	61,3	58,3	61,1	61,8	58,5
Cost of equity, %	38,3	18,4	13,8	19,7	28,1	4,9	27,3	20,2	27,7
Cost of debt, %	7,3	7,4	7,4	7,4	8,0	8,8	6,6	6,4	6,6
WACC	20,4	10,0	8,4	10,6	14,9	6,3	13,9	11,0	14,7

Source: compiled by the author on the basis of data from Tables 1 and 2

As a next step, the weighted average cost of capital is calculated in Table 3 and visualised alongside the capital structure in Figures 3 and 4.

It is evident that the weighted average cost of capital is also dynamically changing and largely depends on the expected cost of equity, with the lowest weighted average cost of equity observed in 2018 at 5.1% and 6.3% for companies A and B respectively, and the highest in 2013 at 22.5% and 20.4%.

To assess the evolution of changes in the capital structure in combination with changes in the cost of debt, equity, and weighted average cost of capital for each company, the calculated data are visualised in Figures 3 and 4.

As shown in Figure 3, the cost of equity is heterogeneous and cyclical, with a decrease in the

cost of equity from 2013 to 2015, there is a noticeable trend towards an increase in the share of equity from 52.9% in 2013 to 57.7% in 2015, which had a positive impact on the weighted average cost, which was 11.2% in 2015. In 2017, the company reduced the share of equity by increasing the share of long-term liabilities in the form of corporate bonds with a rate of 9.00–9.25% per annum, which is lower than the expected cost of equity, which was 28.1% in 2017.

It can be seen in Figure 4 that while the value of equity decreased from 2013 to 2015, Company B, on the contrary, showed a tendency to decrease the share of equity from 44.5% in 2013 to 30.0% in 2015, which is also due to the increase in long-term liabilities, the estimated value of which in 2015 was 7.4%, which had a positive impact on the weighted average cost, which in 2015 was 8.4%. In 2017, the company

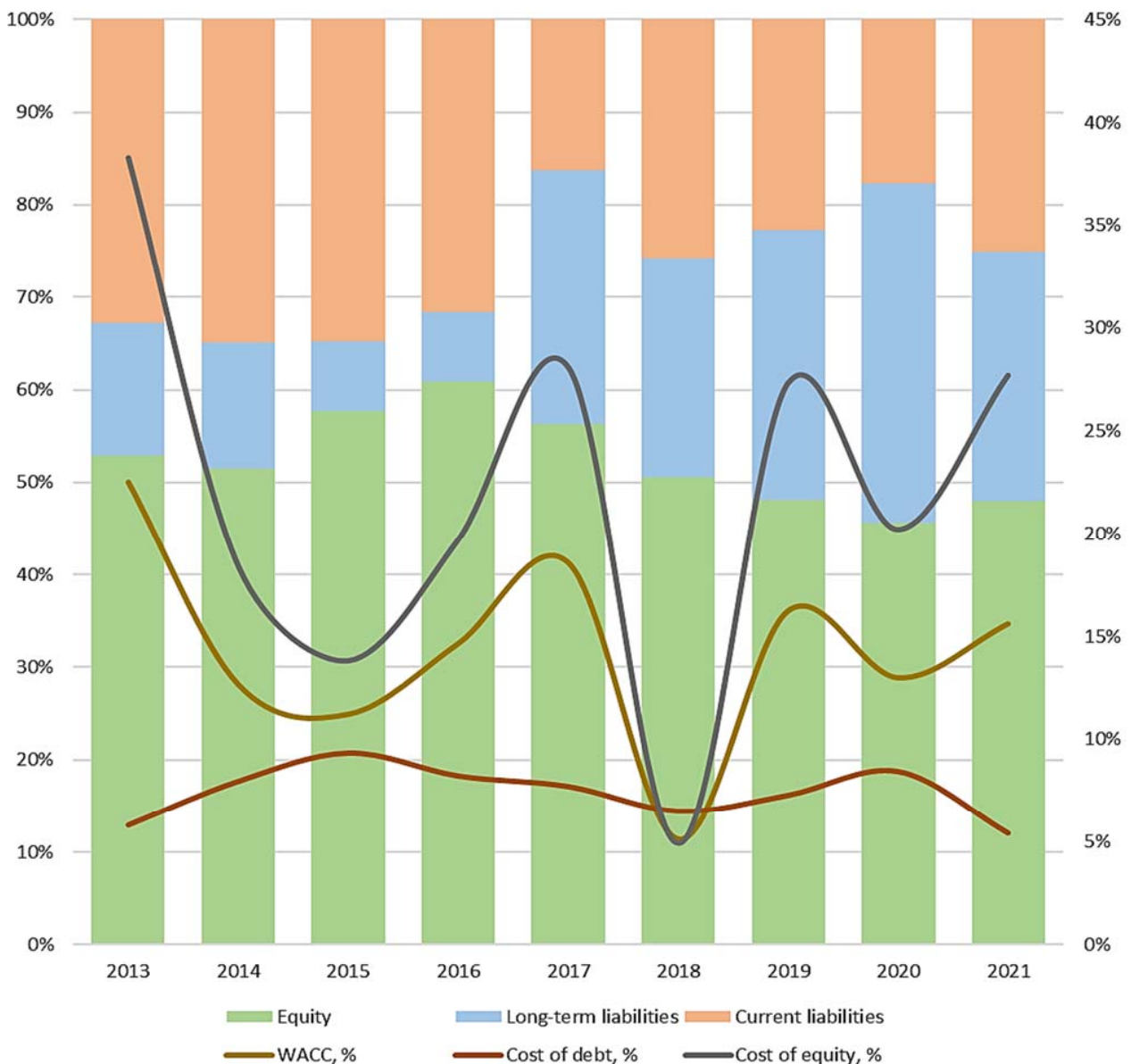


Fig. 3. The structure and value of the components of Company A's capital in 2013–2021

Source: visualised by the author on the basis of data calculated in Table 3

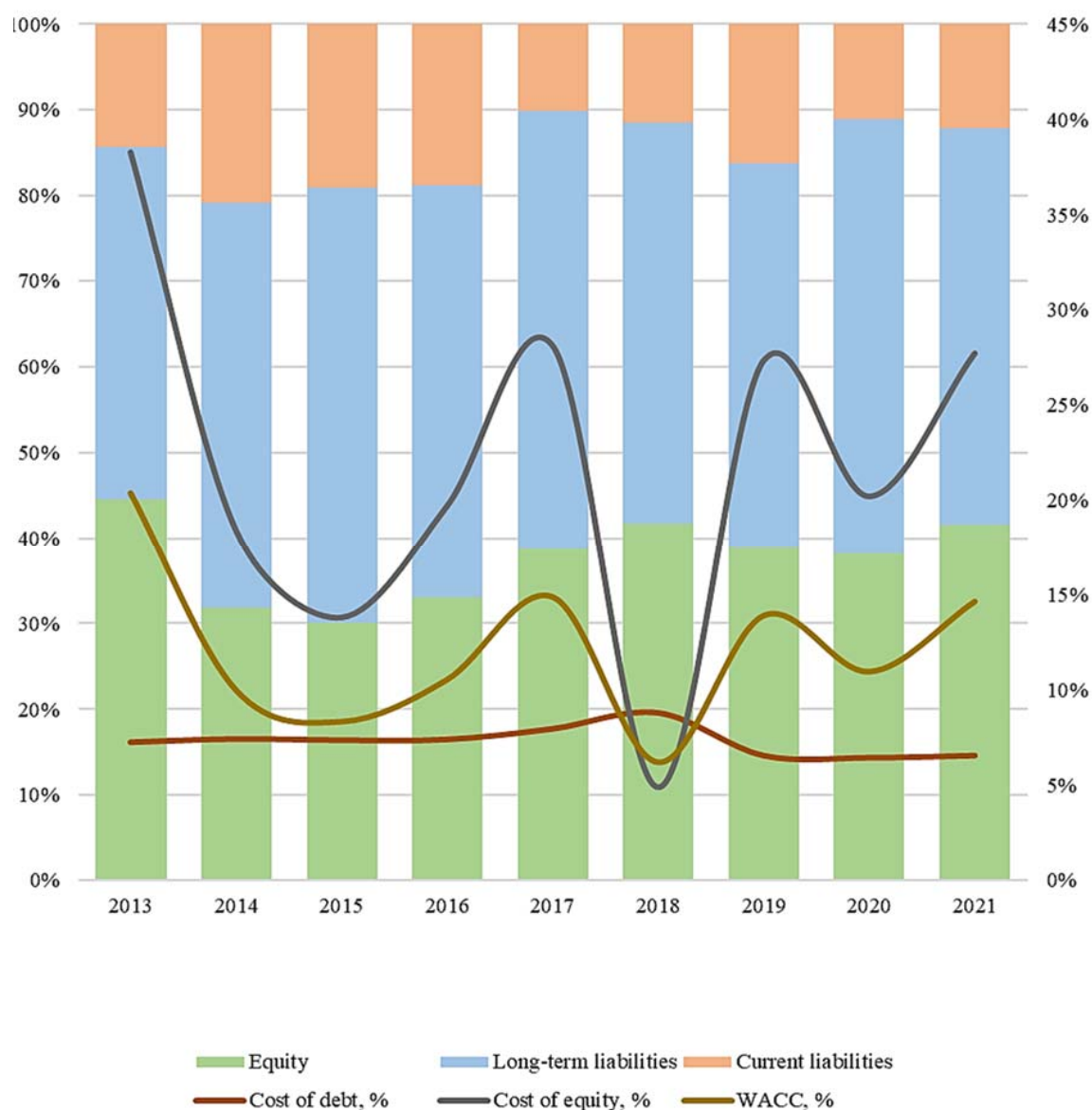


Fig. 4. The structure and value of the components of Company B's capital in 2013–2021

Source: visualised by the author on the basis of data calculated in Table 3

increased its share of equity to 38.7%, which, with an increase in the cost of equity to 28.1%, had a comprehensive negative impact on the weighted average cost, which in 2017 was 14.9%.

Conclusions and further research prospects.

The cost of capital of Ukrainian agricultural companies is structurally formed by elements that differ significantly in value – equity capital is usually much more expensive than debt capital due to the country risk premium, which in 2013-2021 ranged from 6.3% to 15.7%, this is due to the country's credit rating and other risks for doing business in the country.

The capital structure of the studied companies A and B changed differently under the influence of changes in the cost of equity – company A increased the share of equity in the financing structure during the period of decline in the cost of equity in 2014–2015,

and in 2017, as the cost of equity increased, it began to attract cheaper financing through long-term financial instruments. Company B, in turn, despite the decline in the equity rate in 2014–2015, followed a strategy of reducing the share of equity and increasing financing through cheaper debt financing, which seems illogical in the context of a decline in the equity rate, but debt financing was nevertheless cheaper, which in any case had a positive impact on the weighted average cost of capital.

Achieving the optimal cost of capital can be achieved in different ways, but other indicators, such as financial strength and solvency, should be taken into account when designing a change in the capital structure to reduce the weighted average cost of capital. The prospect of further research is to analyse similar indicators of other agro-industrial companies

and other sectors of the economy and to take into account indicators of financial stability and solvency when modelling the optimal capital structure with the lowest possible weighted average cost of capital.

REFERENCES:

1. Modigliani F., Miller M.H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, vol. 48(3), pp. 261–297. Available at: <http://www.jstor.org/stable/1809766>
2. Chadha S., Sharma, A.K. (2015). Determinants of capital structure: an empirical evaluation from India. *Journal of Advances in Management Research*.
3. Frank M.Z., Shen T. (2016). Investment and the weighted average cost of capital. *Journal of Financial Economics*, vol. 119(2), pp. 300–315.
4. Vo M.T. (2021). Capital structure and cost of capital when prices affect real investments. *Journal of Economics and Business*, vol. 113, p. 105944.
5. Andriichuk V.H. (2007). Kapitalizatsiia silskoho hospodarstva: stan ta ekonomichne rehuliuвання rozvytku: monohrafiia [Capitalisation of agriculture: state and economic regulation of development: monograph]. Nizhyn: Aspekt-Polihraf, 213 p.
6. Didukh S.M. (2015). Otsinka finansovoho stanu ta dynamiky rozvytku ahrokhodyniv Ukrainy [Assessment of the financial condition and development dynamics of Ukrainian agricultural holdings]. *Ekonomika kharchovoi promyslovosti*, vol. 7(3).
7. Mohylnyi O.M., Khodakivska O.V. (2017). Vplyv ahrokhodyniv na rozvytok aharnoho sektora krainy [The impact of agricultural holdings on the development of the country's agricultural sector]. *Ekonomika ta derzhava*, vol. 6, pp. 4–9.
8. Aleskerova Y., Titenko Z., Skrypnyk H., Grytsyna, O. (2020). Modeling the level of investment attractiveness of the agrarian economy sector. *International Journal of Industrial Engineering & Production Research*, vol. 31, no. 4, pp. 490–496. Available at: <http://ijiepr.iust.ac.ir/article-1-1138-en.html>.
9. Davydenko N., Buriak A., Titenko Z., Mrachkovska N. (2022). Modeling the Investment Attractiveness of Agricultural Enterprises in Different Regions. In *Distributed Sensing and Intelligent Systems: Proceedings of ICDSIS 2020*, pp. 231–240. Cham: Springer International Publishing.
10. Volkart R. (1999) Unternehmensbewertung und Akquisitionen.-Zurich: Versns, p.62.
11. Tereshchenko O.O. (2003) Educational and methodological manual. Kyiv: KNEU, 554 p.
12. The State Statistics Service of Ukraine. (2022). Available at: <http://ukrstat.gov.ua>
13. Financial Data Extraction from Investing.com (2022). Available at: <https://www.investing.com/rates-bonds/u.s.-7-year-bond-yield-historical-data>
14. Historical Returns on Stocks, Bonds and Bills: 1928–2022 (2022). Available at: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html

[nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html](https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html)

15. Damodaran Online Data Archive (Risk Premium for Other Markets, Total beta by industry sector for emerging markets). Available at: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html

БІБЛІОГРАФІЧНИЙ СПИСОК:

1. Modigliani F., Miller M.H. The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 1958. Вип. 48(3). С. 261–297. URL: <http://www.jstor.org/stable/1809766>
2. Chadha S., Sharma, A.K. Determinants of capital structure: an empirical evaluation from India. *Journal of Advances in Management Research*. 2015.
3. Frank M.Z., Shen T. Investment and the weighted average cost of capital. *Journal of Financial Economics*, 2016. Vol. 119(2). P. 300–315.
4. Vo M.T. Capital structure and cost of capital when prices affect real investments. *Journal of Economics and Business*, 2021. Vol. 113. P. 105944.
5. Андрійчук В.Г. Капіталізація сільського господарства: стан та економічне регулювання розвитку: монографія. Ніжин : Аспект-Поліграф, 2007. С. 213.
6. Дідух С.М. Оцінка фінансового стану та динаміки розвитку агрохолдингів України. *Економіка харчової промисловості*. 2015. Вип. 7(3).
7. Могильний О.М., Ходаківська О.В. Вплив агрохолдингів на розвиток аграрного сектора країни. *Економіка та держава*, 2017. Вип. (6). С. 4-9.
8. Aleskerova, Y., Titenko, Z., Skrypnyk, H., & Grytsyna, O. Modeling the level of investment attractiveness of the agrarian economy sector. *International Journal of Industrial Engineering & Production Research*. 2020. Vol. 31. № 4. P. 490–496. URL: <http://ijiepr.iust.ac.ir/article-1-1138-en.html>.
9. Davydenko N., Buriak A., Titenko Z., Mrachkovska N. Modeling the Investment Attractiveness of Agricultural Enterprises in Different Regions. In *Distributed Sensing and Intelligent Systems: Proceedings of ICDSIS 2020* (pp. 231–240). Cham: Springer International Publishing.
10. Volkart R. Unternehmensbewertung und Akquisitionen.-Zurich: Versns, 1999, p. 62.
11. Терещенко О.О. Навчальний посібник. Київ : КНЕУ, 2003. 554 p.
12. Державна служба статистики України. (2022). URL: <http://ukrstat.gov.ua>
13. Financial Data Extraction from Investing.com (2022). URL: <https://www.investing.com/rates-bonds/u.s.-7-year-bond-yield-historical-data>
14. Historical Returns on Stocks, Bonds and Bills: 1928–2022 (2022). URL: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html
15. Damodaran Online Data Archive (Risk Premium for Other Markets, Total beta by industry sector for emerging markets). URL: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html