Articles

Determination of the Weighted Average Cost of Capital (WACC) applied to a COOPAC of Lima Cercado

Determinación del Costo Promedio Ponderado del Capital (WACC) aplicado a una COOPAC de Lima Cercado

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ABSTRACT

In a context characterized by continuous changes, in which political instability is coupled with the damage caused by cyclone Yaku and the consequences of heavy rainfall that affected large areas of the northern coast of our country during the first three months of 2023. In addition, the actions taken by the Superintendence of Banking, Insurance and AFP against certain Savings and Credit Cooperatives, due to the negative balances in their equity accounts, have caused a high level of uncertainty and distrust towards the management carried out by the Peruvian cooperative system. This is due to the fragility of their financial structures, both for those involved internally and externally. Therefore, the main objective of this study was to determine the Weighted Average Cost of Capital in the financial decision making of a savings and credit cooperative in Lima Cercado. To achieve this, a descriptive study was carried out that addressed the fundamental concepts and appropriate techniques, based on a theoretical review of the evolution of corporate finance, considered a novelty in today's business.

Keywords: Capital structure, equity, financial debt, cost of capital.

RESUMEN

En un contexto caracterizado por cambios continuos, en el que la inestabilidad política se une a

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los daños provocados por el ciclón Yaku y las consecuencias de las fuertes precipitaciones que afectaron amplias áreas de la costa norte de nuestro país durante los primeros tres meses de 2023. Además, las acciones emprendidas por la Superintendencia de Banca, Seguros y AFP contra determinadas Cooperativas de Ahorro y Crédito, debido a los saldos negativos en sus cuentas patrimoniales, han provocado un nivel elevado de incertidumbre y desconfianza hacia la gestión llevada a cabo por el sistema cooperativo peruano. Esto se debe a la fragilidad que exhiben sus estructuras financieras, tanto para los involucrados internamente como para los externos. Es por ello que, el objetivo principal de este estudio fue determinar el Costo Promedio Ponderado del Capital en la toma de decisiones financieras de una cooperativa de ahorro y crédito en Lima Cercado. Para lograr esto, se llevó a cabo un estudio descriptivo que abordó los conceptos fundamentales y las técnicas apropiadas, basándose en una revisión teórica de la evolución de las finanzas corporativas, considerada como una novedad en los negocios actuales
Palabras clave: Estructura del capital, capitales propios, deuda financiera, costo del capital.

INTRODUCTION

Making an investment implies allocating a determined amount of economic resources, generally money, with the objective of obtaining a financial benefit in a specific period (Horno-Bueno, 2022). In this case, the benefit refers to the yield obtained by carrying out such operation. To achieve this, it is necessary to have knowledge of fundamental management tools that optimize decision making and generate the expected added value; this implies using effective valuation criteria and handling relevant information, which guarantees that the invested capital generates the expected profits, not only for those directly involved, but also for the organizations that consider this activity as part of their functions. Likewise, the global economy is characterized by a high degree of uncertainty, which, together with the commercial dynamics between countries, makes financial tools essential to mitigate the risks associated with decision making. One of these tools, in the field of finance, is the cost of capital method. This method refers to the required rate of return on an investment or the value of financial instruments in a given period, it is crucial to determine the opportunity cost of capital invested by the company and shareholders. (Haag and Koziol, 2023).

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Along the same lines, Afzal et al., (2023) considers that the cost of capital represents the minimum return that a company must obtain from its investment projects to meet investors' expectations and maintain the company's market value, and is considered an important tool in investment and financing decisions.

This method predicts the behavior of competitive markets considering the relationship between investment cost and risk. It impacts investment decisions, resource allocation, information and risk management, reducing uncertainties and generating growth opportunities through financing for companies; the combination of debt and equity optimizes decisions by considering the opportunity cost (Mantecon et al., 2023). (Mantecon et al., 2023).

Thus, Lilford, (2023), argues that the weighted average cost of capital (WACC) is a widely recognized financial methodology used to determine a company's cost of financing based on its capital structure and the composition of its sources of financing. The WACC represents the weighted average of the individual costs associated with the different types of financing that a company uses to support its operations; the main components considered in the calculation of the WACC are the cost of debt and the cost of equity. Basically, the weighted average cost of capital (WACC) is an essential tool for evaluating a company's cost of financing. By considering both the cost of debt and the cost of equity, the WACC provides a comprehensive perspective that takes into account a company's capital structure. By accurately understanding and calculating the WACC, managers and analysts can make informed investment decisions and evaluate the profitability of the firm as a whole. (Dobrowolski et al., 2022)

For this research it will be of utmost importance to establish a brief theoretical framework; in this context the theory is based on the article published in 1958 by Modigliani and Miller, in which the application circumstances are exposed, revealing the premises on which the companies are based to use a financing tool interchangeably. For Modigliani and Miller the model proposes the idea of irrelevance in the financing structure, showing that firms are not affected by the choice of financial instruments. In this sense, the total cost of capital does not depend on the instrument selected; these assumptions imply the absence of taxes, costs associated with bankruptcy and information asymmetries (Kolari and Velez-Pareja, 2012). The contribution of these authors implies that, by relaxing the established assumptions, the fundamentals of corporate finance are fixed in three main areas; these areas are: information asymmetries, agency problems and risk management. All these aspects support crucial financial decision making in the management and planning process of companies.

In view of this, determining the cost of equity capital (Ke), as well as the weighted average cost of capital (WACC) in a COOPAC of Lima Cercado, is a pleasant opportunity, where theoretical knowledge and our professional experience over many years is used to enrich this work.

Before starting to develop the methodology used to determine the weighted average cost of capital (WACC), we must point out that the financing structure of COOPAC de

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Lima Cercado has a very special feature, which is reflected in its capital structure, which will be described below.

MATERIALS AND METHODS

This research is framed within a quantitative study, since it seeks to measure and analyze the WACC of COOPAC de Lima Cercado using numerical data and financial formulas. The level is descriptive, since it seeks to describe and analyze the WACC of COOPAC de Lima Cercado based on real data and financial factors; it does not seek to establish causal relationships or causality, but rather to understand and present the current situation of COOPAC's WACC. The study design used will be a case study as a specific COOPAC located in Lima Cercado will be selected and relevant financial data will be collected to determine the WACC. The approach will be analytical, as formulas and methods will be applied to determine the weighted average cost of capital. The approach will be deductive, as it will start from existing financial theory and apply concepts and formulas to determine the WACC of the COOPAC under study. An analytical approach will also be used, where available financial data will be analyzed and evaluation techniques will be applied to obtain results and conclusions on the WACC. (Hernandez and Mendoza, 2018).

Next, we will specify some basic concepts for the development of the cost of equity capital and the cost of external financing and therefore the weighted average cost of capital (WACC).

According to Huong (2023) WACC is the cost of resources employed by the firm in its operations is perceived as an expense from the perspective of the firm, but is considered a return from the perspective of the providers of funds, such as shareholders and investors.

The cost of funding (CMPC), where capital is financed with external resources (bank loans, bonds, customer savings, etc.), as well as equity financing, i.e., shareholder contributions.

The average cost of capital is expressed by the following formula:

$$WACC = Kd(1-t) *(D/P+D) + Ke*(P/D+P) \quad (1)$$

Where:

Kd=Cost of external financing
D=Financial debt
P=Equity
Ke=Cost of equity
T=Taxes

Cost of Equity Formula (Ke)

$$Ke = Rf + \beta*(Risk\ premium) + RP \quad (2)$$

Where:

Rf=Risk-free rate

β=Systemic risk
Rm=Market return
Risk premium= (Rm - Rf)
RP=Country risk

Risk Free Rate (Rf):

The zero risk rate, or risk-free rate, is a theoretical concept based on the premise that in the economy there is an investment option that does not entail any risk for the investor (Chávarri and Neciosup, 2022).

Systemic Risk (β):

Systematic or non-diversifiable risk is a concept from portfolio theory or modern finance. It describes the residual risk that cannot be diversified, even if the individual securities in the portfolio are optimally mixed.

Reyes-Clavijo, (2022) considers that systematic or non-diversifiable risk refers to the risk generated when a number of financial institutions experience related failures in a short period of time, resulting in a decrease in liquidity and an increase in distrust in the financial system as a whole.

It should be noted that many companies generally use the systemic risk (β) by type of industry sector that has been developed by Damodaran, which can be found at the following link: www.damodaran.com

Market Return (MR):

The market rate of return on equity is equal to the combination of the rate of change of the net present value, which is influenced by expectations, and the ratio of the accounting rate of return to the valuation rate at the beginning of the period.

Risk Premium:

In economics, the risk premium is the difference in the interest rate that an investor is paid when assuming a certain investment with a lower economic reliability than another. For Ceballos and Mongrut (2021) the risk premium is the additional return that investors require (in the form of interest) when buying a country's sovereign debt, compared to what they demand from other countries.

Country risk (PR):

Country risk is any risk inherent in investments and financing in one country as opposed to another.

According to Llada (2021), country risk relates to a country's ability and willingness to meet its debt obligations; it implies the possibility that a government's actions may directly or indirectly affect its ability to meet its commitments in a timely manner.

Another important point to take into consideration is that when determining the systemic risk (β) of a particular company, in order to calculate its weighted average cost, the following formula should be taken into consideration:

$$\beta l = \beta u \left[1 + (1 - t) \frac{D}{E} \right]$$

Where:

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D = Financial Debt
E = Equity
The cost of equity (Ke) is calculated using the financial asset pricing model known as CAPM. This model determines the return required by an investor when investing in a financial asset, as a function of the risk assumed. It was developed by Treynor, Sharpe, Lintner and Mossin, based on Markowitz's previous work on diversification and Modern Portfolio Theory. Sharpe received the Nobel Prize in Economics along with Markowitz and Miller for his contribution to financial economics.
Other considerations to be taken into account are the following:

Systemic risk (β) = 1
Ke = Rm (4)

Systemic risk (β) > 1
Ke > Rm (5)

Systemic risk (β) < 1
Ke < Rm (6)

Capital Asset Pricing Model (CAPM)

$$\underbrace{K_e}_{\text{Cost of Equity}} = \underbrace{R_f}_{\text{Risk Free Rate}} + \underbrace{(R_m - R_f)}_{\text{Market Risk Premium}} x \underbrace{\beta}_{\text{Beta}}$$

(7)

RESULTS

Before starting the calculation of the cost of equity (Ke), as well as the cost of financial debt (Kd) and therefore the weighted average cost of capital (Wacc), we will now detail the data that has been taken into consideration for the calculation as of December 31, 2022.
Systemic Risk (β): 0.11
The coefficient of 0.11 has been obtained through the web page: www.damodaran.com, corresponding to the sector corresponding to the year 2022; since the calculation of the cost of financial debt (Kd), cost of equity (Kd) and the weighted average cost of capital (WACC), is being calculated as of December 31, 2022.
Market Yield: 10.54%.
The Standard & Poor's 500 index, also known as the S&P 500, is one of the most important stock market indexes in the United States. The S&P 500 is considered the most representative index of the real market situation.

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This 10.54% yield has been obtained through the yields of financial assets, as shown in the data below. Data considered from December 2018 to December 2022.
In the Peruvian case, the performance of financial assets has been taken from the information provided by the Peruvian stock exchange and/or Bloomberg Financieros.
Risk Free Rate (Rf)
Obtaining the risk-free rate of 2.93% (average year 2022), which is the yield rate of U.S. treasury bonds for a 10-year term with a risk exposure of zero. The data obtained is shown below.

Table 1: *Yield data according to Bloomberg financials*

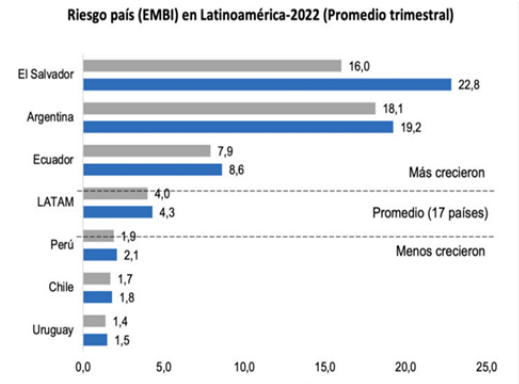
Tasas de interés internacionales - Bonos del Tesoro EE.UU. - 10 años (%)	
Fecha	cierre
01.01.2023	3.51
01.12.2022	3.879
01.11.2022	3.611
01.10.2022	4.05
01.09.2022	3.829
01.08.2022	3.196
01.07.2022	2.658
01.06.2022	3.017
01.05.2022	2.849
01.04.2022	2.938
01.03.2022	2.345
01.02.2022	1.822
01.01.2022	1.784
01.12.2021	1.512
2.9285714	2.93%

Source: Own elaboration

Country Risk (PR)

As can be seen in the following figure, Peru's country risk exposure as of December 28, 2022 was 1.90%, which is well below that of other countries in the region.

Figure 1: Peru Country Risk



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The financial structure of COOPAC de Lima Cercado is somewhat different from other cooperatives in the sector, since its main source of funding comes from member contributions, as can be seen in the capital structure presented below.
The financial debt as of December 31, 2022 represented the amount of S/2,696,235.46, while the invested capital, which is equal to the financial debt plus the net equity, totaled S/113,258,994.66, meaning that the Cooperative is financed with 2% of financial debt and 98% with its own resources.

Table 2: *Financial structure*

Detalle	Diciembre 2022	%
Deuda Financiera (D)	2,696,235.46	2%
Patrimonio (P)	113,258,994.66	98%
Capital Invertido	115,955,230.12	100.00%
T	0.00%	
D/P	2.38%	
D/(D+P)	2.33%	
P/(D+P)	97.67%	
Gastos Financieros	**155,669.96**	
Deuda financiera	**5.77%**	

Source: EEFF COOPAC of Lima Cercado

After having obtained the proportion of financial debt with respect to net worth as of December 31, 2022, which represents 2%, in addition to having as data the systemic risk by type of industrial sector USA, as well as the application of the dispersion of the yields of the financial assets, both of the Peruvian market and of the North American market, the β of the Peruvian financial sector was determined at first, in order to later determine the β of our cooperative, which as of December 31, 2022 represents a coefficient of 0.1290, as explained in detail below.
The following formula was used:

$$\beta l = \beta u \left[1 + (1 - t) \frac{D}{E} \right] \quad (8)$$

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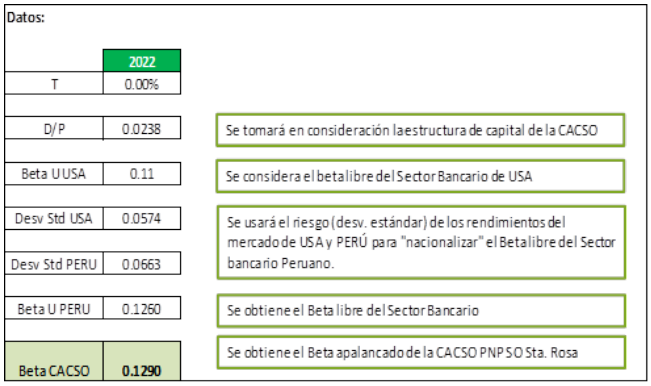
Table 3: *Calculation of the B CACSO*



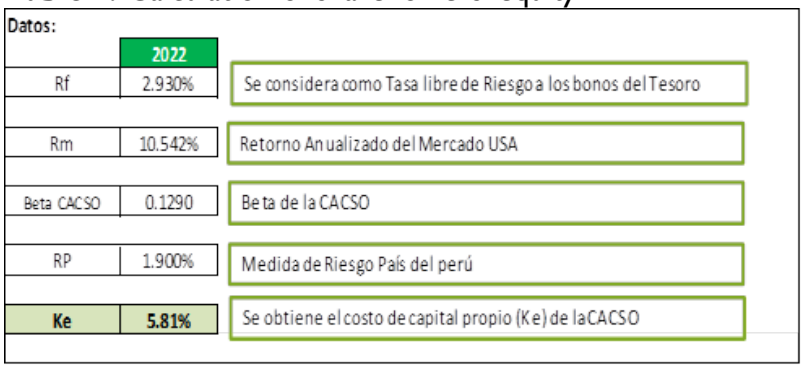
Source: Own elaboration

Calculation of the Cost of Equity (Ke) COOPAC de Lima Cercado.
Taking into consideration the risk-free rate (Rf), the yield of the American market (Rm), the country risk, as well as the β of our cooperative, the cost of equity of COOPAC SO de Lima Cercado (Ke) has been determined, estimating an annual cost of 5.81%, which in monthly terms represents 0.47%. It should be pointed out that, according to theory, the cost of equity capital is higher than the cost of financial debt as a result of the greater risk assumed by the investor, which is why we can corroborate in this study that this theory is true; however, we should point out that "COOPAC de Lima Cercado" has a certain peculiarity in terms of its financing, since it is financed in greater proportion through the contributions of its members (equity capital 98%). Finally, we should mention that the cost of capital is the minimum rate of return that the cooperative must obtain on its investments so that their value remains unchanged.

The following formula was used:

$$R_e = R_f^{EU} + \beta_i\,[\text{Prima de riesgo}^{EEUU}] + RP \quad (9)$$

Table 4: Calculation of shareholders' equity



Source: Own elaboration

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From the numbers calculated above we can see that the Systemic Risk (β): 0.11 is less than 1, while the cost of equity (Ke) is less than the market return (Rm).

Calculation of the Weighted Average Cost of Capital (WACC) COOPAC de Lima Cercado:
After having determined the cost of equity (Ke), in addition to knowing the ratio of equity to invested capital, the cost of financial debt and the ratio of financial debt to invested capital, the weighted average cost of capital (WACC) at book value was calculated, determining an annual cost of 5.81%, which in monthly terms represents 0.47%.

The following formula was used:

$$WACC = We * \mathrm{Re} + Wd * Rd * (1 - t) \quad (10)$$

Table 5: *WACC results*

Datos:	2022	
Ke	5.81%	Se considera el Costo de Capital Propio previamente calculado.
P/(D+P)	97.67%	Se considera la proporción del Patrimonio sobre el Capital Invertido
T	0.0000	Se considera la tasa de Impuestos
Kd	5.77%	Se considera el Costo de la Deuda Financiera
D/(D+P)	2.325%	Se considera la proporción de la Deuda Financiera sobre el Capital Invertido
WACC	5.81%	Se obtiene el costo de capital promedio ponderado (WACC) de la CACSO

Source: Own elaboration

Tax Aspect
General Law of Cooperatives (Supreme Decree No. 074-90TR)
Title I
General
Article 1.- The promotion and protection of Cooperativism, as an effective system to contribute to economic development, to the strengthening of democracy and to the achievement of social justice, is hereby declared of national necessity and public utility.

Article 2.- The State guarantees the free development of Cooperativism and the autonomy of cooperative organizations.

Every cooperative organization shall be constituted for non-profit purposes, and shall seek, through its own efforts and the mutual aid of its members, their immediate service and the immediate service of the community (1)(2).

(1) Pursuant to Article 1 of Law No. 29683, published on May 13, 2011, it is specified that, in accordance with this article, cooperatives, by their nature, perform cooperative acts, which are defined as those performed internally between cooperatives and their members in compliance with their corporate purpose. Cooperative acts are acts proper to their mandate with representation, these are not for profit.

(2) Pursuant to Article 2 of Law No. 29683, published on May 13, 2011, it is specified that, in accordance with this article, cooperatives are not subject to the General Sales Tax (IGV) for transactions carried out with their members.

In compliance with current regulations, the COOPAC in question is exempt from taxes on operations related to its CORE BUSINESS.

Valorization of the Lima Cercado COOPAC

COOPAC de Lima Cercado is valued at book value, since it is a cooperative sector company and due to the nature of its operations, its shares have no market value.

CONCLUSIONS

The results of the research entitled 'Determination of the Weighted Average Cost of Capital (WACC) applied to a COOPAC of Lima Cercado' show that the weighted average cost of capital (WACC) applied to a COOPAC of Lima Cercado is 5.81% per year, which is equivalent to 0.47% per month. The calculation was made using the book value and considering the cost of equity (Ke), the ratio of equity to invested capital, the cost of financial debt and the ratio of financial debt to invested capital. It is important to note that the WACC is a measure used to evaluate the minimum profitability that a company must achieve to remunerate its investors, taking into account the cost of financing and the capital structure of the company. (Lilford, 2023), In this case, COOPAC de Lima Cercado has a WACC of 5.81%, which implies that the company must obtain a profitability equal to or higher than this percentage to meet investors' expectations and justify the use of financial resources. It should be mentioned that these results are specific to COOPAC de Lima Cercado and may vary depending on the financial situation and characteristics of other companies or institutions. It is important to perform a detailed analysis of each particular case to determine the appropriate WACC.

In conclusion, according to the Modigliani and Miller theorem, the value of a company is not affected by the way it is financed, either through its own resources or those of others. In the case of Cooperativa de Lima Cercado, it has a certain peculiarity in its capital structure. The capital structure of the COOPAC in question as of December 31, 2022 is made up as follows: Financial debt: 2% and equity: 92%; it is evident that the main source of financing comes from the contributions of the members, which makes its funding cheaper compared to presenting a different structure. The cost of equity (Ke)

as of December 31, 2022, has been determined at 5.81%, which in monthly terms is equivalent to 0.47%, likewise the weighted average cost of capital (WACC) at book value as of December 31, 2022, has been determined at 5.81%, which in monthly terms is equivalent to 0.47%, meaning that this is the minimum return required by the Cooperative with respect to its CORE business investments. Finally, Modigliani and Miller base their theory on three branches: Information Asymmetry, Agency Problems and Risk Management; these points must be very well valued, since they support the financial decision making of the organization, emphasizing also that, although it is possible to arrive at a numerical value as a management indicator, it is its interpretation and use of the information obtained that will make the difference between one institution and another.

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