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Cost of Capital and Return on Assets of Commercial Micro, Small, And Medium Enterprises (MSMEs) in Bogotá

Costo de capital y rentabilidad de los activos de las micro, pequeñas y medianas empresas comerciales (MIPYMES) en Bogotá

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Abstract

This study aims to analyze the cost of capital and asset returns among MSMEs in Bogotá's commercial sector from 2011 to 2021. The objective is to establish a foundation for financial decision-making, both retrospectively—evaluating if profitability during the study period was adequate—and prospectively, by assessing the financial viability of future investment projects. The research draws on theoretical concepts related to the cost of capital and return on assets, employing the Weighted Average Cost of Capital (WACC) to determine capital costs and the Capital Asset Pricing Model (CAPM) for equity costs. Asset profitability is measured using pre-tax operating profit and operating assets. This quantitative study examines a sample of 362 commercial MSMEs in Bogotá, excluding microenterprises, with findings indicating an average annual capital cost of 11.6% and an asset return of 7.8%. Notably, only in 2021 did asset profitability surpass capital costs.

Keywords: CAPM; Cost of Capital; Cost of Equity; MSMEs; Return on Assets; WACC.

Resumen

Este estudio tiene como objetivo analizar el costo de capital y la rentabilidad de los activos de las Mipymes del sector comercial de Bogotá entre 2011y 2021. El propósito es establecer una base para la toma de decisiones financieras, tanto de forma retrospective evaluando si la rentabilidad en el período de estudio fue adecuada como prospectiva, al evaluar la viabilidad financiera de proyectos de inversión futuros. La investigación se fundamenta en conceptos teóricos relacionados con el costo de capital y el rendimiento de los activos, utilizando el Costo Promedio Ponderado de Capital (WACC) para determinar los costos de capital y el Modelo de Valoración de Activos de Capital (CAPM) para los costos de capital accionario. La rentabilidad de los activos se mide a través de la utilidad operativa antes de impuestos y los activos operativos. Este estudio cuantitativo examina una muestra de 362 MIPYMES comerciales en Bogotá, excluyendo microempresas, y los resultados indican un costo de capital promedio anual del 11.6% y un

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rendimiento de los activos del 7.8%. Cabe destacar que únicamente en el año 2021 la rentabilidad de los activos superó el costo de capital.

Palabras clave: CAPM; costo de capital; costo de capital propio; MIPYMES; rentabilidad de los activos; WACC.

1. Introduction

According to financial theory, determining a firm's cost of capital is essential for sound financial decision-making [1], [2], [3]. A firm aware of its cost of capital can strategically enhance its value [4]. The cost of capital plays a vital role in evaluating the financial feasibility of any project, as accurate calculation and application determine project suitability [5], [6].

When firms lack knowledge of their capital costs, investment decisions may rely solely on subjective assessments, which, while possibly well-intentioned, may not be financially sustainable due to risks that could be avoided or managed [7], [8].

The minimum profitability expected by company owners correlates with the cost of capital [9]. However, various profitability measures require choosing an appropriate benchmark for comparison. García [9] posits that Return on Assets (ROA) is the best profitability measure for comparison with the cost of capital, as ROA represents the returns from company assets.

The Research Group on Enterprise Sustainability at Universidad del Rosario [10] reports that 16.4% of MSMEs cease operations within seven years, with financial management as a critical sustainability factor [11]. Debt levels significantly affect MSME longevity, with high indebtedness increasing the likelihood of closure within five years. Financial management also limits the growth of Latin American SMEs [12] and poses a significant challenge [13], [14].

MSMEs play a vital role in economic and social development through production, job creation, and contribution to Gross Domestic Product (GDP) [15]. In Colombia, they represent over 99% of companies and provide around 75% of formal employment [16], [17]. Bogotá's commercial sector is crucial for the economy, contributing significantly to GDP growth and employment [18]. Hence, it is important to deepen the understanding of the financial structure of MSMEs in Colombia [19].

Financial management in any company aims to maximize value and meet shareholders' objectives. Rational decision-making is based on financial theories applied to both company and market information [20], [21]. However, many decisions in practice are irrational [22].

In MSMEs, irrational decisions often stem from information shortages [23]. Thus, it is critical to assess the financial situation of Bogotá's MSMEs, as they face limitations in rational financial decision-making.

Additionally, MSMEs in Colombia often turn to bank credit after depleting their own resources, despite high costs associated with borrowing through the Colombian financial sector [17], [24], [25], [26].

Considering the relationship between debt levels, financial costs, and company value [27], [28], this study explores the cost of capital relative to ROA for Bogotá's MSMEs in the commercial sector, enabling informed financial decisions to achieve key financial goals.

This study's purpose is to analyze the cost of capital and ROA among Bogotá's commercial MSMEs from 2011 to 2021. It builds upon the recommendation to use a five-year dataset [29] and extends to include updated information through 2021.

Data from the Superintendency of Companies in Colombia was sourced from three databases: SIREM (2011-2015), PIE (2016-2019), and SIIS (2020-2021), each with different accounting standards.

The survey sample decreased significantly post-2015 from 1.313 to 362, due to a shift from national to international accounting standards, attributed to the costs and complexities of implementing International Financial Reporting Standards (IFRS) in Colombia [30].

This research intends to serve as a theoretical basis for MSMEs' financial decision-making in two respects: first, by determining whether asset profitability has been sufficient since 2011, and second, by assessing the viability of future investments to prevent potential losses from unprofitable projects.

2. Background

This study is grounded in previous research on the capital structure of Colombian companies. For example, Sarmiento & Salazar [31] analyze the financing structure of 60 Colombian companies across 18 sectors from 1997 to 2004, noting that companies adjust their debt levels to a target debt level, facing transaction costs.

Tenjo, López & Zamudio [32] explore capital structure across 7,326 companies from 1996 to 2002, using an econometric model to examine the influence of profitability, sales, and other factors on indebtedness. They find profitability negatively impacts debt levels.

Botero et al [1] investigate capital costs in Colombia from 1990 to 2006, associating investment growth with low capital costs during this period. Their macroeconomic model includes asset value, tax discounts, sales, and other factors.

Gama [33], [34] studies capital costs in Bogotá's poultry sector SMEs, finding that the nominal interest rate predominantly influences capital cost determination.

Further studies have adapted capital structure theory to project evaluations, such as Zúñiga, Soria & Sjoberg [35] who integrate capital cost and ROA comparisons in project assessments.

The objective of the study conducted by Vecino, Rojas & Muñoz [36] was to identify the criteria and practices utilized for the financial evaluation of investments in Colombian companies. To this end, a sample of 300 companies was surveyed. The most prevalent criterion is the net present value, which calls to mind the necessity of calculating and utilizing the cost of capital in order to correctly determine the net present value. Furthermore, it can be posited that the size of the company and the level of education of the managers are two significant factors to be considered when selecting an evaluation criterion.

Restrepo & Jiménez [37] examine the implementation of the cost of capital in the context of small and medium-sized enterprises (SMEs) in Colombia. To this end, they have consulted research conducted since 2007, which has yielded macroeconomic and financial models. The optimal model is deemed to be the one that aligns with the principle of the cost of debt being less than the cost of equity, with adjustments from other authors.

In examining the relationship between the cost of capital and the return on assets, Moral [38] presents an analysis of borrowing constraints for Spanish companies. This analysis employs a model that compares the return on assets with the cost of debt, utilizing a spread between these two ratios. The proposed model incorporates constraints, including an elevated cost of external resources resulting from an increase in debt and debt volume.

Altuve [39] illustrates the significance of contrasting the weighted cost of capital with the return on assets. He demonstrates that current assets generate profitability, which must be commensurate with the cost of capital within the financial structure. While his work primarily concerns the cash conversion cycle, he defines ROA as the ratio of operating profit to current assets.

2.1. Cognitive biases and the cost of capital

Behavioral finance posits that financial decisions do not always align with financial models and are not always made rationally. It asserts that there are behavioral aspects involved in the decision-making process that are not considered in the models proposed by traditional finance [40], [41]. These behavioral aspects have two pillars: heuristics and biases. Heuristics are defined as the cognitive strategies employed to streamline problem-solving by reducing the time and effort required for problem-solving. Biases, in turn, are defined as any systematic error in a process derived from a rapid decision (use of a heuristic) and leading to an inaccurate estimate [42].

A particular area of interest within the field of behavioral finance pertains to the manner in which cognitive biases affect the estimation of the cost of capital. The extant literature on this subject includes several studies that have examined the influence of overconfidence bias, favorite-longshot bias, available information bias, analyst optimism, CEO personality, and availability bias.

2.1.1 Overconfidence bias

In the context of overconfidence, Aghazadeh et al. [43] examine the impact of CEO overconfidence on the cost of equity or investors' resources. They accomplish this by calculating the cost of equity and measuring overconfidence. To calculate the cost of equity, they utilize four models that are modifications of the CAPM. To measure overconfidence, three distinct metrics were employed: the first metric indicates whether the value of the options held by the CEO exceeds the industry median; the second metric relates the price of the options held by the CEO to the total price at the conclusion of a fiscal year; and the third metric indicates whether the company experiences a negative market-adjusted result over the subsequent two years. The study's findings, based on a sample of 81,623 companies from 1996 to 2012, indicate an inverse relationship between CEO overconfidence and the cost of equity.

Andreou et al. [44] establish a link between overconfidence and the stock repurchase anomaly, asserting that the occurrence of long-term positive abnormal returns following stock repurchase announcements is low in instances of CEO overconfidence. To support this assertion, the researchers

employed data from 1992 to 2009 obtained from the U.S. Stock Information Company, encompassing 16,025 buyback announcements. In their analysis, they employ three distinct measures to gauge overconfidence: a press-based measure, an option-based measure, and a gender-based measure. Concerning the cost of capital, the researchers conclude that the inverse relationship between overconfidence and the cost of capital signifies that when the cost of capital is high, there is an undervaluation of stocks.

In their study, Baek & Neymotin [45] sought to assess overconfidence in entrepreneurs. However, the utilization of the terms "overconfidence" and "optimism" interchangeably in their work is a notable limitation. In contrast to overconfidence, optimism bias does not depend on personal skills. For instance, an individual might overestimate the probability of winning the lottery.

Baek & Neymotin [45] do not establish a direct correlation between overconfidence and the cost of capital. However, their finding that overconfident entrepreneurs tend to seek financing in informal sectors is noteworthy. It is important to mention that the interest rates charged by informal sectors are higher, thereby establishing a direct relationship between overconfidence and the cost of capital for entrepreneurs.

In contrast, Nazarkina et al. [46] conceptualize CEO overconfidence as a personal trait, exploring its influence on value creation within the Russian capital market. They employ an industry-adjusted ratio of industry and narcissism, as measured through the analysis of CEO photographs, to assess overconfidence. This approach was applied to a sample of 111 companies and 235 CEOs. The authors conclude that the relationship between overconfidence and capital market value is direct, consistent with the inverse relationship between overconfidence and cost of equity [43], [44], as lower cost of capital yields higher firm value.

Finally, Tseng & Demirkan [47] analysis of the relationship between CEO overconfidence and the cost of equity, augmented by the concept of corporate social responsibility, contributes to our understanding of the phenomenon. Their findings indicate that CEO overconfidence prompts CEOs to underestimate risks and divert social responsibility resources to high-risk projects, thereby reducing the cost of equity.

2.1.2 Favorite-Longshot bias

This cognitive bias manifests in contexts involving prediction or betting, wherein individuals underestimate the likelihood of a favored outcome, such as a favored team winning, or overestimate the likelihood of a covered or improbable outcome occurring. According to Grant et al. [48], an investor's behavior in a prediction financial market can be likened to that of a gambler, as both assign a subjective probability of the contract being profitable. The discount rate or cost of capital is seen to fluctuate in response to these subjective probability shifts. It has been determined that investors who prioritize risk aversion tend to ascribe a high probability of success, which is tantamount to a low cost of capital. This observation aligns with the bias explanation.

2.1.3 Available information

In this section, will be examining the theory of information asymmetry. This theory posits that markets are not perfect and that not all parties have access to the same information. The calculation of the cost of capital or some of its variables will therefore depend on the information available. Although none of the authors explored here mention it, there is a close relationship between these problems of information asymmetry and the availability and representativeness biases.

In their review of an international version of the CAPM, Bellalah & Dammak [49] claim to have been the first to propose it. The prevailing notion is that asymmetric information is predominantly associated with risk. They find that the less useful information that is available leads to an increased risk in the rate of change, which would imply a higher cost of capital.

In a related study, Botosan et al. [50] examined the distinction between public and private information, investigating the relationship between the quality of this information and the cost of equity. Utilizing a sample of 2,804 companies from 1993 to 2001, they conducted their study. Their findings include the following conclusions: first, the accuracy of public and private information is crucial for the estimation of the cost of equity; second, there is a positive relationship between the cost of equity and the accuracy of the information. This suggests that as the accuracy of information improves, the calculation of the cost of equity becomes more precise.

Finally, Mantovani & Gadzinski [51] propose a methodology for evaluating the financial performance of private companies that are not listed (not publicly traded). The authors acknowledge that such evaluations are subject to information bias, arising from incomplete data. Utilizing a sample of 13,583 small and medium-sized companies in Italy from 2007 to 2014, they assess the efficacy of their Integrated Evaluation Methodology. Within the proposed methodology, the cost of capital is taken into account. It is acknowledged that certain

companies may lack adequate financing due to their unlisted status on the stock exchange, a circumstance that can give rise to a suboptimal capital structure. This, in turn, can lead to a heightened concentration of equity, thereby reducing unsystematic risk and, consequently, the cost of capital.

2.1.4 Analyst Optimism

In their study, Ketterer et al. [52] examined various cost of capital estimates and estimates of future cash flows. They then proposed adjustment variables for estimating cash flows, with the aim of determining the relationship between analyst optimism bias and these estimates. To this end, they implemented their adjustment variables on companies listed on the Nasdaq and NYSE stock indexes between 1981 and 2014. The researchers' conclusions suggest that the bias may either be non-existent or may not invalidate the cost of capital estimates.

Conversely, Kryzanowski & Rahman [53] and Psychoyios [54] demonstrate that optimism bias in analysts impacts cost of equity estimates, indicating an inverse relationship between optimism and cost of equity. This bias is not associated with personal skills, suggesting that its impact on the cost of equity is primarily driven by analyst optimism towards macroeconomic variables such as the exchange rate, risk-free rate, and country risk premium.

2.1.5 CEO Personality

Adebambo et al. [55] take extraversion as a CEO personality trait and examine how it is related to the cost of equity. They measure extraversion during CEO speeches or conferences. They conduct their study with a sample of 76,815 transcribed conferences and 1,936 companies between 2004 and 2013. They conclude that the relationship between CEO extraversion and the cost of equity is direct, mainly due to the fact that the more extraverted the CEO, the more risks he/she takes.

Although the authors do not mention it, a correlation between extraversion and optimism can be considered, understanding that in the case of CEOs, the relationship between optimism and cost of equity is direct.

2.1.6 Availability bias

Hogrebe & Lutz [56] develop their research based on venture capital, which is defined as investments in early-stage companies that do not yet have a proven business model, so the uncertainty and risk of results is very high. These companies typically have multiple rounds or stages of investment. The study considers investment decisions made in a sample of 30,602 different rounds between 2009 and 2019. We find that companies that have achieved good valuations (low cost of capital) and investments in early rounds are more likely to achieve good investments in future rounds. This confirms the availability bias of investors, who prefer to invest in companies that have previously received investment.

3. Charaterisation of MSMEs in Colombia

In Colombia, MSMEs are legally classified by size based on staff and asset thresholds, as defined in Law 590 of 2000, amended by subsequent legislation.

In order to classify an enterprise, it is necessary to ascertain whether at least one of two conditions is met. These are the number of employees and the value of total assets. In the event of a discrepancy, the condition that places the enterprise in the larger category takes precedence. In other words, the employed personnel and total assets are verified, the classification of the enterprise that each condition would assign is evaluated, and the enterprise is ultimately assigned to the largest classification of enterprise.

Table 1 summarizes MSME classification criteria based on the number of employees and asset value.

Table 1. Classification of MSMEs according to Colombian legislation

Type of enterprise	Employed staff		Total assets	
	From	To	From	To
Microenterprise	<11		<501	
Small enterprise	11	50	501	5.000
Medium enterprise	51	200	5.001	15.000

Source: Own elaboration.

As previously stated, in Colombia, micro, small, and medium-sized enterprises (MSMEs) represent over 99% of all enterprises and employ approximately 75% of the formal labor force [16], [17]. The commercial sector in Bogotá plays a pivotal role in the Colombian economy, contributing significantly to GDP growth and employment generation in the city. In 2010, it accounted for 31.4% of GDP growth and 28% of employment generation in Bogotá [18].

Table 2 presents the number of companies included in this study, classified according to size. Furthermore, the data illustrates the impact of transitioning from national to international accounting standards on the composition of the sample.

Table 2. Participation of companies in the sample

Type of enterprise	Total to 2015	%	Total to 2017	%	Total to 2019	%	Total to 2021	%
Micro-enterprise	14	1	-	0	-	0	-	0
Small enterprise	752	57	153	29	90	24	87	24
Medium enterprise	547	42	384	71	282	76	275	76

*Figures in thousands of Colombian Pesos

Source: Own elaboration

4. Theoretical framework

This research employs a theoretical framework that analyzes the concepts of cost of capital and return on assets. This research employs the corrected irrelevance thesis, the Weighted Average Cost of Capital (WACC) model for calculating the cost of capital, and the Capital Asset Pricing Model (CAPM) for measuring the cost of equity.

Modigliani and Miller [57] put forth the Irrelevance Thesis, initially operating under the assumption of perfect markets and no taxes. Their proposition asserts that capital structure decisions have no impact on firm value. Subsequently, the same authors [58] rectified this and considered taxes, stating that the utilisation of debt optimises the capital structure by capitalising on tax benefits. They introduce the WACC or Weighted Average Cost of Capital.

The model proposed by Modigliani and Miller has been the subject of various questions, criticisms, and even new proposals. Arditti [59] aims to demonstrate, using mathematical techniques, that the so-called WACC can be understood as an average of the cost of capital for a firm with constant earnings expectations in perpetuity. Secondly, the components of the after-tax WACC have been incorrectly specified. Thirdly, it has been demonstrated that the capital structure which minimizes the after-tax WACC is suboptimal.

Nevertheless, Pettit [60] presents a mathematical objection to Arditti's demonstration that the accurate cost of equity and after-tax debt are, respectively, the required pre-tax rate of return on equity multiplied by one minus the corporate income tax rate and the interest rate.

Furthermore, McConnell & Sandberg [61] provide a mathematical response to Arditti's claims that the components of the after-tax WACC have been incorrectly specified and that the capital structure that minimizes the after-tax WACC is suboptimal. Bloomfield & Ma [62] concentrate exclusively on responding to Arditti's demonstration that the after-tax components of the WACC have been incorrectly specified.

In a separate but concurrent study, Ang [63] demonstrated a potential bias in the calculation of the WACC and developed a method for calculating the true cost, which was applied to the constant dividend growth model. In this regard, they respond to the arguments presented by Reilly, Brigham, Linke, Kim & Ang [64] and Henderson [65], who defend the use of the WACC.

Vélez [66] examines the calculation of the cost of capital for unlisted companies. Vélez & Benavides [67] address the cost of capital in the context of deductible dividends. Kolari & Vélez [68] investigate the interrelationship between corporate taxation and the cost of equity. With regard to the matter of tax savings, they put forth the proposal of discounting interest payments on debt with the cost of equity with debt.

The cost of equity can be defined as the cost of the members' capital, which in many cases represents the desired return to the members. Nevertheless, one method for calculating it is through the CAPM [69]. The CAPM is a key tool for measuring the cost of equity, and its application can have a significant impact on investment decisions. Therefore, it is essential to ensure that it is accurately and consistently measured [70].

Nevertheless, alternative methodologies for ascertaining the cost of equity have been put forth. García [9] asserts that this corresponds to the expected return on equity, which is calculated on the basis of net income and subsequently expressed after tax. Moscoso, Sepúlveda, García & Restrepo [71] cite a dividend growth model, whereby the price of a share is the present value of its future dividends. The same authors indicate that this model is not applicable to unlisted companies.

Sharpe [72], Lintner [73] and Mossin [74] introduced and developed the CAPM. This model is founded upon the theoretical framework established by Markowitz [75],

which incorporates the concept of systematic risk into the cost of capital. It is noteworthy that various scholars have identified constraints inherent to the model. This has prompted further research, which has typically built upon the existing work. Merton [76] introduces an intertemporal perspective to the CAPM model, thereby abandoning its static approach.

Black, Jensen, and Scholes [77] employed time series and cross-sectional methodology to test the model. The authors present evidence indicating that the expected excess return of an asset is not necessarily proportional to its beta.

Fama and French [78] consider two variables: size and the book-to-market value ratio. The researchers then proceeded to test the significance of these variables as explanatory factors of variations in average returns. Furthermore, they ascertain those variables not explained by the CAPM, such as firm size, sales growth, and short- and long-run historical returns, are presumed to be anomalies.

Estrada [79], [80] put forth the Downside Capital Assets Pricing Model (D-CAPM). In this context, he modifies the estimation of beta, focusing on below-average returns or undesirable risk, under the assumption that symmetry in the distribution of returns is not a prerequisite.

In the context of capital budgeting, Jagannathan & Meier [81] examine the application of the CAPM in estimating the cost of capital and in managing the cost of capital in capital budgeting.

Vélez [82] notes that a number of proposals have been put forth with the aim of incorporating country risk into the CAPM calculation. The most prevalent proposal is to utilize the CAPM and incorporate a country risk premium into the market risk premium, subsequently multiplying it by the non-debt beta ratio of a comparable firm in the United States. The approach proposed by Lessard [83] indicates that the firm's risk should be calculated using the firm's beta in the local economy.

With regard to the profitability of the asset, Altuve [84] posits that the necessity for an evaluation of ROA is predicated on the assumption that if current liabilities have a cost of capital, then current assets must, in turn, generate profitability. In his view, ROA is defined as the ratio of operating profit to current assets.

In the view of Gitman & Zutter [85], the assets in question and the profits available to common shareholders are taken into account. This is referred to as the return on total assets (ROA) or the return on investment (ROI). This indicator is calculated as the ratio of earnings available to common shareholders to total assets. García [9] considers only operating assets and operating profit before tax.

5. Methodology

This research adopts a positivist epistemological approach [86] and employs a quantitative, documentary, and descriptive method [87], [88]. The deductive method is applied to secondary data sources [89].

Given the absence of personnel data, company size is determined by total assets, with MSMEs defined as those with assets not exceeding 9,665,250,000 Colombian pesos in 2015. Commercial companies are identified by ISIC codes G (divisions 41, 46, and 47), excluding non-commercial activities like vehicle repair.

In order to form the population, it is first necessary to gain access to the Business Information and Reporting System (SIREM) of the financial superintendence of Colombia.

5.1. Sources of information

5.1.1. CAPM

In regard to the betas, the database published by New York University and prepared by Professor Aswath Damodaran contains historical information on leveraged and unleveraged betas by industry in emerging countries. Thus, the annual unlevered betas of the retail industry from 2011 to 2021 are considered.

In regard to the market return, two methodologies are under consideration. The initial calculation is performed on a year-on-year basis, representing the percentage change between the final value (as of December 31) and the initial value (as of January 1) of the COLCAP (The values of the COLCAP index are taken from http://www.banrep.gov.co/es/tes).

Subsequently, the daily fluctuations in COLCAP returns are treated as continuous variables, with an average calculated over the year and annualized. As with either methodology, the market return values yield a negative market risk premium (MRP) in the majority of years and on average.

The betas of all stocks traded between 2011 and 2021 that are part of the COLCAP index, along with the return of each stock at that date, are subjected to regression analysis. The slope or coefficient of the beta represents an estimate of the PRM, as proposed by Vélez [82].

For those seeking to ascertain the country risk premium, access is provided to the database published by New York University (The country risk premium values are sourced from http://pages.stern.nyu.edu/~adamodar/) and prepared by Professor Aswath Damodaran. This database contains historical information on country risk premia.

5.1.2. WACC

Given the elevated costs associated with MSME financing and their significant reliance on bank credit [91], [92], the prevailing interest rate for consumer and ordinary credit in effect in January of each year, as determined by the Financial Superintendency of Colombia, serves as the basis for establishing the cost of debt.

Martínez, Ledesma & Russo [90] posit that in order to analyze an investment in an emerging country, it is necessary to take into account the risk-free rate of that same country. Accordingly, the effective annual interest rate of the 10-year Colombian public debt securities (TES) in force in January of each year is assumed to be calculated by the Banco de la República de Colombia.

Table 3 presents the outcomes of the market performance and, consequently, the MRP as determined by the two methodologies described. This serves merely to underscore the unfavorable outcome of the MRP in the majority of years and on average.

For the purposes of this analysis, debt is defined as the sum of short- and long-term financial obligations. This information can be found in the balance sheets and is expressed in thousands of Colombian pesos. In accordance with Article 240 of the Tax Statute for Colombia, a tax rate of 33% is assumed. Furthermore, Law 1429 of 2010 establishes a progressive income tax rate that considers, among other factors, the year of establishment of the company and the generation of new employment. In the absence of this information, this legislation is not considered.

It is assumed that total equity will be equal to the total liabilities. This information can be found in the balance sheets and is expressed in thousands of Colombian pesos.

5.1.3. ROA

Operating assets are defined as those in which the company invests, including land, factories, inventories, and other assets [93]. It is assumed that the operating assets include the year-end values of total cash on hand, customers, total inventory, property, plant and equipment, and intangible assets, including trademarks, patents, concessions and franchises, know-how, and licenses.

Table 3. Market Risk Premium Calculation

Item \ year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Interest TES (Rf)	8,5144%	7,5029%	5,3243%	7,6448%	6,9930%	9,2070%	6,9413%	6,6900%	6,9900%	6,0200%	5,9000%
Final COLCAP	1.571,55	1.832,75	1.606,33	1.512,98	1.153,71	1.351,68	1.513,65	1.325,93	1.662,42	1.437,89	1.410,97
Initial COLCAP	1.823,70	1.571,55	1.832,75	1.606,33	1.512,98	1.153,71	1.351,68	1.516,68	1.332,80	1.662,42	1.437,89
Market return with initial and final COLCAP variation	-14,881%	15,376%	-13,187%	-5,987%	-27,110%	15,837%	11,318%	-13,441%	22,099%	-14,510%	-1,890%
PRM	**-23,395%**	**7,873%**	**-18,511%**	**-13,632%**	**-34,103%**	**6,630%**	**4,376%**	**-20,131%**	**15,109%**	**-20,530%**	**-7,790%**
Market return with the average of the daily change of COLCAP	-16,089%	16,568%	-14,093%	-6,169%	-31,127%	17,105%	11,981%	-14,155%	25,369%	-15,566%	-1,908%
PRM	**-24,603%**	**9,065%**	**-19,417%**	**-13,814%**	**-38,120%**	**7,898%**	**5,040%**	**-20,845%**	**18,379%**	**-21,586%**	**-7,808%**

The operating profit is assumed to be that found in the income statements and is expressed in thousands of Colombian pesos.

6. Results

This section presents a summary of the research findings, highlighting the key outcomes. The primary data employed in the calculations are presented in Table 4, which provides a comprehensive listing.

Once the aforementioned procedure for calculating the DRP has been completed, the resulting data is presented in Table 5 and Figure 1.

Table 4. Statistics of the adjusted regression between profitability and beta

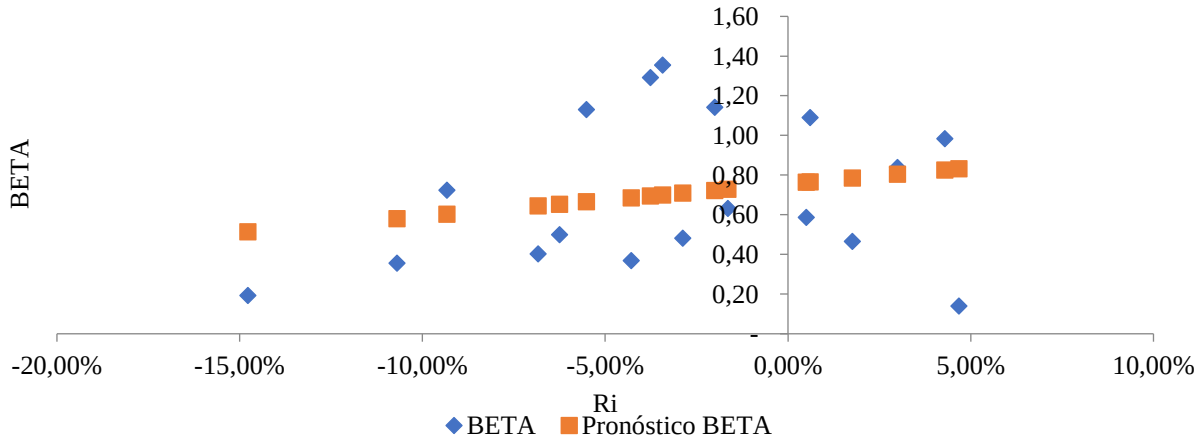
	Coeficientes	Standard error	Statistic t	Probability
Interception	0,755	0,106	7,151	0,000
Ri	1,635	1,760	0,929	0,367

Source: Own elaboration.

Table 5. Information needed for the calculation of the cost of capital

Item \ year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Unlevered beta emerging countries	0,5592	0,7857	0,8013	0,6973	0,9535	0,8558	1,0372	0,8207	0,8439	0,7713	0,7179
Final COLCAP	1.571,55	1.832,75	1.606,33	1.512,98	1.153,71	1.351,68	1.513,65	1.325,93	1.662,42	1.437,89	1.410,97
Initial COLCAP	1.823,70	1.571,55	1.832,75	1.606,33	1.512,98	1.153,71	1.351,68	1.516,68	1.332,80	1.662,42	1.437,89
Interest TES (Rf)	8,51%	7,50%	5,32%	7,64%	6,99%	9,21%	6,94%	6,69%	6,99%	6,02%	5,90%
Country risk	3,00%	3,00%	3,30%	2,85%	2,98%	2,71%	2,19%	2,64%	1,88%	1,84%	1,88%
Current interest (Kd)	15,61%	19,92%	20,75%	19,65%	19,21%	19,68%	22,34%	20,69%	19,16%	18,77%	17,32%
Tax rate Colombia	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%

Figure 1. Fitted regression curve between profitability and beta



Source: Own elaboration

The tables that present the primary calculations and outcomes of the CAPM, WACC, and ROA can be found in Tables 6, 7, and 8, respectively. It should be noted that throughout the document, all figures presented in the tables are expressed in millions of Colombian pesos. It should be noted, however, that the calculations were performed using figures in thousands of Colombian pesos. Then Table 9 and Figure 2 illustrate the comparison between the cost of capital and the return on assets.

Table 6. Calculation of the cost of equity

Item \ Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Leveraged Betas	0,6761	0,9489	0,9572	0,8451	1,1524	1,0944	1,3231	0,9533	0,9843	0,9063	0,8362
Risk-free rate	8,51%	7,50%	5,32%	7,64%	6,99%	9,21%	6,94%	6,69%	6,99%	6,02%	5,90%
PRM	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%	1,635%
PRP	3,00%	3,00%	3,30%	2,85%	2,98%	2,71%	2,19%	2,64%	1,88%	1,84%	1,88%
CAPM	**12,62%**	**12,05%**	**10,19%**	**11,88%**	**11,86%**	**13,71%**	**11,29%**	**10,89%**	**10,48%**	**9,34%**	**9,15%**

Source: Own elaboration.

Table 7. Calculation of the cost of capital

Item \ year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CAPM (Ke)	12,62%	12,05%	10,19%	11,88%	11,86%	13,71%	11,29%	10,89%	10,48%	9,34%	9,15%
Interest (Kd)	15,61%	19,92%	20,75%	19,65%	19,21%	19,68%	22,34%	20,69%	19,16%	18,77%	17,32%
Debt	$172.036	$189.444	$199.370	$228.045	$249.731	$401.466	$438.445	$278.590	$315.249	$363.960	$385.909
Equity	$551.267	$610.885	$686.845	$720.745	$802.344	$964.609	$1.065.859	$1.155.714	$1.269.272	$1.393.489	$1.569.680
Wd	0,238	0,237	0,225	0,240	0,237	0,294	0,291	0,194	0,199	0,207	0,197
We	0,762	0,763	0,775	0,760	0,763	0,706	0,709	0,806	0,801	0,793	0,803
Taxes	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
WACC	**12,106%**	**12,360%**	**11,025%**	**12,186%**	**12,098%**	**13,553%**	**12,365%**	**11,466%**	**10,948%**	**10,012%**	**9,632%**

*Figures expressed in millions of Colombian pesos

Source: Own elaboration.

Table 8. Calculation of the return on assets

Item \ year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Operating profit	$122.966	$118.581	$132.274	$147.168	$195.733	$330.663	-$32.028	$230.989	$259.415	$287.889	$422.212
Operating assets	$934.459	$1.005.339	$1.100.789	$1.229.342	$1.405.766	$1.816.927	$1.993.301	$2.133.894	$2.299.505	$2.400.825	$2.801.136
Taxes	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
ROA	**8,817%**	**7,903%**	**8,051%**	**8,021%**	**9,329%**	**12,193%**	**-1,077%**	**7,253%**	**7,559%**	**8,034%**	**10,099%**

*Figures expressed in millions of Colombian pesos

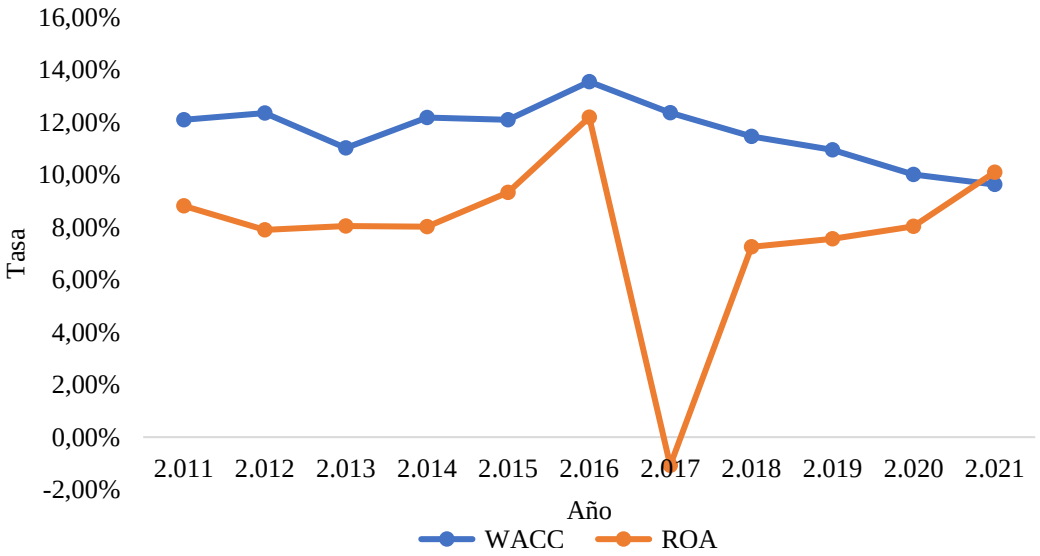
Source: Own elaboration.

Table 9. Comparison between WACC and ROA

Item \ year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
WACC	12,11%	12,36%	11,03%	12,19%	12,10%	13,55%	12,37%	11,47%	10,95%	10,01%	9,63%
ROA	8,82%	7,90%	8,05%	8,02%	9,33%	12,19%	-1,08%	7,25%	7,56%	8,03%	10,10%

Source: Own elaboration.

Figure 2. Comparison between WACC and ROA



The results provide key insights into Bogotá's commercial MSMEs' capital costs and asset returns. Capital costs varied throughout the study period, peaking in 2016 before declining to 9.63% by 2021. However, only in 2021 did ROA exceed the capital cost, indicating potential financial improvements.

7. Discussion

The observed behavior of the Colombian stock market during the period under study presents a significant challenge. The occurrence of negative returns, in conjunction with the presence of a risk-free rate, gives rise to a negative equity risk premium (PRM). Mathematically, this is a viable proposition; however, from an economic standpoint, it is not logical to have a cost of equity that is lower than the risk-free rate. This situation implies that, by assuming a certain level of risk and exerting efforts in the business, shareholders would anticipate a lower return than that offered by risk-free securities. In such a scenario, it would be more prudent to refrain from launching the business venture and instead invest the capital in risk-free securities. This is why the alternative method described was employed, resulting in a PRM of 1.635%.

The cost of equity exhibits a decreasing trend, with a range of 9.15% to 13.71% and a starting point of 12.62%. While this research is primarily concerned with the comparison of the cost of capital with the asset return, it would be prudent to also consider the cost of equity in relation to the equity return.

The cost of capital is subject to fluctuations, initially increasing until 2016, when it reaches a peak of 13.55%. Subsequently, a decline is observed, reaching 9.63% in 2021, which necessitates a reduced return on assets. Nevertheless, it is clear that in the year 2021, the asset return surpassed the cost of capital. In 2016, the WACC commenced a decline, with the ROA approaching this point. However, in 2017, the commercial sector in Bogotá reported a negative asset return. The sector begins to demonstrate signs of recovery in 2018, with an increase in asset return.

Consequently, the sector is confronted with significant financial challenges, particularly until 2018. However, there is a discernible improvement from that point onwards, driven by a reduction in the cost of capital and an increase in asset returns. What is the current status of the sector? It is anticipated that this trajectory will persist, although projections for 2022 and the current year of 2023 would be invaluable. Furthermore, it would be beneficial to examine the factors influencing value in the sector, which encompass net margin, asset turnover, and financial leverage.

Finally, what factors contributed to the negative asset return in 2017? This question remains unanswered. It is crucial for the individual providing the answer to consider a comprehensive financial diagnosis, as well as the political and economic context of the country, the city, and the sector.

8. Conclusions

Considering the impact of capital costs and asset returns, it can be observed that the commercial sector in Bogotá has recently faced unfavorable financial outcomes but is currently on a path to recovery. In addition to analyzing the cost and return on equity, as well as the factors driving value, it is crucial to examine the strategic aspects of companies. Financial results serve as indicators of the effectiveness of employed strategies, and a lack of intentional strategic planning is likely to result in unrealized strategies.

In line with the suggestion to investigate strategic aspects, it is equally important to explore the decision-making process, assessing whether it is rational or irrational in nature.

Moreover, the calculation of equity and capital costs has been extensively studied, especially in non-listed companies like those examined in this study. Therefore, it is necessary to explore alternative methods, particularly during periods when the analyzed stock market exhibits negative returns, as observed in this study. This aspect presented a significant challenge that we endeavored to address to the best of our abilities.

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Autor Contributions

F. A. Torres-Castro: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Visualization, Writing – original draft. M. A. Calderón-Diaz: Calderón-Díaz: Conceptualization, Data curation, Formal analysis, Writing – review & editing. Z. A. Melgarejo-Molina: Conceptualization, Investigation, Validation, Visualization.

Conflicts of Interest

The authors declare no conflict of interest.

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