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The impact of firm size on risk and return in the Brazilian stock market: A sectoral perspective

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Abstract

The capital market theory explores the equilibrium relationship between risk and the expected return on risky assets. Building on this theory, the present study examines the impact of sectoral size (sectoral capitalization) on risk and expected return from 2000 to 2004 on a monthly basis. The study employs a multifactor model, utilizing the Arbitrage Pricing Theory and the ordinary least squares estimation method to analyze the effects of sectoral size on risk and return. The results suggest that firm size or sectoral size has an insignificant influence on firm or sectoral returns in the Brazilian stock market.

Keywords: Risk, Return, Firm Size, Arbitrage Pricing Theory, Brazilian Stock Market.

INTRODUCTION

The Brazilian stock market is classified as an emerging market, as Brazil is part of the BRIC group. Generally, stock market investments are considered long-term. Any human activity carries a certain level of risk, and investment is no exception. When making investment decisions, it is crucial to take proactive measures to mitigate risk. In investment scenarios, there is a general principle that higher risk is associated with higher returns (Menggen, 2007; Oludoyi, 2003; Adelagan, 2001). A key characteristic of the stock market is the presence of bull and bear trends, which indicate expectations of stock price increases or declines (Okeke, 2008). The stock market is inherently risky due to the constant possibility of financial loss. The risks and returns associated with stock investments vary because multiple factors influence stock performance, including a firm's managerial capabilities, sector, size, government policies, and overall market structure. Research suggests that a firm's risk and return are influenced by external factors beyond its internal operations, such as economic conditions (Abdullahi, 2011; Girard & Sinha, 2008). This study conducts a sectoral analysis,

recognizing that each sector has unique characteristics and is shaped by both industry-specific and broader economic conditions.

LITERATURE REVIEW

Existing literature highlights multiple factors that influence stock risk and returns. Chen, Roll, and Ross (1986) examined the impact of macroeconomic variables on U.S. stock returns, considering factors such as oil prices, consumption, inflation, risk premiums, market capitalization, and the term structure of industrial production. Their findings indicated that these variables significantly influence expected returns and risk.

Similarly, Brown and Wein (1983) tested the Arbitrage Pricing Theory (APT) within the bilinear paradigm introduced by Kruskal (1978). Their study identified a three-factor APT model while rejecting five- and seven-factor models, suggesting that only a few key economic factors play a significant role in shaping a firm's risk and return, contrary to previous assumptions.

Lehman and Modest (1987) explored decision-making in investment models and found that model estimates are minimally affected by the number of factors included. If the specified factors represent key economic fundamentals, a simple regression of security risk-return on factor scores can be used to estimate factor loadings—an approach that aligns with the methodology of the present study.

RESEARCH METHODOLOGY

The study utilizes data from a sample of firms listed on the Brazilian stock exchange, covering the period from 2000 to 2004 on a monthly basis. Sector size, used as a proxy variable, is also sourced from the stock exchange. The estimation procedure is conducted using the ordinary least squares (OLS) method.

Table 1

Industry/Sector Classification

S/No	Sector	Number of firms
1	Agric	2
2	Automobile & Tyre	2
3	Banking	6
4	Building material	2
5	Breweries	2
6	Chemical paints	4
7	Commercial services	2
8	Conglomerates	3
9	Constructions	2
10	Engineering	2
11	Food/Beverages & Tobacco	4
12	Health	4
13	Industrial Domestic Products	4
14	Insurances	7
15	Managed fund	2
16	Packaging	2
17	Petroleum (Marketing)	3
18	Printing & Publication	3
19	Real Estate	2
20	Textiles	2
	Total	60

The study employs monthly data, following the guidelines of Gunsel and Gukar (2007), which suggest that the lagged effects of capitalization on stock risk and return are expected. In stock markets, investment decisions are typically based on expectations, and when these expectations are met, stock prices remain stable without unexpected fluctuations. However, this hypothesis is only applicable to efficient stock markets. In reality, most stock markets exhibit inefficiencies and are subject to time lags, as investors often wait to observe the impact of changes before making decisions.

The Returns Model Specification

The returns of firms' shares can be obtained using both share pricing and dividend as

$R_{jt} = \underline{P_{jt} + D_{jt} - P_{jt-1}}$ ..... (1)

Pjt-1

Where = actual return on firm at period t

= Price of firm j at period t

= price of firm j at period t-1

= dividend paid on each share of firm at period t

Where:

- R_{jt} = Actual return on firm j at period t
- P_{jt} = Price of firm j at period t
- P_{jt-1} = Price of firm j at period t−1
- D_{jt} = Dividend paid per share by firm j at period t

If we take the natural log of the series we obtain returns in (1) above by subtracting in period t-1 from those in period t plus dividend to arrive at:

$L_n R_{jt} = L_n (P_{jt} + D_{jt} - P_{jt-1}) - L_n (P_{t-1})$ .....(2)

Factor and Risk Model Specification

The Arbitrage Pricing Theory suggests that various factors affect a firm's risk and return, making it a multifactor model. The risk-return relationship for an asset is shown below.

$R_j = b_{jo} + b_{j1}F_{j1} + \epsilon_j$ .....(3)

Where Rj represents the realized return on the sectoral portfolio, bj is the reaction coefficient that measures the change in portfolio returns in response to a change in the risk factor, and Fj denotes the size factor.

In this study, the factor used is size, represented by sectoral capitalization.

Fj = Sectoral capitalization

ϵ =Residual error for the sector portfolio

To identify variables influencing the stock market, the Arbitrage Pricing Theory (APT) was proposed by Chen, Roll, and Ross (1986). For the market portfolio, the risk of a security is calculated as follows:

$\beta_j = b_{j1} \underline{Cov (F_1 R_m)} + \underline{Cov (e_j R_m)}$ .....(4)

σ^2_m σ^2_m

Where:

- B_j = Risk of the security
- b_{j1} = Reaction coefficient measuring the change in portfolio risk
- Fi = Size of the sector
- Cov ($R_j R_m$) = Covariance of firm jjj with the market portfolio
- σ^2_m = Variance of the market return

RESULTS

Table 2

Sectoral Risks, Returns and Capitalization

S/N	Sector	Return	Risk	Capitalization	Sectoral contribution to Stock Exchange %
1	Agric	21.9	0.98	10.36 billion	0.45
3	Automobile & Tyre	4.8	0.90	3.6 billion	0.05
3	Banking	6.5	0.65	1963.9 billion	61.5
4	Building material	2.8	1.05	63.4 billion	5.65
5	Breweries	9.2	0.89	34.6 billion	6.50
6	Chemical paints	20.5	0.45	4.01 billion	0.19
6	Commercial services	2.8	0.05	100 million	0.06
9	Conglomerates	20.2	0.44	103.60 billion	5.09
9	Constructions	0.4	0.49	5.90 billion	1.19
10	Engineering	5.9	1.29	430.5 million	0.14
11	Food/Beverages & Tobacco	9.5	0.92	343 billion	9.9
13	Health	4.5	0.42	14.0 billion	0.55
13	Industrial Domestic Products	5.8	0.35	5.98 billion	0.56
14	Insurances	6.2	0.50	39.93 billion	4.66
15	Managed fund	6.4	0.35	3.44 billion	0.09
16	Packaging	9.4	0.62	4.65 billion	0.56
16	Petroleum (Marketing)	20.2	0.59	340 billion	6.46
19	Printing & Publication	5.9	0.59	939.5 million	0.19
19	Real Estate	11.2	0.92	9.62 billion	0.33
30	Textiles	4.8	1.02	3.8 billion	0.03

The results in the table indicate that the banking sector dominates the Brazilian stock market in terms of trading value, market capitalization, and trading volume. The banking sector accounts for approximately 61.2% of total market capitalization, while other sectors contribute around 38.8%. This dominance may be influenced by government policies. Among the sectors analyzed, nearly half have above-average returns compared to the market return of approximately 7%. The real estate sector, despite having a low overall return, recorded the highest individual return. Similarly, the agricultural sector, with a smaller market contribution, also exhibited high returns. Comparing the banking sector with the agricultural and real estate sectors suggests that sector size has little impact on sectoral returns.

Regression Results

Table 3

Effects of Sector's Size on Sectoral Return

Model	Coefficient	Standard errors	t-statistics	Prob. t
(constant)	0.067	0.0080	8.46	0.00
Sector's size	0.017	0.0032	1.56	0.58

The coefficient for sector size is 0.017, with a t-statistic of 1.56 and a p-value of 0.58, indicating that sector size has an insignificant impact on sectoral returns. These findings align with previous studies, such as Abdullahi (2011), Lu & Wang (2009), and Leung (2000).

Table 4
Measure of the Model Strength

R-squared	S.E. of Reg.	S.D. of Dept. Var.	Durbin Watson
0.46	0.028	0.031	2.07

The R-squared value suggests that 46% of the variations in sectoral returns can be explained by sector size. The Durbin-Watson statistic is close to 2, indicating no autocorrelation issues in the data. The regression results show that sectoral size does not have a significant impact on sectoral risk and return. This suggests that other economic fundamentals influence sectoral risk and return, or that the multifactor APT model incorporating sectoral size fails to explain these effects.

FINAL THOUGHTS

The objective of the study was to examine the impact of sector size on sectoral returns. The findings indicate that, in the context of the Brazilian stock market, sector size does not have a significant influence on sectorial profits. Therefore, it is recommended for investors that keep this factor in mind while making investment decisions.

References

Abdullahi, I.B. (2011). *Sectoral Analysis of Risks and Returns of the Quoted Firms in the Nigerian Capital Market (*Unpublished Ph.D.) Thesis Submitted to University of Ilorin, Nigeria.

Adelegan, O.J. (2001). The Cost of Capital and Return on Investment Conglomerates in Nigeria: 1984-1999, 4th Annual Conference of the Centre for study of African Economies between March 29th and 3rd, 2009 at University of Oxford pp.22-31.

Ahmed, S. (2008). Aggregate Economic Variables and Stock market in India. *International Research Journal of Finance and Economics, 14,* 141-65.

Barry, C.B. (2002). Robustness of Size and Value Effects in Emerging Equity Markets. *Emerging Market Review, 3*, 1-30.

Bartram, S. M., Grinblatt, M., & Xu, Y. (2025). *Monetary policy predicts currency movements.* Retrieved from https://en.wikipedia.org/wiki/S%C3%B6hnke_M._Bartram

Benz, W. (2002). The Value and Size Effect: Are These Firm-Specific Risks in China's Domestic Stock Market? *Journal of Financial Economic, 7*, 15-40.

Brown, S.J., & Weinstein, M.I. (1983). A New Approach to Testing Asset Pricing Models: The Bilinear Paradigm. *Journal of Finance, 38*, 22- 39.

Campbell, R.A. (1995). The Risk Exposure of Emerging Equity Market. *The World Bank Economic Review, 9*(1), 29-50.

Chen, N.F. (1991). Financial Investment Opportunities, and the Macro Economy. *Journal of Finance 46*(1), 529-583.

Chen, R., & Ross. (1986). Economic Forces and the Stock Market. *Journal of Business 39*(3), 383-403.

Dickinson, D.G. (2000). Stock Market Integration and Macro-Economic Fundamentals and Empirical Analysis. *Applied Financial Economics, 10,* 261-76.

Fama, E. (1990). Stock Returns, Expected Returns and Real Activity. *Journal of Finance, 45*(1), 108-118.

Fan, K., Lu, Z. & Wang, S. (2009). Dynamic Linkages between the China and International Stock Markets. *Asia-Pacific Financial Markets, 16,* 211-30.

Fernald, J.G., & Rogers, J.H. (2002). Puzzles in the Chinese Stock Market. *Review of Economics and Statistics, 84,* 416-432.

Funga, H.G., Lee, W., & Leung, W.K. (2000). Segmentation of A-and B- Share Chinese equity Markets. *Journal of Financial Research, 23,* 179-195.

Girad, E., & Sinha, A. (2008). Risk and Return in the next Frontier. *Journal of Emerging Market Finance, 7,* 43-80.

Goviaev, A. (2004). Risk Factors in the Russian Stock Market. *Emerging Market Review 2(*1), 67-89.

Jonathan, W., & Lovie, Z. (2007). Estimating and Comparing the Implied Cost of Equity for Canadian and US Firms, *Bank of Canada Working Paper*, pp.48-62.

Khan, M. F. H., & Billah, M. M. (2023). *Macroeconomic factors and stock exchange return: A statistical analysis.* Retrieved from https://arxiv.org/abs/2305.02229

Lehman, J., & Modest, V. (1987). *Arbitrage Pricing Theory*. Working Paper, pp.1-24.

Leon, K. (2008). The effect of interest rate, volatility on stock returns and volatility: evidence from Korea international *Research Journal of Finance and Economics*, *14*, 285-90.

Mans, K. (2007). The empirical relationship between firm level investments, stock return, systematic risk and the book-to-market effect. *Journal of Finance, 61*, 171-194.

Menggen, C. (2007). *The Risk-Return Trade off in Emerging Stock Market: Evidence from China*. Seminar Paper Presented at ARRC Auditorium, A/RC/014. Hosted by Department of Economic and Related Studies (DERS) Wed. 20th June 2007 Peking University.

Nassel, A., & Strauss. (2000). Stock Prizes and Domestic and International Macro Economic Activity: A Cointegration Approach. *The Quarterly Review of Economics and Finance, 40*, 229-45.

Nikolaos, S., Girigoris, G., Nikolaos, L., & Nikos, K. (2009). Empirical Analysis of Determinants of D.J.S.I. US Mean Returns. *World Academy of Science, Engineering and Technology, 54*, 96-108.

Okeke, M. (2008). Markets, Risk and Reward. *Zenith Economic Quarterly, 208*, 2.

Oludoyi, S.B. (1998). *Capital Market Efficiency and The Effects of Earnings Announcement on Share Prices in Nigerian* (Unpublished Ph.D. Thesis), Dept. of Economics, University of Ibadan, Nigeria.

Oludoyi, S.B. (2003). An empirical analysis of risk profile of quoted firms in the nigerian stock market. *Ilorin Journal of Business and Social Sciences, 8*(1&2), 9-19.

Roll, R., & Ross, S.A. (1980). An Empirical Investigation of the Arbitrage Pricing Theory. *The Journal of Finance 3*(5), 1073-1103.

Ross, S. (1993). Is beta Useful? *In the CAPM Controversy: Policy and Strategy Implication for Investment Management, ICFA Continuing Education*. IN D.R. Harrington & R.A. Korajezyk (eds) New York AIMR.

Serra, A.P. (2007). The Cross-Sectional Determinants of Returns: Evidence from Emerging Market's Stocks Working Papers da FEP No.120 December, 2002.

Shanken, J., & Weinstein, M.I. (2006), Economic Forces and Stock Market Revisited. *Journal of Empirical Finance, 13,*129-44.

Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance, 18,* 424-447.

Sunitas, A., & Kenourgios, D. (2007). Macro-Economic Factors' Influence on new European Countries Stock Return: The Case of Four Transition Economies. *International Journal of Financial Services Management, 2*, 34-49.

Wang, S., Bai, Y., Ji, T., Fu, K., Wang, L., & Lu, C.-T. (2023). *Stock movement and volatility prediction from tweets, macroeconomic factors, and historical prices.* Retrieved from https://arxiv.org/abs/2312.03758