

THE EFFECTS OF FIRM SIZE ON RISK AND RETURN IN THE BRAZILIAN STOCK MARKET: A SECTORAL ANALYSIS

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ABSTRACT

The theory of capital market is to deal with the equilibrium relationship between risk and expected return on risky assets. Based on the theory, the present study investigates the effects of sectoral size (sectoral capitalization) on risk and expected return for the period of 2000-2004 as monthly. Multifactor model is utilized in the study using the Arbitrage Pricing Theory in analyzing the effects of sectoral size on the risk and return by utilizing the ordinary least square estimation procedure. The findings indicate that the firm size or sector have insignificant effects on firm or sectoral return in the Brazilian stock market.

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

INTRODUCTION

The Brazilian stock market is an emerging market as Brazil is part of the BRIC. Generally, investment in stock market is considered as a long term investment. Any human activity bring with it some degree of risk. Every investment brings with it some sort of risk. While making investment, it is important to take proactive measure to minimize the risk. Generally, in investment situation, the higher the risk, the higher the return (Menggen, 2007; Oludoyi, 2003; Adelagan, 2001). In stock market world, the common feature is the bull and bear feature which explains the expectations of stock price rise or drop (Okeke, 2008). Stock market is considered risky because there is always possibility of some risk. The stock market

related risk and return may differ since different factors affect stock such as managerial capacity of firms, sector, size of the firm, government policies, and the structure. Literature indicate that a firm's return and risk depends on factors beyond organizational internal factors such as sensitivity to economy (Abdullahi, 2011; Girad & Sinha, 2008). In present study, the sectoral analysis is conducted since each sector has its own requirements and influenced collectively by industry and country environment. In literature, most of the stock investment decisions taken by investors are done based on either the rule of the

LITERATURE REVIEW

Literature indicate that there are several factors influencing stock risk and returns. One study by Chen, Roll, & Ross (1986) investigated the influence of macro-economic data series for explaining US stock return. The study variables included oil prices, consumption, inflation, risk premium market capitalization, and term structure of industrial production. The study results showed that these variables are predicting the expected return and the risk.

A study by Brown and Wein (1983) tested the APT in the context of bilinear paradigm introduced by Kruskal (1978). The study reported a 3 factor APT model and refuted the 5 or 7 factor model. The results indicate that few important factor in economy plays their role in shaping a firm's risk and return compare to the many factors as previously thought.

A study by Lehman & Modest (1987) of all the decision choices, a model estimate is least effected by the number of factors. If the factors specified economic fundamental(s), one uses simple regression of factor providing security risk-return on the factor score, to estimate the factor loadings. This is applicable to this study.

RESEARCH METHODOLOGY

The study data is based on the sample of firms listed in the Brazilian stock exchange for the 2000 to 2004 time period on monthly basis. The data about the proxy for the sector size is obtained from the stock exchange as well. Ordinary least square method is used for estimation procedure.

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 data utilized in the study is monthly basis. Based on the guideline by Gungel and Gukar (2007), lagged effects of capitalization on variables on stocks risk and return is expected. Since in stock exchange market, investors usually take decisions based on expectations and if expectations are realized, there is no unexpected change in the stock prices. The hypothesis only applicable to the efficient stock exchange markets. However, mostly, the stock exchange markets are inefficient and have time lag factor. The time lag is because of the fact that investors wait for the effects for a change.

The Returns Model Specification

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

$$R_{jt} = \frac{P_{jt} + D_{jt} - P_{jt-1}}{P_{jt-1}} \dots\dots\dots (1)$$

Where R_{jt} = actual return on firm 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 on each share of firm 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:

$$\ln R_{jt} = \ln (P_{jt} + D_{jt} - P_{jt-1}) - \ln (P_{jt-1}) \dots\dots\dots(2)$$

Factor and Risk Model Specification

The Arbitrage pricing theory propose numerous factors which have influence on a firm's risk and return thus it can be said that the theory is multifactor model based. The risk return asset is presented below.

$$R_j = b_{j0} + b_{j1}F_{j1} + \epsilon_j \dots\dots\dots(3)$$

Where R_j is the realized return on sectoral portfolio and b_j is the reaction coefficient measuring the change in portfolio returns for a change in risk factor and F_j is the size factor.

In this study the factor employed is size proxy by sectoral capitalization.

F_j = Sectoral capitalization

ϵ_j = A residual error for sector portfolio

For identification of variables which have impact on stock market, ATP is proposed by Chen,

Roll and Ross (1986). For market portfolio, the risk of security is computed as follows;

$$\beta_j = b_{j1} \frac{\text{Cov}(F_j R_m)}{\sigma_m^2} + \frac{\text{Cov}(\epsilon_j R_m)}{\sigma_m^2} \dots\dots\dots(4)$$

Where B_j = risk of security

b_{j1} = the reaction coefficient measuring the change in portfolio risk

F_i = size of the sector

$\text{Cov}(R_j R_m)$ = covariance of the firm j with market portfolio.

σ_m^2 = 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	22	0.99	10.36 billion	0.45
3	Automobile & Tyre	4.9	0.91	3.6 billion	0.05
3	Banking	6.6	0.66	1963.9 billion	61.5
4	Building material	2.9	1.06	63.4 billion	5.65
5	Breweries	9.3	0.90	34.6 billion	6.50
6	Chemical paints	20.6	0.46	4.01 billion	0.19
6	Commercial services	2.9	0.06	100 million	0.06
9	Conglomerates	20.3	0.45	103.61 billion	5.09
9	Constructions	0.5	0.50	5.90 billion	1.19
10	Engineering	6.0	1.3	430.6 million	0.14
11	Food/Beverages & Tobacco	9.6	0.93	343.1 billion	9.9
13	Health	4.6	0.43	14.0 billion	0.55
13	Industrial Domestic Products	5.9	0.36	5.99 billion	0.56
14	Insurances	6.3	0.51	39.94 billion	4.66
15	Managed fund	6.5	0.36	3.45 billion	0.09
16	Packaging	9.5	0.63	4.66 billion	0.56
16	Petroleum (Marketing)	20.3	0.60	340 billion	6.46

19	Printing & Publication	6.0	0.60	939.6 million	0.19
19	Real Estate	11.3	0.93	9.63 billion	0.33
30	Textiles	4.9	1.03	3.9 billion	0.03

The results in table shows that in Brazilian stock market, the banking sector is dominating in terms of value of trading, market capitalization, and volume of trading. The banking sector contribution is about 61.2% to the total market capitalization whereas other sector contribution is about 38.8%. The dominance of the banking sector in the market can be due to the government policy. Out of the sectors studied, almost half of the sectors have above average returns from the market return i.e. about 7%. A low return is observed in the real estate sector but it has shown highest return. Same is the case of agricultural sector which have less contribution but the return is high. By comparing the results of the banking sector with the agriculture and the real estate, we can conclude that sector size does not have much influence on the sectoral return.

Regression Results

Table 3

Effects of Sector's Size on Sectoral Return

Model	Coefficient	Standard errors	t-statistics	Prob. t
(constant)	0.068	0.0081	8.47	0.00
Sector's size	0.018	0.0033	1.57	0.59

The coefficient for the sector size is 0.018 with the t-statistics of 1.57 and p value of 0.59 which indicate that the sector size has insignificant influence on the sectoral return. The results of the study are matching with some other studies (e.g. Abdullahi, 2011; Lu & Wang, 2009; Leung, 2000).

Table 4

Measure of the Model Strength

R-squared	S.E. of Reg.	S.D. of Dept. Var.	Durbin Watson
0.47	0.029	0.032	2.08

The Rsquare value indicate that for the sectoral return, 47% changes are explainable by the sector size. The DW statistics is close to 2 so it shows that there is no problem of autocorrelation in our data. Conclusion

The regression results indicate that sectoral size tested has no significant influence on both sectoral risk and return. This indicates that other economic fundamentals affect the sectoral risk and return or the multi-factor APT model with sectoral size variable fails to explain the effect on sectoral risk and return.

CONCLUSION

The objective of the study was to test the influence of sector size on the sectoral return. The findings of the study shows that in the Brazilian stock market context, the sector size does not have significant influence on the sectoral profit.

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