RedFame

Applied Economics and Finance
Vol. 6, No. 1; January 2019
ISSN 2332-7294 E-ISSN 2332-7308
Published by Redfame Publishing
URL: http://aef.redfame.com

Risk and Return: The Case of Securities Listed on the West African Economic and Monetary Union Regional Exchange of Securities (BRVM)

Hervé Ndoume Essingone[1] & Mouhamadou Saliou Diallo[2]

[1]Institut National des Sciences de Gestion, Libreville, Gabon

[2]Faculté des Sciences Economiques et de Gestion, Université Cheick Anta Diop, Dakar, Sénégal

Correspondence: Hervé Ndoume Essingone, Institut National des Sciences de Gestion, Libreville, Gabon.

Received: September 20, 2018 Accepted: December 12, 2018 Available online: December 17, 2018

doi:10.11114/aef.v6i1.3778 URL: https://doi.org/10.11114/aef.v6i1.3778

Abstract

The purpose of this research is to study the relationship between risk and return on the BRVM. The empirical results, obtained using the *Asymmetric Response Model (ARM)* model, show the asymmetric nature of the return of the securities that are rated on them. This does not reflect the level of risk taken by investors, which is much higher than the return obtained. While this result is consistent with the distancing characteristics of risk and return observed in emerging markets, it highlights above all the need to rebalance the relationship between risk and return at the RSE in order to make it more attractive for investors.

Keywords: risk, return, ARM, Capital Asset Pricing Model (CAPM), BRVM

1. Introduction

Is the return on securities listed on the West African Economic and Monetary Union (WAEMU) Regional Exchange of Securities (BRVM) correlated with the level of risk taken by investors? Such a question already benefits from Markowitz's (1952) historical response, extended by the works of Treynor (1962), Sharpe (1963), Lintner (1965), Mossin (1969), and Black (1972). These authors legitimize risk and return as the two determinants of any investment decision on a financial security. They highlight, through the Capital Asset Pricing Model (CAPM), the relationship linking the profitability of financial assets and their risk. Thus, the level of return of a security is determined by that of its risk in a positively correlated movement and intensity. A high risk must correspond to a high return and vice versa. However, this response seems unsatisfactory with regard to the new avenues of research opened up by the existence of financial market anomalies and the cognitive biases of market players (Thaler, 2005) who rather predict an asymmetrical relationship between these factors.

The work on the risk and return of securities on African stock exchanges remains limited and focus mainly on the study of the sensitivity of African stock markets to economic facts and global shocks (Aka, 2009, Zivanayi Mandimika 2012, Elda du Toi , 2015), on the one hand, the validity of the theoretical models, in particular the CAPM on these markets, on the other hand (Pamane and Vikpossi, 2014, Georgas Janata, 2016). However, in view of the proliferation of financial markets since the 1990s, there has been little work on the relationship between risk and return, as determinants of the attractiveness of these markets, based on a remuneration of securities consistent with the level of risk incurred by investors. In this regard, we note that, despite their ever-increasing number, from five (5) stock exchanges in the 1990s to almost twenty-three (23) in 2010, the total capitalization of African stock exchanges is still very low in the to less than 10% of that of the United States. This reflects the low attractiveness of these markets.

The purpose of this paper is to study the link between risk and return in African markets by using the RSE to test the consistency between the level of risk taken by investors and the return obtained. Our study is based on an alternative model to CAPM, namely the ARM model.

Three reasons at least justify this choice:

1) the proximity of African markets with those of emerging countries in which there is a weak correlation with mature markets, as well as the asymmetrical nature of the distribution of returns on securities observed on these markets (Bakir, 2012);

2) the problem of efficiency in African markets arises. Indeed, it reflects the idea that all information available on a security

is reflected in the price of the security on the market. However, this condition is difficult to meet in African markets where the level of knowledge of the market by its investors is average. In addition, the flow of information and the transparency of operations are not optimal (Bamba, 2001). Regarding the latter aspect, it should be noted that it is in contrast to the CAPM model, based in particular on the assumption of market efficiency, that alternative models of the ARM type have developed;

3) Finally, the interest of testing the risk- return relationship using an MRA in the context of African countries appears in view of the limits of the CAPM in this field of investigation (Pamane and Vikpossi, 2014; Janata 2016, Gahé et al., 2017).

The rest of the study is organized as follows. Section 2 presents the review of the literature on the link between risk and return. Section 3 presents the ARM model. Section 4 declines the methodology. Section 5 is devoted to empirical analysis. Finally, section 6 concludes.

2. The Literature Review

One distinguishes works based on a permanent balance between risk and return, on the one hand, those based on the existence of an asymmetry between these two factors, on the other hand.

2.1 Risk and Return on Securities: Normality and Symmetry

The founding work of Markowitz (1952) establishes the relationship between risk and return, thus formalizing the dilemma faced by investors in financial securities: achieving low but certain profitability, or accepting a risk in the hope to increase this profitability. The expectation of return is even higher than the risk is important. Thus, these studies highlight risk and return as the two determinants of the investment decision and their evolution is considered correlated and symmetrical. Therefore, the interest in investing in a financial security should not be assessed separately but in the context of the investor's entire portfolio. The value of the latter is determined by the risk and return of its constituent securities in a competitive market.

As a result of this relationship, authors such as Treynor (1965), Sharpe (1963 and 1964), Lintner (1965), Mossin (1969), and Black (1972) develop a central model for describing operatively the relationship between the return on financial assets and their risk. It is the CAPM that establishes the link between risk and return by considering what is happening on the market and in the company. In this perspective, the return is not only related to the intrinsic performance of the company, but also to the performance of the market. If the latter is generally favorable, its performance will positively impact the return of the security and vice versa in case of adverse performance. The correlation between the return of the security and that of the market is captured by the "beta".

Subsequently, Ross (1976) develops the APT (Arbitrage Pricing Theory) model based on the idea that there are no sustainable arbitrage opportunities over time. In fact, an asset A as risky as a B asset, but more profitable, would see its demand increase rapidly until its profitability becomes equal to that of asset B, thus canceling any arbitrage opportunity in the future. The other basic assumption is that the expected profitability of a stock can be modeled by a linear function of the different macroeconomic or industry weighted business sector factors, depending on their impact on the stock., by a "beta" coefficient specific to each factor retained. Many empirical studies will seek to determine these macroeconomic or sectoral factors. These include the book value / market value ratio (Stattman, 1980, Rosenberg, Reid and Lanstein, 1985), size (Banz, 1981), profit / price ratio (Basu, 1983), figure ratio business / course (Senchack and Martin, 1987), leverage (Bhandari, 1988). Nevertheless, even if these factors are considered fundamental, they are in fact only extensions of the CAPM extended to sectoral and economic information. Fama and French (1992, 1993) will also develop a model that offers an original specification of the relationship between risk and return. In this respect, the authors argue that the return is a function of a systematic risk factor: the market portfolio. It also depends on two specific risk factors: the book value / market value ratio and the size of the market measured by market capitalization. Despite these extensions, these models have a common lineage based on the existence of a symmetrical and normal relationship between the risk and the return of the securities on a financial market.

2.2 Risk and Return of Securities: Abnormality and Asymmetry

Many market anomalies are likely to challenge the conclusions of the Markowitz (1952), Ross (1976), Fama and French (1992, 1993) models. In fact, the work of Lo and Mackinlay (1999), Lo, Mamaysky and Wang (2000) and Shiller (2000) highlight aspects of financial market dynamics and courses that do not advocate a random walk. and the assumption of efficiency of the financial markets. Non-zero autocorrelations and successive variations that do not take the same direction are spurious to the assumption of a stock market price following a random walk. January, size, weekend effects, predictability patterns based on price / earnings ratios, dividend / price, sub-reaction and overreaction, the mean reversion of long-term returns are all arguments that reinforce the questioning conclusions based on the assumption of financial market efficiency. The work in behavioral finance (Thaler, 2005) completes this table on market anomalies because they argue that certain patterns found in the dynamics of the financial markets are compatible with psychological feedback mechanisms. These include the effect of follow-up or imitation, which may create serious disruptions to the functioning of the market. These anomalies call into question the efficiency hypothesis considered as one of the pillars of the CAPM (Lakoniskok, Shleifer and Vishny, 1994).

In this perspective, alternative models to CAPM suggest an appreciation of the relationship between risk and return that takes into account the following characteristics of emerging equity markets: i) higher average returns than traditional markets; (ii) weak correlations with developed markets; iii) more predictable returns and higher volatility (Bekaert and Harvey, 1995) leading to problems of excess volatility, CAPM relevance and anomalies (size effect, book-to-market, value stocks ...).

According to Pedersen and Hwang (2002), when stock returns are abnormal, CAPM is rejected in favor of LPM-CAPM to measure risk, performance and stock prices. This is particularly relevant when listed companies are small. LPM-CAPM or ARM models then provide credible alternatives to CAPM for estimating equity risk and return on emerging equity markets.

Similarly, taking into account the psychological dimensions to explain the behavior of individual investors shows that they do not always seem to use a single measure of risk and seem to favor semi-variance and the probability of loss in place of the variance (Veld and Veld-Merkoulova, 2008).

Empirical studies by Mitton and Vorkink (2007) on the behavior of individual investors show that they do not diversify (or very imperfectly) their portfolio and choose securities with high skewness, even if the variance is also.

This explains why tens of billions are spent every year in games of chance whose profitability expectancy is very largely negative (but with a largely positive skewness) and larger amounts devoted to the acquisition of insurance contracts against any kind of risk. The work in behavioral finance thus emphasizes that the attitude of individuals to the risk depends significantly on the type of risk they face. This means that it is unrealistic to assume a uniform attitude to risk, as well as an objective assessment of the probability of occurrence of events. In this respect, Rabin and Thaler (2001) show that decision-making based on maximizing the expectation of a concave utility function leads to inconsistent results.

Therefore, the limitations of the utility expectancy theory in describing observed behaviors have led to the development of "behavioral" alternatives such as rank-dependent utility models (Quiggin, 1982), perspectives (Kahneman and Tversky 1984, Tversky and Kahneman 1981) or optimal beliefs (Brunnermeier and Parker 2005). Indeed, three elements pose a "problem" to the utility expectancy theory: (i) the idea that decisions are made by calculating utility expectancy on total wealth; (ii) the attitude to risk is assumed to be uniform (concavity of the utility function); (iii) the fact that the investor makes a linear assessment with respect to probabilities.

Because of these limitations, the outlook theory offers an alternative for calculating utility taking into account changes in wealth, gains and losses, and not final wealth. This utility calculation can also take into account the subjectively biased deformation of individuals. Kahneman and Tversky (1979) also show that the attitude to risk may be different for gains and losses depending on whether individuals are optimistic or pessimistic. The authors finally mention loss aversion combined with the assessment of risky prospects in terms of wealth variation and not total wealth.

3. The ARM Model

The main idea of the ARM model is to divide the excess market returns into two negative and positive components in order to capture the asymmetric responses of asset returns (or portfolio of assets) to changes in market conditions. Initiated by Bawa, Brown and Klein (1981), this model is as follows:

$$\begin{gathered} R_i(t) - R_f(t) = \beta_{1i} R_m^-(t) + \beta_{2i} R_m^+(t) + \pi\delta(t) + \varepsilon_i(t) \quad (1) \\ or\ R_m^-(t) = R_{mt} - R_f(t) when\ R_m(t) < R_f(t)\ and\ zéro\ otherwise \\ R_m^+(t) = R_m(t) - R_f(t)\ when\ R_m(t) > R_f(t)\ and\ zéro\ otherwise \end{gathered} \tag{1}$$

with:

$-\ R_i(t)$ the return of security i at period t;
$-\ R_i(t) - R_f(t)$ the risk premium at time t;

$-\ \beta_{1i}$ the return response of the i security to the unfavorable market return, β_{2i} is the return response of the asset to the favorable market return; π captures the asymmetric response of the model;

$-\ R_m(t)$ et $R_f(t)$ are, respectively, the market return and the risk-free rate of return;

$-\delta$(t) an indicator variable which is equal to 1 when $R_m(t) > R_f(t)$ and 0 otherwise;
$-\varepsilon_i(t)$ The term of error is not correlated.

The ARM model, like the LPM-CAPM, is a derivative of the CAPM. To distinguish these three models and to situate the ARM model more specifically, we start from Harlow and Rao (1989), then Eftekhari and Satchell (1996) who assume that when $\pi = \emptyset(\beta_{1i} - \beta_{2i})$in (1), where ø is the expectation of $R_m^+(t)$ given that $R_m\,(t) > R_f(t)$, ie:

$$\phi = E\left[R_m(t) - R_f(t) \middle| R_m(t) \succ R_f(t)\rangle\right] = \frac{E\left[R_m^+(t)\right]}{\Pr\left(R_m(t) \succ R_f(t)\right)} \tag{2}$$

Using expectations, we can show that equation (1) is reduced to the LPM-CAPM equation in Bawa and Lindenberg (1977) and that:

$$\beta_{1i} = \hat{\beta}_{LPM} = \frac{CLPM_{R_f}\left(R_p, R_m\right)}{LPM_{R_f}\left(R_m\right)} = \frac{\sum_{t=1}^{T}\left(R_i(t) - \bar{R}f(t)\right)\min\left[0, R_m(t) - R_f(t)\right]}{\sum_{t=1}^{T}\left(\min\left[0, R_m(t) - \bar{R}_f\right]\right)^2} \tag{3}$$

The "beta" of the LPM-CAPM therefore gives a measure of risk equivalent to the risk equilibrium measure of a model whose assumptions are the same as those of the CAPM, but where the volatility is measured by a semi-standard deviation. instead of variance as a measure of risk.

d$\left[\sum_{i=1}^{n}\left(\tau - R_i(t)\right)^2\right]^{\frac{1}{2}}$ in which R_i (t) < τ.

Here τ is the targeted return, typically the risk-free rate of return.

Equation (3) replaces the traditional CAPM beta and is a measure of the downside (semi-variance) risk of returns.

As for $\beta_{2i,}$ it can be analogically interpreted as the response of asset returns to the upside returns of the market.

By putting $\beta_{1i} = \beta_{2i}$ (and thus by (3) also $\pi = 0$) in (2) and taking into account expectations, we find the traditional CAPM where:

$$\beta_{2i} = \hat{\beta}_{CAPM} = \frac{\operatorname{cov}\left(R_i, R_m\right)}{\operatorname{var}\left(R_m\right)} = \frac{\sum_{t=1}^{T}\left(R_i(t) - \bar{R}_i\right)\left(R_m(t) - \bar{R}_m\right)}{\sum_{t=1}^{T}\left(R_m(t) - \bar{R}_m\right)^2} \tag{4}$$

We can therefore remember that the CAPM and LPM-CAPM models are only extensions of the ARM model. Their difference can however be appreciated in the following way: when the distribution of the returns is "non-normal" and asymmetric, one chooses either the LPM-CAPM or ARM. In the opposite case, that is to say if there is "normal" and symmetrical distribution of the returns, the CAPM model is the best adapted.

The implementation of the ARM model also requires characterizing the returns of market securities. For this, it is necessary to analyze empirically the assumptions that are at the origin of the distribution keys of the distribution of market returns. This is done using the maximum likelihood test of the ARM model which is broken down as follows:

$$pdf\left(R_i(t)\middle|R_m^-(t), R_m^+(t), \delta(t)\right) = \frac{1}{\sigma\sqrt{2\pi}}\exp\left[-\frac{1}{2\sigma^2}\left(R_i(t) - \beta_{i1}R_m^-(t) - \beta_{i2}R_m^+(t) - \pi\delta(t)\right)^2\right] \tag{5}$$

The second term $pdf\left(R_m^-(t), R_m^+(t), \delta(t)\right)$ requires an appropriate assumption based on the observed market return distribution. The probability density function is also used to explain the normality or non-normality of equity returns on the RSE. The Mixed Gamma (MG) test, proposed by Knight, Satchell and Tran (1995), captures the asymmetry of asset returns downward and upward. The distribution described by MG is as follows:

$$pdf(x) = \begin{cases} \dfrac{\lambda^{\alpha} x^{\alpha-1}}{\Gamma(\alpha)}\exp(-\lambda x);\ x \succ 0 \\ 0;\ other \end{cases} \tag{6}$$

Γ is the Gamma function, α > 0; λ > 0.

Under these conditions, Knight, Satchell and Tran (1995) show that the likelihood test can also be written as follows:

$$pdf\left(R_i(t)\middle|R_m^-(t),R_m^+(t),\delta(t)\right)=\left[pdf\left(R_m^-(t)\right)p\right]^{\delta(t)}\left[pdf\left(R_m^+(t)\right)(1-p)\right]^{1-\delta(t)}$$

$$=\left[\frac{p\lambda_1^{\alpha_1}\left[R_m^+(t)\right]^{\alpha_1-1}\exp\left[-\lambda_1R_m^+(t)\right]}{\Gamma(\alpha_1)}\right]^{\delta(t)}\times\left[\frac{(1-p)\lambda_2^{\alpha_2}\left[-R_m^-(t)\right]^{\alpha_2-1}\exp\left[-\lambda_2\left(-R_m^-(t)\right)\right]}{\Gamma(\alpha_2)}\right]^{1-\delta(t)} \quad (7)$$

Or:

- (λ1, α1) are parameters that represent the Gamma distribution for favorable market returns $R_m^+(t)$;
- (λ2, α2) are parameters that represent the gamma distribution for adverse market returns $R_m^-(t)$;

-p is the probability of the dummy variable δ (t).

4. The Methodology

A general procedure of homogeneity tests presented by Hsiao (1986) and described in figure 1.

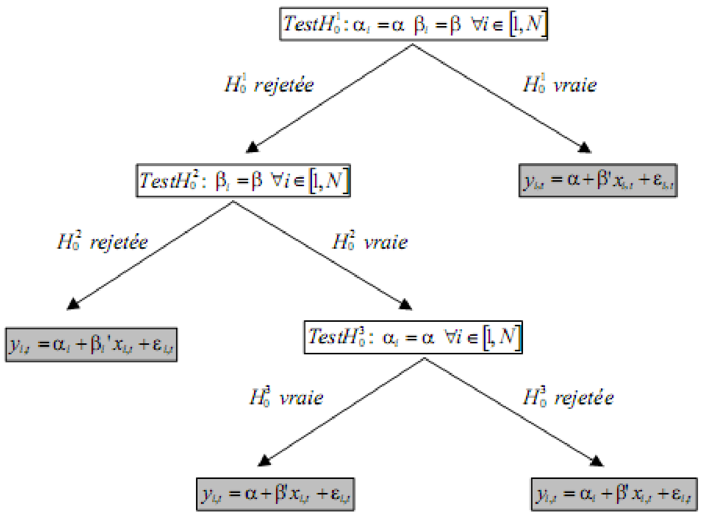

Figure 1. General Homogeneity Test Procedure

In the first step, we test the hypothesis of a perfectly identical structure. If we accept the null hypothesis H_0^1 of homogeneity, we obtain a totally homogeneous pooled model $y_{i,t}=\alpha+\beta' x_{i,t}+\varepsilon_{i,t}$. On the other hand, if we reject the null hypothesis, we go on to a second stage to test if the heterogeneity comes from β_i.

In the second step, if we reject the null hypothesis H_0^2 of homogeneity of the coefficients β_i, we reject the panel structure, since at best only the constants α_i can be identical between the individuals $y_{i,t}=\alpha+\beta_i' x_{i,t}+\varepsilon_{i,t}$:. Different models are estimated for each individual. On the other hand, if one accepts the null hypothesis H_0^2 of homogeneity of the coefficient β_i, one retains the structure of panel and one tries then to determine in a third stage if the constants α_i have an individual dimension.

In the third step, the rejection of the assumption H_0^3 homogeneity assumption leads to a panel model with individual effects: $y_{i,t}=\alpha_i+\beta' x_{i,t}+\varepsilon_{i,t}$. Otherwise, we obtain a totally homogeneous or pooled model which only serves to confirm or invalidate the conclusions of the test H_0^1.

5. The Empirical Analysis

It successively leads to the presentation of data, results and discussion.

5.1 The Data

The study concerns all the companies introduced on the BRVM market over the period from September 16, 1998 to December 31, 2016. A panel database is used on a daily frequency of quoted market securities as well as on a daily basis. than the evolution of the market returns through the BRVM Composite index. In this period, we observe in-migrants and leavers causing missing data. The STATA software used provides for the processing of missing data. Finally, an unbalanced panel is retained.

The affiliation of the ARM to the CAPM involves the calculation of certain indicators such as the risk premium and the effects induced by the performance of the financial market to remunerate the investors, also called systematic risk.

The risk premium measures the difference between the observed performance of a stock in the market (including dividends) and the risk-free interest rate, usually represented by the return on the government bond. It allows an investor to know if the return on his investment offsets the risk he has taken.

In the case of this study, we use the risk-free interest rate as the average interest rate on the State of Côte d'Ivoire's loans for two main reasons:

1) The State of Côte d'Ivoire is one of the few states of the West African Economic and Monetary Union (WAEMU) that has been rated in local currency. The latter reflects the level of risk taken by investors on securities issued in local currency by the latter and, consequently, the level of remuneration that they must expect. The interest rate on Ivorian government bonds thus offers a good approximation, for the market, of the risk-free rate on a BRVM largely constituted by Ivorian companies;

2) This country provides economic leadership in the WAEMU sub-region, which makes its market borrowing rate a reference for investors interested in acquiring similar securities in the sub-region.

The average interest rate on government bonds of the Ivory Coast for the period (2013-2016) is 5% annual average, or the daily rate 0.013365%;

The systematic risk of a financial asset is the risk that a particular event will cause a chain reaction to have a significant impact on the investor's compensation. It can have an impact on the real economy.

Finally, the security and market returns are calculated as follows:

$$R_{i,t} = \ln\left(\frac{C_{i,t}}{C_{i,t-1}}\right)$$

With:

- $C_{i,t:}$ the course of the company i at the period t;

- I_t: the BRVM composite index at period t.

5.2 The Results

Descriptive statistics for the titles are presented, followed by the results of the ARM model estimate.

5.2.1 Descriptive Statistics

Tables 1, 2 and 3 provide descriptive statistics on the performance of BRVM Composite securities. These tables show that the average return on BRVM securities is negative overall (-0.009%) when considering the study period as a whole (1998-2016). The split into two sub-periods, due to the change in the method of listing, shows a negative average return on securities from 1998 to 2011 (-0.004%), then a positive average return from 2012 (+ 0.002%). The new method of listing securities on the RSE seems to favor a better return for investors. However, it remains to be seen whether the level of return observed from 2012 covers the level of risk.

Table 1. Descriptive statistics of the BRVM

	Risk premium	return of the deficit market	Excess market return	Indicator variable
Average	-0,0000926	-0,0032899	0,0036321	0,5005342
Standard deviation	0,0378592	0,0088375	0,0097158	0,5000028
Skewness (0,00)	-33,08941	-14,8639	14,20025	-
Kurtosis (3,00)	2775,073	503,9763	452,3099	-
Jarque-Bera (5,99)	218465,40	155533,58	152147,28	-
Number of negative observations	63605	40202	-	-
Proportion in the sample	79,02%	49,95%	-	-
t-value[1]	-0,6939	-105,614	106,059	284,007
Number of observations		80490		

Table 2. Descriptive statistics (18/09/1998-07/06/2012)

	Risk premium	return of the deficit market	Excess market return	Indicator variable
Average	-0,0004646	-0,0041335	0,0043122	0,474873
Standard deviation	0,0346469	0,0118391	0,0126664	0,4993747
Skewness (0,00)	-2,653471	-12,49552	11,40947	0,1006352
Kurtosis (3,00)	172,4054	322,6803	275,1441	1,010127
Jarque-Bera (5,99)	31796,78	68054,14	65061,06	-
Number of negative observations	30159	20157	-	-
Proportion in the sample	78,57%	52,51%	-	-
t-value	-2,6272	-68,4029	66,6992	186,3057
Number of observations		38385		

Table 3. Descriptive statistics (08/06/2012-31/12/2016)

	Risk premium	return of the deficit market	Excess market return	Indicator variable
Average	0,0002466	-0,0025209	0,0030121	0,5239283
Standard deviation	0,0405641	0,0045038	0,0057782	0,499433
Skewness (0,00)	-49,92668	-4,737364	18,26342	-0,0958229
Kurtosis (3,00)	3943,375	83,94075	1075,779	1,009182
Jarque-Bera (5,99)	132505,75	43990,32	90054,07	-
Number of negative observations	33446	20045	-	-
Proportion in the sample	79,43%	47,61%		
t-value	1,2474	-114,8519	106,9642	215,2565
Number of observations		42105		

In contrast to investor expectations, risk factor premiums were negative in most observations. Indeed, the results reveal negative balances for more than 78% of risk premiums and for almost half of market premiums.

These poor performances can be explained in part by the Ivorian political crisis that occurred during the first decade of the third millennium. Indeed, the central headquarters of the RSE is located in Côte d'Ivoire from which the vast majority of listed companies come from. This high proportion of negative returns has been observed in similar studies in emerging markets. For example, Aksu and Onder (2003) show that 52% of stocks have negative returns on Turkish markets. Similarly, according to Ben Naceur and Ghazouani (2007), this proportion is 60% over a period of 5 years in the Tunisian markets.

1 La t-value is calculated by dividing the average of the daily returns by its standard deviation which is: $\sigma/(T-1)^{0,5}$

Regarding the symmetrical or non-symmetrical nature of the securities' returns, that is to say, to assess whether the rate of the return distribution is in line with the market risk, the coefficients of skeweness, kurtosis and Jarque-Bera (Table 3) indicate that the distributions of stock market returns are neither symmetrical nor normal. On the other hand, they reveal asymmetric and leptokurtic behavior (presence of thick tail) since the kurtosis coefficients are significantly different from the reference value of a normal distribution ($K \leq 3$) while the skeweness coefficients are all negative. In addition to the non-normality, there is a flattening and an asymmetry of the series.

The Jarque-Bera tests show chi-two above the norm of 5.99, which leads to rejecting the null hypothesis of normality of stock market returns. In other words, there are excess returns in relation to the average. These differences are explained in practice by the presence of bullish returns or significant downward returns on the BRVM market over the observation period. Figure 2 illustrates this asymmetric distribution of return.

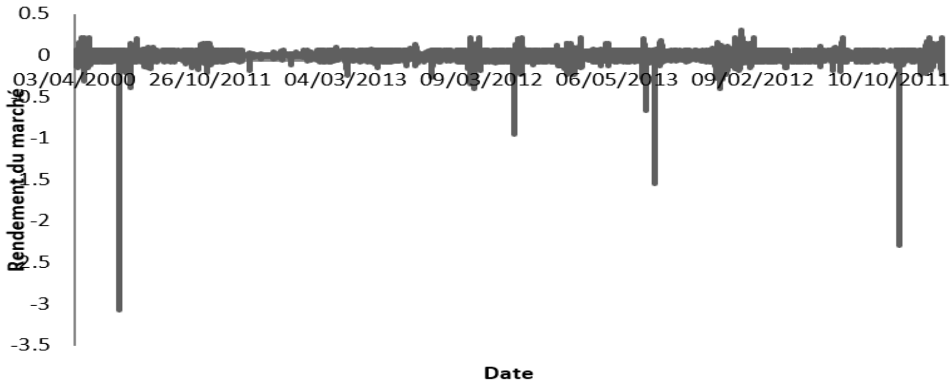

Figure 2. Rish permium

There is also a near-zero trend in the risk premium, which tends to show that the BRVM market is not attractive because it does not pay the excess risk taken by investors through the acquisition of the shares. which are listed there.

Finally, the idea that market returns are moving more towards negative performance than positive performance is confirmed.

5.2.2 The Results of the ARM Model Estimation

They are presented in Tables 4 and 5, which show that securities listed on the BRVM can be divided into two categories depending on the return, which validates the research hypothesis relating to the asymmetrical nature of the relationship between risk and return on this market. market. Thus, we have on the BRVM positive returning securities that include all companies whose market performance is favorable, on the one hand, negative return securities associated with companies whose market performance is unfavorable, somewhere else.

Table 4. Specification test according to Hsiao (1986)

	F_1	F_2	F_3
ARM	-	-	69.215259
	-	-	(0.0000)

Table 5. Estimation of coefficients of the ARM by OLS

Parameter	Constant	β^-	β^+	δ	R^2
Risk premium	-0.0015742	0.2768562	0.0226011	0.0046158	0.0112
	0.000	0.000	0.125	0.000	
Risk premium [2]	-0.0027117	0.2695664	0.0042185	0.0070402	0.0251
	0.000	0.000	0.775	0.000	
Risk premium [3]	-0.0006885	0.2389789	0.0515831	0.0026381	0.0032
	0.089	0.000	0.190	0.000	

The dummy variable is a dummy variable that captures the asymmetrical nature of the distribution of security returns and indicates the direction of financial market performance if it exists. Thus, with the exception of positive market

[2] Fixing auction

[3] Continuous quotation

performance, all other variables are significant at the 1% level. Indeed, the market trend indicates the existence of return but it is rather oriented towards an unfavorable performance. As a result, the distribution of market returns shows a negative performance for most securities listed on the financial market.

5.3 Discussion

The main results are discussed in relation to the issue of the attractiveness of the RSE and the insights gained by behavioral finance work on investor attitudes at the RSE in this asymmetrical context.

Regarding the attractiveness of the BRVM, the results show that this market is essentially composed of "fundamentalist" investors who buy securities and keep them for the purpose of receiving dividends. This investor profile contrasts with that commonly observed on developed stock markets interested in returns and potential gains.

In addition, investors in the BRVM take little or no risk and are only interested in securities that have potential and / or "visibility" with a high current return. This is the case of the Sonatel share, which concentrates most of the transactions on the market.

Because of this homogeneity of behavior, we can say that the investors at the BRVM obey an identical model of interpretation based on analysis and anticipation the model of dividend or the current value which focuses on the fundamentals or the real determinants of dividends and interest rates and hence all the variables that influence these factors. Even if this market is composed of various investors, as long as it is dominated by the "fundamentalists", the reasoning remains valid. Indeed, even if each actor acts according to its own rationality, the market will always balance in the direction of the expectations of the dominant.

These homogeneous or dominant expectations at the level of the BRVM favor the absence of speculative behavior, which is illustrated by the weakness of the R2, ie 1.12%. In such a context, the risk is so low that it has a very small impact on the stock market performance of the securities. However, it is when the impact of risk on the return of the securities is effective, as in the developed stock markets, that the returns tend to move away from their fundamental value and constitute a source of attractiveness of the securities. The test results confirm the assumption of asymmetry of the distribution of returns on the BRVM market since the dummy variable shows the existence of an asymmetric response characterized by the presence of a return having a high proportion (49.95%) of negative market response.

Driven by limited-limit orders, composed of investors with a homogenous profile and associated with an asymmetrical response on the distribution of the returns of its securities, the BRVM is not ultimately attractive because it does not offer the possibility of obtain significant capital gains. The low attractiveness of the market is also explained by the fact that the returns on securities are close to, or even confused with, their fundamental values.

With respect to the theoretical implications, the results are consistent with the conclusions of theories of risk aversion and loss. Indeed, loss aversion reinforces the tendency to retain losers since if you sell a loss in order to buy another one and you realize a loss, you do not pay. that half of the disappointment caused by the loss on the first title. This is why, despite a sometimes positive orientation of RSE securities returns, investors prefer to keep them rather than give them up so as not to suffer losses.

Perspective theory (Kahneman and Tversky 1979, Tversky and Kahneman 1992) also illuminates the behavior of investors at the RSE. Indeed, if the latter had a behavior in line with that indicated by the expected utility theory, they would disengage from their investment as soon as a possibility arises, that is to say, when the price moves away. of its fundamental value. But in reality, the opposite happens: they tend to keep their securities even when the market is favorable. Everything happens as if they set a horizon of daily gain and withdraw as soon as it is realized. This behavior is consistent with the theory of perspectives if one postulates that this horizon of gain serves as a reference to their decision.

6. Conclusion

This study highlights the relevance of the ARM model to capture the relationship between risk and return in developing markets, such as the BRVM. Indeed, the empirical results confirm the necessary paradigmatic rupture with the CAPM when it comes to studying risks and stock market returns on this type of market.

The study of risk and profitability also helps to shed light on the attractiveness of the RSE. This shows that most securities have a negative performance, with the exception of banking stocks and insurance companies. This is explained by the central position of these actors among market investors and functionalist stakeholders. In such a context, one cannot help wondering about the "responsibility" of banks and insurance companies to increase the attractiveness of the BRVM.

Finally, the study highlights the low influence of risk on the returns of BRVM securities. In this, she takes the opposite of Markowitz's thesis (1952). Various explanations are possible which open up future research tracks. These include the impact of the regulatory framework of the market, the fixed exchange rate CFA francs / Euro, as well as exchange controls that do not allow speculators (including international) to be able to play on capital gains.

Note

Beyond this, this work is based on the implicit assumption that securities are modeled according to a symmetric normal distribution and that in this respect there is a permanent balance between the risk and return of a security taken in isolation within a portfolio of securities.

References

Aka, B. (2009). Subprime crisis and contagion: evidence from the BRVM. *African Review of Money Finance and Banking*, 51-71.

Aksu, M. H., & Turkan, O. (2003). *The Size and Book-to-Market Effects and Their Role as Risk Proxies in the Istanbul Stock Exchange*. EFMA 2000 Athens; Koc University, Graduate School of Business, Working Paper No. 2000-04. Available at SSRN: https://ssrn.com/abstract=250919 or http://dx.doi.org/10.2139/ssrn.250919_

Bakir, K. (2002). *The efficiency of financial markets in emerging countries: the example of the Casablanca Stock Exchange*. ANRT, Université Pierre Mendes France (Grenoble II).

Bamba, N., & Galadjo, L. (2001). *The construction of regional financial markets in the African countries of the franc zone.* In Proceedings of the Annual Meeting of Finance Ministers of the Franc Zone Countries.

Banz, R. (1981). The Relation between Return and Market Value of Common Stocks. *Journal of Financial Economics, 9*, 3-18. https://doi.org/10.1016/0304-405X(81)90018-0

Basu, S. (1983). The Relationship between Earnings Yield, Market Value, and Return for NYSE Common Stocks: Further Evidence. *Journal of Financial Economics, 12*, 129-156. https://doi.org/10.1016/0304-405X(83)90031-4

Bawa, V., & Lindenberg, E. (1977). Capital Market Equilibrium in a Mean-Lower Partial Moment Framework. *Journal of Financial Economics, 5*, 89-200. https://doi.org/10.1016/0304-405X(77)90017-4

Bawa, V., Brown, S., & Klein, R. (1981). *Asymmetric Response Asset Pricing Models: Testable Alternatives To Mean-Variance*. Mimeo".

Bekaert, G., & Harvey, C. (1995). Time-Varying World Market Integration. *The Journal of Finance*. https://doi.org/10.1111/j.1540-6261.1995.tb04790.x

Benartzi, S., & Thaler, R. H. (1996). Myopic Loss Aversion and the Equity Premium Puzzle. *Quarterly Journal of Economics*, *110*, 75-92.

Benartzi, S., & Thaler, R. (2001). Naive Strategies in Defined Contribution Saving Plans. *American Economic Review, 91*, 79-98. https://doi.org/10.1257/aer.91.1.79

Bhandari, L. (1988). Debt/Equity Ratio And Expected Common Stock returns: Empirical Evidence. *Journal Of Finance, 43*(2), 507-528. https://doi.org/10.1111/j.1540-6261.1988.tb03952.x

Black, F. (1972). Capital Market Equilibrium With Restricted Borrowing. *Journal Of Business, 45,* 444-455. https://doi.org/10.1086/295472

Brunnermeier, M., & Parker, J. (2005). Optimal Expectations. *American Economic Review, 95*(4), 1092-1118. https://doi.org/10.1257/0002828054825493

Cencia, M., & Filippinib, F. (2006). Portfolio Selection: A Linear Approach With Dual Expected Utility. *Applied Mathematics and Computation, 179*(2), 523-534. https://doi.org/10.1016/j.amc.2005.11.141

Eftekhari, B., & Satchell, S. (1996). Non-normality of returns in emerging markets. *Research in International Business and Finance, Supplement, 1*, 267-277.

Eldadu, T. (2015). Revisiting the relationship between different financial risk measures and the market return on ordinary shares in South Africa. *South African Journal of Economic and Management Sciences (SAJEMS), 18*(2), 218-231.

Fama, E., & French, K. (1992). The Cross-Section Of Expected Stock returns. *Journal Of Finance, 47,* 427- 465. https://doi.org/10.1111/j.1540-6261.1992.tb04398.x

Gahé, Z., Hongzhong, Z., Allate, B., & Belinga, T. (2017). Capital Asset Pricing Model Testing In West Africa Economic And Monetary Union Stock Market: The Case Of Ivorian Listed Firms. *International Journal of Research Granthaalayah, 5*(2), 23-30.https://doi.org/ 10.5281/zenodo.345437

Harlow, W., & Rao, R. (1989). Asset-Pricing in a Generalised Mean-Lower Partial Moment Framework : Theory and Evidence. *Journal of Financial and Quantitative Analysis, 24*, 285-311. https://doi.org/10.2307/2330813

Hearn, B., & Piesse, J. (2008). *Market Liquidity and Stock Size Premia in Emerging Financial Markets: The Implications for Foreign Investment. Research Paper 49, International Business,* SSRN

Hsiao, C. (1986). *Analysis of Panel Data.* Cambridge University Press, Cambridge, Mass.

Hwang, S., & Satchell, S. (1999). Modelling Emerging Market Risk Premia Using Higher Moments. *International Journal of Finance and Economics, 4*(4), 271-296. https://doi.org/10.1002/(SICI)1099-1158(199910)4:4<271::AID-IJFE110>3.0.CO;2-M

Hwang, S., & Satchell, S. (2001). *The Asset Allocation Decision in a Loss Aversion World*. Financial Econometrics Research Centre, Working Paper WP01-7, City University Business School.

Hwang, S., & Satchell, S. (1999). Empirical Identification of Common Factors in Emerging Markets returns. *Emerging Markets Quarterly, 3*(4), 7-26.

Janata, G. (2016). *Validity of the Capital Asset Pricing Model (CAPM) for Securities Trading at the Nairobi Securities Exchange (NSE).*

Kahneman, & Tversky (1979). Prospect Theory: An Analysis of Decision Under risk. *Econometrica, 47*(2), 263-291.

Kim, M. K., & Zumwalt, K. J. (1979). An analysis of risk in bull and bear markets. *Journal of Financial and Quantitative Analysis, XIV*(5), 1015-1025. https://doi.org/10.2307/2330303

Knight, J., Satchell, S., & Tran, K. (1995). Statistical modelling of asymmetric risk in asset returns. *Applied Mathematical Finance, 2,* 155-172. https://doi.org/10.1080/13504869500000009

Kolani, P., & Anani, E. V. (2014). *An Analysis of the Relationship between Risk and Expected return in the BRVM Stock Exchange.* Test of the CAPM.

Lakoniskok, J., Shleifer, A., & Vishny, R. (1994). Contrarian Investment, Extrapolation, and Risk. *The Journal of Finance, 49*(5), 1541-1578 https://doi.org/10.1111/j.1540-6261.1994.tb04772.x

Lintner, J. (1965). The Valuation of Risk Assets and The Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics, 47*, 13-37. https://doi.org/10.2307/1924119

Lo, A. W., & Mackinlay, A. C. (1999). *A Non-Random Walk Down Wall Street*. 448pp. Princeton University Press. ISBN 0-691-09256-7.

Lo, A. W., Mamayski, H., & Wang, J. (2000). Fondations Of Technical Analysis: Computational Algorithms, Statistical Inference, And Empirical Implementation. *Journal Of Finance. NBER Working Paper N0 7613Issued in March 2000*

Markowitz, H. (1952). Portfolio selection. *Journal of Finance, 7*, 77-91.

Mitton, T., & Vorkink, K. (2007). Equilibrium Under-diversification and the Preference for Skewness. *Review of Financial Studies, 20*, 1255-1288. https://doi.org/10.1093/revfin/hhm011

Mossin, J. (1969). Security Pricing and Investment Criteria in Competitive Markets. *American Economic Review, 59,* 749-756.

Ndong, B. (2007). *Marchés boursiers émergents et problématique de l'efficience: cas de la BRVM.* Thèse de doctorat.

Pedersen, C. (1998). *Empirical Tests For Differences in Equilibrium Risk Measure With Application To Downside Risk in Small and Large UK Companies*. Cambridge Discussion Papers in Accounting and Finance, No41.

Pedersen, C., & Hwang, S. (2002). *Asymmetric Equilibrium Risk Measures*. (Unpublished Manuscript).

Pedersen, C., & Satchell, S. (2000). Small Sample Analysis of Performance Measures in the Asymmetric Response Model. *Journal of Financial and Quantitative Analysis, 35*(3), 425-450. https://doi.org/10.2307/2676212

Pedersen, C., & Satchell, S. (2002). On the Foundation of Performance Measures under Asymmetric returns. *Quantitative Finance, 3*, 217-223. https://doi.org/10.1088/1469-7688/2/3/304

Quiggin, J. (1982). A Theory of Anticipated Utility. *Journal of Economic Behavior and Organization, 8*, 641-645. https://doi.org/10.1016/0167-2681(87)90041-2

Rabin, M., & Thaler, R. (2001). Risk Aversion. *Journal of Economic Perspectives, 15*(1), 219-232. https://doi.org/10.1257/jep.15.1.219

Rosenberg, B., & Lanstein, R. (1985). Persuasive Evidence Of Market Inefficiency. *Journal of Portofolio Management, 11*, 9-17. https://doi.org/10.3905/jpm.1985.409007

Ross, S. A. (1976). Arbitrage Theory Of Capital Asset Pricing. *Journal of Economic Theory, 13*, 341-360. https://doi.org/10.1016/0022-0531(76)90046-6

Sami, B. N., & Samir, G. (2007). Stock markets, banks, and economic growth: Empirical evidence from the MENA region. *Research in International Business and Finance, 21*(2), 297-315. https://doi.org/10.1016/j.ribaf.2006.05.002

Senchack, J., & Martin, J. D. (1987). The Relative Performance of the PSR and PER Strategies. *Financial Analysts Journal, 43*, 46-56. https://doi.org/10.2469/faj.v43.n2.46

Sharpe, W. (1963). A Simplified model for portfolio analysis. *Management Science*, 277-293.20

Shiller, R. J. (2000). Measuring Bubble Expectations And Investor Confidence. *Journal of psychology And Financial Markets, 1(*1)*,* 49-60. https://doi.org/10.1207/S15327760JPFM0101_05

Sttatman, D. (1980). Book Value And Stock returns. *The Chicago MBA: A Journal of Selected Papers, 4*, 25-45.

Thaler, R. (2005). Advances in behavioral finance. *Princeton University, 2*.

Treynor, J. (1965). How To Rate Management of Investment Funds. Harvard Thaler R.H., "Toward a Positive Theory of Consumer Choice. *Journal of Economic Behavior and Organization, 1*, 39-60.

Tversky, A., & Kahneman, D. (1981). The Framing of Decision and the Psychology of Choice. *Science, 5*, 297-323. https://doi.org/10.1126/science.7455683

Veld, C., & Veld-Merkoulova, Y. (2008). The Risk Perceptions of Individual Investors. *Journal of Economic Psychology, 29*, 226-252. https://doi.org/10.1016/j.joep.2007.07.001

Zivanayi, M. N. (2012).Risk return trade-off and behaviour of volatility on the south african stock market: Evidence from both aggregate and disaggregate data. *South African Journal of Economics, 80*(3).

Annex: List of Companies in the RSE

List of companies that make up the RSE from September 1998 to December 31, 2016						
Industry	Public services	Finance	Transport	Agriculture	Distribution	Others
SICABLE CI CEDA CI BLOHORN CI FILTISAC CI NEI CI NESTLE CI SAEC CI SIEM CI SAGECO CI SIVOA CI SOLIBRA CI SMB CI SITAB CI TRITURAF CI UNILEVER CI UNIWAX CI	CIE CI ONTBF SODECI CI SONATEL SN	BICICI CI BOAC BOA BN BOA BF BOAN ETIT SAFCA CI SGBCI	SAGA CI SDV CI SIVOM	PALMCI PHCI SICOR CI SOGB CI SAPH CI	ABIDJAN CAT BERNABE CI CFAO CI ELF CI PEYRISSAC CI SHELL CI SARI CI SOCIMAT CI TOTAL CI	SETAO