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Highlighting the Financial Asset Assessment Model (CAPM) in Emerging African Markets: An Application on the Abidjan Stock Exchange (ASE)

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Abstract: Capital Asset Pricing Model (CAPM) is one of the most important developments in the finance literature. Capital Asset Pricing Model (CAPM) predicts the expected return on astock depends on its systematic risk as measured by its beta. This study is designed to examine theoretical and empirical validity of the CAPM on "BRVM". For this study, monthly stock returns from 28 companies for the period January 1999 to December 2004 are chosen. Recent empirical evidence suggests that the relation between beta and realized returns is weak or event non-existent. The traditional two-step procedure due to Fama and MacBeth (1973) used in most studies implies a test of two joint hypotheses. The hypothesis that there is a positive relationship between beta and realized return is tested jointly with the hypothesis that the average market risk premium is positive. The result of this analysis show that the intercept terms are not significantly different from zero and reject the linear relationship between expected returns and their systematic risk, thus rejecting the validity of the CAPM on RSES.

Keywords: Stock, expected return, CAPM, RSES, systematic risk.

Introduction

WAEMU, like several other sub-regions or countries, in its strategy of mobilizing domestic savings to finance the economic activity of member countries decided to create a financial market in December 1996. This decision s is materialized by the creation of the Regional Stock Exchange of Securities (RSES) and the Central Depository / Settlement Bank (DC / BR) in December 1996. Now WAEMU member countries can finance their economy by public call to l savings in this market. However, faced with the markets of developed countries which are much more organized and experienced, one can try to wonder how the markets of developing countries and of which the weakly structured BRVM, coupled with chronic instability linked to the political cycle

of their country (Bourguinat and Ménai, 1996) can attract the capital necessary to finance the economy of their country. The markets of the industrialized countries also differ from the markets of the developing countries by the existence in these markets of an operational risk which is due to the weak reliability of information, to the weakness of the protection of the investors, to a transparent insufficiency of the system financial, as well as an absence of security and speed in settlement operations - Delivery (the deadline is still D + 5 at the RSES while it is D + 3 on developed places like the NYSE) and of title conservation (Tchemeni, 1997). The existence of this operational risk makes these markets inefficient.

However, increasing market integration in developed countries tends to reduce the benefits of diversification. In addition, the debt crisis has kept crowding out several individual banking establishments and operators from their markets. American, European, but also Chinese and Qataris banks and operators are multiplying initiatives to strengthen themselves in Africa. (Young Economic Africa, 2012). With the debt crisis in Europe and the recession that threatens the developed economies, the continent of a billion inhabitants and economic growth of 5.8% in 2012 (Forecast) becomes a preferred destination for foreign investors. Here we can cite the case of Standard Chartered through its Africa director Diana Layfield, who stated in December 2012 "We are on the lookout for any acquisition opportunities in Africa (Young Economic Africa, 2012).

The main question for these foreign as well as domestic investors remains the use of modern financial tools to assess their assets or their earnings expectations in a market such as the RSES. This main questioning justifies our reflection on the subject entitled "Applicability of the Balance Model of Financial Assets (CAPM) to equities listed on the Regional Stock Exchange (RSES)".

Problem of the Study

The debt crisis that hit African countries in the 1980s prompted several countries, notably the WAEMU countries, to take an interest in the market economy by creating financial markets. This unprecedented development of the direct funding system will solve (if only partially) the thorny problem of very limited access to finance in an indirect funding system.Financial markets are very useful in the economy of a country, as they allow private savings to be directed towards business or community investments for the best benefit of the national economy (Tchemeni, 1997). The proof is that all industrial nations have at least one stock exchange and that the majority of the most dynamic in developing countries have created one.

In addition, these financial markets, which have experienced a veritable explosion since the 1970s, allow economic agents in one way or another to reconcile the antagonistic objectives of the clientele identified by James Tobin

(1958). These are profitability, security and liquidity objectives. Thus, to obtain portfolios reconciling a high level of profitability and a high level of security (and therefore less risky), the actors of the financial markets have several instruments called financial asset management instruments. In reality it was Harry Markowitz's article, "Portfolio Selection" which, during the 1950s, marked the starting point of modern theory relating to the management of financial assets and the functioning of financial markets, which resulted in the formalization in a rigorous framework of the relationship between risk and return on securities.

Twelve years later, William Sharpe (1964), John Lintner (1965), Jan Mossin (1966) developed a central model in financial theory which makes it possible to describe in a simple way, the relationship between the profitability of financial assets and their risk: c is CAPM. This model enjoys a certain notoriety both academically and practically.CAPM has generated a very large number of empirical studies trying to determine its validity, particularly with regard to the increasing linear relationship between risk and return, as well as the reliability of beta as a financial analysis tool.However, these various empirical studies have so far been carried out in the vast majority of cases, on developed markets. What about the financial markets of African countries and more particularly that of the RSES.

From this problem arises the following central question: **Is it possible to apply the Balance of Financial Assets Model (CAPM) on an African stock exchange in particular, the** RSES**?**This question gives rise to two specific questions:

- What is the nature of the relationship that links the systematic risk and the return of stocks listed on the RSES?
- Is the average market risk premium positive?

Research Objectives

The objective of this study is to test the validity of the CAPM on the Regional Stock Exchange (RSES). Specific objectives:

- Identify the nature of the relationship between equity returns and their systematic risk on the RSES
- Show that the average market risk premium is positive.

Study Assumptions

The Balance of Financial Assets Model (CAPM) is one of the important achievements of financial theory. Its original development is based on the assumption of investors with preferences of the "hope - variance" type. Such a framework makes it possible to simply show a "separation theorem" implying that all investors hold, at equilibrium, the same portfolio of risky assets which they combine in variable proportions with a risk-free asset. This

"separation" is the basis of the central results of CAPM.These results being on the one hand that the relationship between the return of a share and its beta is linear and on the other hand that the average market risk premium is positive. In order to verify the validity of CAPM on the RSES, we have formulated the following hypotheses:

- There is a linear relationship between the returns on financial assets and their systematic risk measured by beta
- The average market risk premium is positive.

Review of Theoretical Works

Origin of MEDAF and modern portfolio theory (1952)

The modern portfolio theory of Markowitz (1952) is the theory from which the authors of CAPM are not inspired. This theory makes it possible to determine the price of an asset knowing its systematic risk. It shows how the investor manages the return and risk of his portfolio using diversification. As the portfolio is a linear and weighted combination of multiple securities, the portfolio return will be the linear and weighted combination of the performance of each security.

The original idea

Modern portfolio theory, developed by Harry Markowitz in the 1950s, defines the stock selection process to create the most efficient portfolio possible, that is, one with maximum profitability for a minimum level of risk. The concept of diversification is the basis of the theory. Markowitz believes that the different securities making up a portfolio cannot be selected individually and, on the contrary, must be chosen according to the correlation of their variations with those of the rest of the assets in the portfolio. On the technical level, this is a fairly banal quadratic optimization problem. Its originality is essentially the application of this model of engineer to the world of finance. The latter is based on information, risk and return assumptions.

Information, risk and return assumptions

The model makes the double assumption that:

- Financial asset markets are efficient. This is the market efficiency assumption that the prices and returns of the assets are supposed to reflect, in an objective manner, all the information available concerning these assets.
- Investors are risk averse (as shown by Daniel Bernoulli): they will only be willing to take more risks in exchange for a higher return. Conversely, an investor who wishes to improve the profitability of his portfolio must accept to take more risks. The risk / return balance considered optimal depends on the risk tolerance of each investor.

Presentation of CAPM

For almost forty years, the financial asset valuation model (CAPM) developed by William Sharpe (1964), John Lintner (1965), and Jan Mossin (1966) has undoubtedly been the most used model by the financial community. Both for the estimation of the cost of capital, the development of investment strategies and for the evaluation of portfolio performance. This model is based on the theory of equilibrium. As a result, market participants seek opportunities to maximize their well-being (profits, utilities), knowing that the value of an asset is its equilibrium price (absence of profitable opportunities or arbitrage).It can be defined as a model which makes it possible to establish a relationship between the expected return of a security and its systematic risk (the beta). It is a one-factor model, i.e. the variations in the expected return are only explained by a single factor (beta) .This model is based on very restrictive assumptions of the behavior of investors and the market environment.

The Hypotheses

Like any other economic model, CAPM is no exception to the rule based on several assumptions. This model stipulates the following theoretical hypotheses:

H1: All investors are risk averse and seek to maximize their expected utility at the end of the investment period.

H2: Investors compose their portfolios with an exclusive concern for the expectation and the variance of their returns.

H3: The capital markets are perfect (no transaction fees, information free and accessible to everyone simultaneously, severability of securities).

H4: Neither dividends nor capital gains are taxed.

H5: Many buyers and sellers intervene in the market and none of them can influence the prices.

H6: All investors can lend or borrow the amount they want at the risk-free rate.

H7: Investors have uniform expectations regarding the return and risk of assets, the latter following the normal distribution law.

H8: The investment period is the same for all investors.

We can see that these CAPM hypotheses are more easily achievable in developed markets where it is possible to diversify non-systematic risks by investing in a large portfolio.

The return

The return represents the gain that an agent will get if he decides to invest an amount of money in a security. One of the CAPM hypotheses assumes that the yield of the security follows a normal distribution (hypothesis which is

not verified in practice). It is in the search for the explanation of the fluctuations of this variable, that the authors of CAPM chose as explanatory variable the beta of market. However, in the years following the introduction of CAPM, other authors have proposed various factors that may also explain performance.

Specific risk and systematic risk

When an investor purchases a financial security, he expects to receive, in the future, a certain value (the expected return). So when we talk about risk, we generally refer to the uncertainty that reigns over the return expected by the investor. There are two types of risk, however: Specific risk and systematic risk.The specific risk is the risk that is specific to the security (the risk that affects a specific security) and that can be reduced with portfolio diversification. In terms of the factors specific to a company that have an influence on this type of risk, we distinguish among other things the management of the company, its activities, and its technology.Systematic risk is the risk that comes from the market (affects all securities). The latter, unlike the specific risk is non-diversifiable, and whose fluctuations depend mainly on macroeconomic factors.It is measured by the title beta compared to the market. Beta represents the sensitivity of the security's return to fluctuations in the market's return. In terms of beta interpretation, we will say that the yield of the security varies in the same direction and in the same proportions as that of the market when the beta is equal to 1, in lesser proportions when the beta is less than 1, and in higher proportions when the beta is greater than 1. There is also the exceptional case where the beta is negative, which means that the return on the security varies in the opposite direction to the market return.

Review of the Empirical Work of CAPM

The literature on the applicability of CAPM has its source in the USA with the work of Markowitz (1952). Which herald the departure of modern theory in relation to the management of financial assets and the exploitation of financial markets during the 1950s. These works lead to modeling in a proper context of the relationship between risk and the profitability of securities. The empirical determination of the equilibrium of the capital markets by the Capital Asset Pricing Model (CAPM), developed independently by Sharpe (1964), Lintner (1965), and Mossin (1966) following Markowitz (1952), made subject to numerous tests which have led to contradictory conclusions, in particular since the 1990s.

The first CAPM tests

The CAPM validity tests are based on two implications of the relationship between the expected return and the market beta, which are: first, the expected return on all securities is linearly linked to their betas, and no other variable

has a any explanatory power. Second, the risk premium is positive, meaning that the expected return on the market portfolio is higher than the expected return on securities whose returns are not correlated with the market return.Taking into account the relationship between the yield of securities and betas

The studies of Douglas and Lintner (1965 and 1968)

Among the first tests of the relation between the return of a security and its systematic risk, we note the studies of Douglas (1968) and Lintner (1965), which each used a sample of companies to test if the systematic risk is the only factor that significantly influences equity returns.Douglas' study (1968) looked at quarterly performance data for 616 companies over the period 1926 to 1960. Douglas divided his observation period into 7 sub-periods of 5 years; for each of them, and for each security, he calculated the average and the variance of the quarterly returns as well as their covariance with the returns of an index composed of 616 companies considered. For 5 out of 7 sub-periods, Douglas obtained a positive and significant coefficient for the variance; as for the coefficient of covariance, it was found to be significant only for two sub-periods out of 7 and its sign was then negative.

Douglas (1968) concluded that the average return on each security was more affected by variance than by systematic risk.

Lintner (1965), in his study, analyzed the effect of systematic risk and the effect of non-systematic risk on the average return of each security. He came to the conclusion that a security's return depended positively on its systematic risk and its non-systematic risk (or specific risk).In addition, despite its positive nature, the coefficient is significantly lower than the average annual risk premium of the companies in the sample. The results of these two authors being in contradiction with the results supported by CAPM, their studies thus formed part of the first empirical studies to reject the assertions of this last model.Another empirical study linked to those of Douglas (1968) and Lintner (1965), in the sense that it comes to contradict the latter, is the study of Miller and Scholes (1972). Indeed their study highlighted the fact that the results obtained by Douglas (1968) and Lintner (1965) were more linked to 7 statistical problems, of which the 2 main ones were an error in the estimation of systematic risk and asymmetry in the distribution of returns.

Miller and Scholes first conducted a study similar to that of Lintner, over the same period of time, that is, from 1954 to 1963, but working on a sample of 631 companies. Miller and Scholes then examined the influence on their results of the seven statistical problems they had identified in the Douglas and Lintner approaches. They highlighted the important role of two of the above problems. The conclusions obtained by Miller and Scholes are reinforced by the work of Black, Jensen and Scholes (1972) insofar as their results validate CAPM. One of the peculiarities of their study was the reduction of bias linked to errors in

the estimation of systematic risk, which greatly contributed to the improvement of the methodology used in finance by introducing for the first time the method of portfolios.Indeed, in order to deal with the beta estimation problem, these authors worked with portfolios rather than with individual titles. To test CAPM, they used data on the monthly returns of stocks listed on the NYSE over the period 1926 to 1966. This approach allows them to conclude that the coefficient alpha (the constant) which is supposed to be zero according to CAPM of Sharpe turns out to be not significantly different from zero than in 3 out of 10 cases with a significance level of 1%. At this level, their main finding was the existence of a relationship between the regression constant and the beta coefficient.

Thus they observe by observing their results, that the regression constant is positive when the beta is less than 1 and that it is negative when it is greater than 1. They continued their study by carrying out a transverse analysis, during which they regressed the average monthly risk premiums for each portfolio on their beta. The results obtained with this analysis, which are not in agreement with the Sharpe CAPM, showed in fact that the constant was positive and significantly different from zero, and that the coefficient of beta was significantly lower than the average of the premium of market risk.

However, they specify that the constant is not very stable over time after having noticed it when they divided the observation period into 4 sub-periods (instability of the result found). Black, Jensen and Scholes thus came to the conclusion that their results were in contradiction with the traditional version of CAPM (Sharpe version) but in agreement with that of Black.Friend and Blume (1970) carried out a study using NYSE data, which aimed to analyze the relationship between risk-adjusted return and the two risk measures (specific risk and systematic risk). If the implications of CAPM are in line with reality, it is an absence of relationship between these elements that should be noted.The study by Friend and Blume focused on 200 portfolios composed at random from the 788 stocks which were continuously listed on the NYSE from January 1960 to June 1968. Of these 200 portfolios, 50 were made up of 25 stocks and equal number 50, 75 and 100 titles. For the entire period, Friend and Blume discovered a negative and statistically significant relationship between risk-adjusted returns and variance and between these same returns and systematic risk. Dividing their observation period into two sub-periods spanning January 1960 to March 1964 and April 1964 to June 1968, respectively, enabled them to observe that the relationships observed were not stable over time.

Negative during the first sub-period, they became positive during the second. In a second study, Friend and Blume examined the relationship between the return and the systematic risk of a number of stocks listed on the NYSE between 1955 and 1968. They used a method similar to that of Black, Jensen and Scholes to avoid measurement errors on beta coefficients. The

results of their tests should provide them with estimates of the risk-free rate of return and the risk premium of the market portfolio, respectively, and allow them to verify the linearity of the relationship between the return and the beta coefficient. At the end of this work they concluded that there was a linear and positive relationship between the return on equities and their systematic risk, with however the estimates of risk-free return and market premium which were not in line with observed values.

Of all the studies, however, one of the most complete and comprehensive was that by Fama and Mac Beth (1973). These authors tested the validity of CAPM, analyzing its three main implications, which they considered as hypotheses in order to ensure that they are verified in the results of their study. It is recalled that these three main implications are: "The relationship between the expected return on an asset and its systematic risk is linear; Systematic asset risk is a comprehensive measure of the risk of that asset; in a market where investors are risk averse, the market risk premium is positive "(Broquet, Cobbaut, Gillet & Van den Berg, 2004). At the end of their study they came to the conclusion that their results did not allow them to formally reject these three hypotheses.

Critics of CAPM

From the early 1970s and 1980s, numerous studies have compared CAPM with empirical data. The encouraging results of these first studies have contributed enormously to establishing CAPM as the benchmark model in market finance. However, gradually, the criticisms addressed to the empirical methods used (Roll 1977), the discovery of certain anomalies, notably the size effect (Banz, 1981]) gradually raised doubts about the validity of the CAPM. The climax of doubt was reached when the results of Fama & French (1992) even seemed to reject it completely. Paradoxically, the criticism of Fama & French seems to have been salutary since the critics of the criticism underlined the capacity of the CAPM to explain a significant part of the variability of the returns when one takes into account certain factors ignored in the works earlier. The criticism of Roll (1977) on the solidity of the tests of CAPM with null beta is based on the right of the market of the securities (SML). He demonstrated that for any ex post portfolio, in a sample of data there is an exactly linear relationship between the average return and the beta. It follows that there is really only one testable consequence of CAPM with null beta that is to say that the market portfolio is efficient according to the criterion of medium variance (Cuthbertson, 2000). If the market portfolio is efficient in this direction, then the SML must be verified by the sample. Therefore, violations of SML in empirical studies must indicate that the portfolio chosen by the researcher is not the true "market portfolio" (cuthbertson, 2000). Unless the researcher is sure that he has chosen the real market portfolio (which may include land, property, human capital, as well as stocks and bonds), otherwise tests based

on SML are largely superfluous and do not provide additional confirmation of CAPM with null beta.

Following Roll (1977), Banz (1981) tested CAPM on the role of firm size in explaining the residual variance in securities returns, which remains unexplained by the CAPM beta. He undermined CAPM by demonstrating that the size of a company explains the cross-sectional variance of average yields. The author concludes that the average return on securities of small businesses (i.e. those with low market value) was higher than the return on securities of large businesses (those with low great value in the market).This discovery is now known as the "size effect". This conclusion by Banz (1981) was supported by the work of Lakonishok and Shapiro (1986). These go beyond the size effect and highlight the explanatory power of two other factors. This is how their work on the New York Stock Exchange (NYSE) rejects the assumption that a stock beta is the sole cause of the systematic component of differences in average stock returns. They conclude that the average return can be explained by other factors such as the price / earnings ratio (PER) or the capitalization ratio of equity.

At the end of the 1980s, Shanken (1985) became interested in the market portfolio and set up a clever methodology for testing (and possibly confirming) CAPM. To perform this test, you must make an assumption regarding the correlation between the real market portfolios that is used to approximate the market portfolio ("proxy" portfolio). This amounts to making an assumption concerning the quality of our approximation of the market portfolio.

We know that the EVM constructed with the stocks coming from the proxy portfolio must be inside the EVM constructed on the basis of all the securities available on the market. With an assumption regarding the correlation between the market portfolio and our proxy, we can calculate the probability that the market portfolio will find itself within a given region in the expected return / standard deviation plan. If this region is to the right of the EVM calculated with the securities coming from the proxy portfolio, we know that it must also be to the right of the global EVM. We will conclude that the market portfolio is itself inefficient, which constitutes a rejection of CAPM. Shanken claims to invalidate CAPM with this methodology. But you have to accept his hypothesis concerning the correlation between the proxy portfolio and the real market portfolio, which is not observable.

CAPM test on emerging markets

Until now, the vast majority of studies testing CAPM have been carried out in developed markets, however more and more, researchers have been interested in the validity of CAPM in emerging markets. We can cite the work of Diacogiannis and Segretakis (1998). They examined the effect of PER and dividends on equity returns on the Amsterdam Stock Exchange (ASE) over the period 1999-1995. Their results showed that the PER significantly explains

equity returns, which is not the case for dividends. In the same perspective, the work of Karanikas (2000) on this same market examines the role of size, the book to market ratio and the dividends on average equity returns. He finds that these variables outside of dividends better explain the return on a stock.

The work of Grigoris et al (2006) on the Greek market has failed two other implications of CAPM. In an article titled "Testing the Capital Asset Pricing Model (CAPM): The Case of the Emerging Greek Securities Market", they used the weekly returns of 100 companies present on the Greek stock market from January 1998 to December 2002 The implications of CAPM that the intercept should be zero and that the slope should be equal to the excess average market yield are not clearly rejected by the results obtained after their studies.All these conclusions were further verified by the work of Hassan et al (2013) on the BANGLADESH stock market. They analyzed the performance of the portfolios and examined the validity of the CAPM of 80 stocks listed on the Dhaka Stock Exchange market for the period from January 2005 to December 2009. To examine the validity of CAPM by the portfolio method, the 80 stocks are ranked in descending order of beta and 10 portfolios of 8 titles each have been formed. The results of this analysis show that the intercept is not significantly different from zero and that the linearity between the returns and the beta is not significant. This analysis is against CAPM.Although CAPM is not relevant in the valuation of assets on several financial markets, the fact remains that it remains a benchmark which makes it possible to establish a certain basis for alternative models (Basu and Chawla, 2010).

Methodology

Description of data and definition of variables

Our goal is to analyze CAPM using RSES data. With this in mind, we needed to collect data on prices and stock market indices on this financial center. The number of shares listed on December 31, 2012 is 3,960 securities from different companies distributed in the different economic activity sectors of the sub-region, the most important of which are Ivorian companies.However, our sample is composed only of 28 values for which we have daily data over a period of 6 years, going from January 1999 to December 2004. This study period represents approximately 2088 observations taking into account the data concerning the market index. The initial sample consisted of 39 stocks. This sample was adjusted taking into account the regular quotation of each share and above all their durability over time. The actions of companies that we have not taken into account are those whose quotations are irregular or those whose official start of quotation does not correspond to the period chosen for our study. The missing data from our series are replaced by the method of the predecessor that is to say by the last quoted prices.

In addition, titles with a large amount of missing data were removed from our sample. Given the difficulty in measuring dividends from securities, in this study we will hypothesize that dividends are immediately reinvested. In this case, the securities yields are calculated by the logarithmic approximation of the securities closing prices, given by: $r_{it} = Log\frac{P_{i,t}}{P_{i,t-1}}$ Where $P_{i,t}$ is the closing price on day t for title i. The market portfolio was represented by the BRVM composite index (BRVM-Cp) which groups together all of the securities listed on this financial center.

The weighted average interest rate (effective rate of return) on 6-month WAEMU Zone treasury bill was chosen to estimate the risk-free rate (R_f). Since these rates are estimated on a semi-annual basis, the following formula will be used to deduce the equivalent risk-free rate in months: $R_{ft} = \sqrt[6]{1 + TBR_t} - 1$ Where R_{ft} is the risk-free rate monthly; TBR_t the rate of the semi-annual Treasury bill in month t. The securities that make up our sample ensure a significant representativeness of all of the securities listed on theRSES. The table below (table 1) presents all of these titles as well as the sectors to which they belong.

Methodological Presentation

Econometric models

To check the hypotheses put forward as part of our research, we will adopt the instant cross-section approach used elsewhere by (Fama *et al.*, 1973) to empirically verify the validity of CAPM. So we proceed in two stages:

- The first step (time dimension) will allow us to perform the specification tests of the market model. For this purpose, we will estimate the betas of each security i separately on the market index and assuming that the betas are constant over time. In total, there are 28 regressions to do. These regressions will be based on the following Sharpe market model equation:

$$R_{it} = \propto_i + \beta_i R_{mt} + \varepsilon_i \quad (1)$$

Where Rit is the yield of security i (i = 1 ..., 28) and t = 1.72; R_{mt} is the rate of return for the market index; at the autonomous yield of security i regardless of the market index; Pi the systematic risk (volatility) of security i in relation to the market index. It measures the sensitivity of the asset (i) to movement across the market. This coefficient can be less, equal or greater than one. A beta of 1 indicates that the security is fluctuating in the same proportions as the benchmark. If beta is less than 1 then the stock price is less sensitive to market changes and e_{it} is the error term. The estimation of the parameters a

Table 1
Titles constituting our sample and their abbreviations

LIBELLE	*SYMBOLS*	*CODES ISIN*
MARCHE DES ACTIONS		
SECTEUR – INDUSTRIE		
SICABLE CI	**CABC**	CI0000000154
CEDA CI	**CDAC**	CI0000000188
FILTISAC CI	**FTSC**	CI0000000121
NESTLE CI	**NTLC**	CI0000000029
SAEC CI	**SACC**	CI0000000147
SIEM CI	**SEMC**	CI0000000345
SAGECO CI	**SGCC**	CI0000000303
SOLIBRA CI	**SLBC**	CI0000000105
SMB CI	**SMBC**	CI0000000170
TRITURAF CI	**TTRC**	CI0000000311
UNIWAX CI	**UNXC**	CI0000000337
SECTEUR - SERVICES PUBLICS		
CIE CI	**CIEC**	CI0000000212
SODE CI	**SDCC**	CI0000000204
SONATEL SN	**SNTS**	SN0000000019
SECTEUR – FINANCES		
BICI CI	**BICC**	CI0000000014
SAFCA CI	**SAFC**	CI0000000022
SGB CI	**SGBC**	CI0000000030
SECTEUR – TRANSPORT		
SAGA CI	**SAGC**	CI0000000261
SDV CI	**SDVC**	CI0000000089
SIVOM CI	**SVOC**	CI0000000279
SECTEUR – AGRICULTURE		
PH CI	**PHC**	CI0000000329
SICOR CI	**SICC**	CI0000000113
SOGB CI	**SOGC**	CI0000000162
SAPH CI	**SPHC**	CI0000000196
SECTEUR – DISTRIBUTION		
BERNABE CI	**BNBC**	CI0000000048
CFAO CI	**CFAC**	CI0000000220
PEYRISSAC CI	**PRSC**	CI0000000055
SHELL CI	**SHEC**	CI0000000246
SARI CI	**SRIC**	CI0000000238
AUTRES SECTEURS		
SETAO CI	**STAC**	CI0000000352

Source: BRVM official website: www.brvm.org

and P are obtained by the application of the ordinary least square method (OLS): the principle consists in determining a and P while minimizing the risk of error. This effectively amounts to minimizing the variance of the errors. These errors are assumed to satisfy the assumptions of the simple regression model.

- **E (sit) = 0**: this means that the effect of the variables not introduced into the model and contained in the error term is zero, therefore, the empirical mean of the residuals (errors) is zero.
- **V (sit) = a2**: Homogeneity of the sample, it is assumed that the variance of the errors is uniform for all the titles. This assumption is called homoscedasticity of errors, that is, the same variance.
- $COV(\varepsilon_{it}, \varepsilon_{jt}) = 0 \forall i \neq j$ Lack of autocorrelation between the errors of two different titles (independence of the errors from each other);
- $COV(R_{mt}, \varepsilon_{it}) = 0$: The £ it error terms are independent of the returns of the R_{mt} market index.

The second step (transverse dimension) is devoted to verifying not two the hypothesis.

- The first is that there is an increasing linear relationship between the excess returns on financial assets over the betas previously obtained by the Sharpe model. The second states that the excess market return is positive. For each asset i, we calculate the excess average returns:

$$\overline{r_i} = E(r_i) - r_f, \; i = 1, ..., 28.$$

Based on the following CAPM model:

$$E(r_i) = r_f + \beta_i \, [E(r_m) - r_f]$$

On estime alors la régression suivante :

$\overline{r_l} = \gamma_0 + \gamma_1 \widehat{\beta_l} + e_i \;\; i = 1, \; 2, \; \ldots\ldots\ldots\ldots, 28$ Where β_i is the estimate obtained in the first step. We state that:

$r_m = E(r_m) - r_f$, We further assume that:

E (ei) = 0 for all i;

V (e_i) = *0*for all i;

Cov {ei, ej) = 0 for all i different from j.

If CAPM is valid, the following null hypotheses are expected to be

$H_0 : \gamma_0 = 0 et \gamma_1 = E(r_m) - r_f > 0$ respected.

If CAPM correctly describes the expected return on asset i and the market portfolio is correctly chosen, then the constant at of the regression should be zero. Otherwise if at <0, then the investment has gained too little for the risk involved. In other words, it costs too much (or was too risky for the return

obtained), so it is overvalued. However if at = 0 then the investment has obtained an adequate return for risk taking. On the other hand, if at> 0 then the investment has a higher return to reward the risk assumed, the asset is undervalued. The purchase and sale of the assets should bring the price back into balance and therefore alpha towards zero.

Results and Discussion

Systematic risk assessment of securities

The results of the regressions carried out present the betas and alphas (specific risks) estimated by the market model as well as their statistics. Of the 28 titles, 11 (39.28%) have a statistically significant (valid) beta at a significance level of 10%, i.e. Prob <0.01. Two stocks have significant beta at 5%, this is the SEMC and SAFC share. This partial significance implies that the market model which is used to estimate the beta coefficients would a priori be a model suitable only for 11 of the 28 stocks. Of the 28 stocks, 26 (or 92.85%) have a negative constant. Having negative constants indicates that each of these stocks gained less than the amount predicted by CAPM (the model predicts a zero constant). These results also show p-values to confirm that all 28 titles are significantly and statistically not different from zero.

Test of hypothesis N ° 1

As we have just recalled, our first hypothesis is concerned with the nature of the relationship between the performance of a security and its beta, which would be linear and positive. The synthesis of the results obtained gives:

$$r_i = \underset{(t = -1.46)}{-0.6967494} - \underset{(t = -0.05)}{0{,}0775434\beta_i} + e_i$$

Acceptance of the first assumption implies that the constant is zero, i.e. = γ_0 = 0.

From the results, we observe at a level of significance of 5% that the statistic -t calculated of the constant is in absolute value lower than its theoretical value which is 1.96.

On a $[t_{cal}(\gamma_0)] = 1,\ 46 < t\frac{a}{2}(n-2) = 1,96.$

Therefore at a significance level of 5%, the regression constant is statistically different from zero. We can see that it is negative. The fact that this constant is negative indicates that equities listed on the RSES yield less than the amount predicted by CAPM (constant zero). This conclusion is similar to those found by Grigoris et al (2006) on the Greek market, as well as the results obtained by Isakov (1999) on the Swiss market. Before concluding as to the validity or not of CAPM on the RSES, we will see what is the case with the second hypothesis.

Hypothesis 2 test

Hypothesis 2 indicates that the average market risk premium is positive. This is due to the fact in the construction of CAPM, this coefficient must be equal to the excess market return $E(r_m) - r_f$, which must be positive since investors are risk averse, therefore, $\gamma_1 = E(r_m) - r_f > 0$. By observing our results we see that the risk premium is negative. Furthermore, starting from the value of its student t statistics, we can conclude with certainty that at a significance level of 5%, the risk premium on the RSES is not statistically positive.So at this level of significance is significantly different from zero and the risk premium is not positive. We can therefore conclude after the various tests that our results reject our two hypotheses, and therefore invalidate the CAPM on the RSES. The various results obtained within the framework of our research generally have three implications. They relate on the one hand to the attractiveness and stability of the national and international movable savings of the RSES, on the other hand to the applicability on this market of modern finance tools notably CAPM and finally to the efficiency of this market.

From a theoretical point of view, the study by Erb, Harvey and Viskanta (1996) showed that there was no significant relationship between beta and yield in emerging countries; the authors concluded that CAPM was not applicable in such a circumstance. Other authors such as Estrada (2000), Godfrey and Espinosa (1996) also believe that the classic CAPM could not capture the dynamics and the instability of these emerging markets. Finally with regard to efficiency, we can say that this market is efficient in the strong sense (because it is possible to take advantage of inside information to make gains on the market), which is moreover a characteristic of emerging stock markets.

Conclusion and Recommendations

Conclusion

The first hypothesis deals with the nature of the relationship between returns and their systematic risks. The results obtained within the framework of our research led to the rejection of the validity of CAPM on the RSES. The cross-sectional test carried out in regression of the excess returns of the securities on their beta leads us to the observation that there is no significant linear relationship between the returns and the betas.Indeed, systematic risk would be able to explain equity returns only up to 0.1% (R value). This rejection generally has three implications. They relate on the one hand to the attractiveness and stability of regional and international savings, on the other hand to the applicability on this market of modern finance tools, notably CAPM, and finally to efficiency of this market.

Precautions for generalizing results

The results found on the RSES as part of this study must be generalized with caution for several reasons: The first is related to the definition of the rate of return and the rate without risk. The ideal would have been to define an overall rate of return that takes into account the dividends distributed. But given the unavailability of dividends from the shares of companies listed on the RSES, we were forced to calculate the returns without taking dividends into account.However, the availability of these dividends combined with the price could better reflect the reality of share price returns. As for the definition of the risk-free rate, in most if not almost all of the studies carried out on the validity of the CAPM, the three-month treasury bill has always been preferred to estimate the risk-free rate. In our case, given the difficulty of accessing data on the three-month treasury bill rate, we used the 6-month treasury bill rate to estimate the risk-free rate. The second is related to the choice of explanatory variables for the profitability of the actions and the time horizon of the study. Our study was done over a period of 6 years; perhaps a longer period would have led to different results.

Furthermore, we did not take into account variables that other authors have already recognized as significant, for example the size effect, the ratio between book value and market value (Farma and French, 1995), the variables macroeconomic, earnings per share ratio (Basu, 1983), leverage (Bhandari, 1988), turnover ratio (Claessens, Dasgupta and Glen, 1995). Taking into account the variables neglected by this study (macroeconomic variables, variables concerning the characteristics of companies, conditional factors, etc.) in subsequent research constitutes interesting avenues for future research.

Recommendations

The recommendations that we are going to formulate aim to contribute to the search for ways and mean to stimulate the regional stock market.For the market authority It will be necessary to take care of the quality of the information transmitted to the public, question of allowing them to take in place and time of good decision as for the couple return / risk; a diversification of the products offered by the stock market and widening of targets; the efficient organization of the financial market and the review of access conditions. In addition, think about the opening of a third compartment that would target SMEs / SMIs, which would have the advantage of diversifying products and services but also widening the targets, thus making the market more liquid. Promotion, training and information actions must be undertaken in order to popularize the stock market culture and allow companies, whatever their size and sector of activity, to become aware of the financing tool represented by the **Regional Stock Exchange Securities (RSES).**

For the WAEMU member states, Participate in the revitalization of the market by guaranteeing the political stability of the region, which would allow

the RSES to be an adequate response of the member states to the challenges of globalization, by l aid for the development and growth at low cost of companies established in their respective territories.

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