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Relationship Between Systematic and Idiosincratic Risk with the Expected Returns of Mila and Bm & Fbovespa

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SUMMARY: Returns on financial assets in the stock markets are affected daily by different types of risk, both internal (systematic) and external (idiosyncratic), to anticipate the possible risks, investors look for tools that allow them to know the behavior of the market and at the same time identify the risks in which they are immersed in order to maintain a profitability in the portfolios of investment; therefore, the present study evaluated the relationship between the idiosyncratic risk, systematic risk and other factors in relation to the expected returns of the companies belonging to MILA and BM&FBovespa in the period 2009-2016 with the aim of identifying which of the existing models in economic theory better forecasts the expected behavior of returns.The risk analysis and profitability in both markets was based on the statistical and financial models that best forecast this relationship, in the case of idiosyncratic risk was calculated by the Three Factors Fama and French model, EGARCH model and stochastic volatilities; For the calculation of idiosyncratic risk and systematic risk, the beta calculated by the CAPM and Beta model of the Economática software was taken. The results of the investigation show a positive and significant relationship between the expected returns and the idiosyncratic and systematic risk for both markets. In addition, it was identified that for such returns it is important to take into account other variables such as the size of the company, book to market and variable momemtum that are significant in predicting the expected returns of the investment portfolios of the MILA and BM&FBovespa markets.

Keywords: idiosyncratic risk, systematic risk, stochastic volatility, expected returns,EGARCH.

I. INTRODUCTION

Currently, Latin American countries are looking for day-to-day integration of their markets, in order to generate and increase resources for participating companies and seek portfolio versification for users (investors), considering this new trend we must have in account that this opportunity for portfolio diversification, is related to possible risks and the profitability that an investor incurs when participating in these markets, thus, considering this new approach, we wanted to investigate the possible idiosyncratic risks that an investor may have when not diversifying your wallet. Thus, market risk can be defined as the possible losses that may occur in the financial assets that are part of the trading or investment portfolio, which are caused by market price movements (Angel, 2000).

Similarly, the behavior of asset prices in financial markets worldwide has always brought the curiosity of investors and academics, and has been a subject of constant research. The Capital Asset Pricing Model (CAPM), developed by Sharpe (1964) and Lintner (1965), these authors with this theory pioneered describing the relationship between risk and return on assets; which analyzed the return of an asset under systematic risk and its foundation is in portfolio theory, predicts that all investors have their market portfolio in balance. According to (Núñez & Cano, 2002), the distinction between systematic and non-systematic (idiosyncratic) risk lies in the possibility that investors have in eliminating or avoiding the second risk component of their investment portfolios through diversification. That is, when you invest in a portfolio, it is possible to achieve a particular return with less risk, than to invest all the capital in a single asset. As a consequence of the latter, non-systematic risk can be diversified, since it depends on idiosyncratic factors of the company, while systematic risk cannot be eliminated through diversification, since it depends on the general market conditions and, therefore, this It will be the only risk component that will be rewarded by the capital market.

Various studies by virtue of market diversification state that idiosyncratic risk is related to expected returns both in the most consolidated securities markets, such as the US market, as well as in some emerging markets. Merton (1987) and Malkiel and Xu (2004) developed asset valuation models, in the US market where expected returns are positively related to idiosyncratic volatility, due to the lack of diversification across all assets. The pricing of idiosyncratic volatility is due to investors demanding a premium for assuming idiosyncratic risk in non-diversified portfolios. (Mustapha, 2013) also documents a positive relationship between idiosyncratic volatility (systematic volatility) and asset returns, during the period 2000-2012 on the Nigeria Stock Exchange. Nartea, Ward and Yao (2011), Reports a positive effect VI in four ASEAN markets (Singapore, Malaysia, Thailand and Indonesia). Against these models there are empirical studies that show a negative relationship between idiosyncratic volatility and future returns. For example, Ang, Hodrick-, Xing and Zhang (2006, 2009) present compelling evidence that idiosyncratic volatility is priced negatively in the US market. and through 23 developed international markets. Like Han & Lesmond (2011) who examine data from 45 world markets and show that there is no significant relationship between average returns and idiosyncratic volatility.

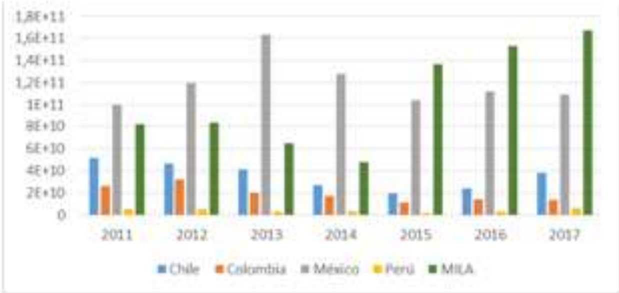
Thus, the objective of this study is to investigate the behavior in relation to idiosyncratic risk in the Latin American Integrated Market - MILA and BM & FBOVESPA, to analyze the relationship between the expected return of an action and its idiosyncratic risk, which is the portion of specific risk to that particular action. Therefore, in this study idiosyncratic volatilities and systematic volatilities conditional on the actions of the sample are constructed, using the Fu (2009) methodology. For this (i) the residuals of the three-factor model of Fama and French, (ii) it is estimated one month in advance idiosyncratic conditional volatilities using EGARCH models. (iii) stochastic volatility and iv) regression models are constructed between the expected returns of the companies and the expected idiosyncratic volatilities, which include other explanatory variables to analyze the influence of these variables on returns and to verify whether their behavior the agrees with the literature. Thus, each variable is selected according to its importance in financial theory. Among the control variables used we have the beta; variable analyzed in the two studies by Fama & French (1992) and Fama & French (1993) - the market value and the quotient between the book value (net equity) and the Market value in addition to two variables - liquidity and impulse effect Additionally, this study is complemented with other studies in Colombia, Peru, Chile and Mexico such as Pukthuanthong-Le & Visaltanachoti (2009) and Angelidis (2010) that finds a relationship between idiosyncratic risk and expected return; in which the idiosyncratic risk correlates positively with the expected return. Thus, to know what is the expected return behavior against idiosyncratic risk in the MILA and BM & FBOVESPA market between 2009 and 2016 ?.

II. REVIEW OF LITERATURE

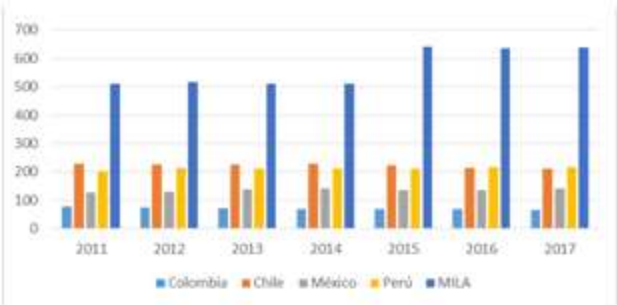
Considering that analysis of returns for an investment is related as a variable of different economic theories that is used as a tool to predict expected returns of the companies, thus in the financial and economic theory indicates that this variable helps to measure profit or loss generated by a financial asset in a given period, which is dependent on different market conditions (Brown & B, 1980). Literature has classified the analysis or verification of these theories by means of statistical or economic models. The first ones start from the hypothesis that returns of financial assets follow a normal distribution. Ya Mackinlay (1997) economic models, are those that analyze behavior of investors, using other additional tools and not only statistical assumptions; The author indicates that all economic limitations in financial markets must be taken into account in order to calculate abnormal returns with a lower margin of error. Likewise, Ugedo (2003) states that economic models are more useful than statistical ones, since in addition to the corresponding statistical hypotheses, they startfrom some assumptions about the behavior of investors and because it also includes economic variables. Thus, in this study the economic models will be located in order to find or establish the relationship between stochastic volatilities with idiosyncratic and systematic volatilities in the main specific Latin American markets inintegrated markets that are currently in this region as Latin American Integrated Market - MILA and in Brazil Bolsa Balcão - B_3 case.

A. Latin American Integrated Market - MILA

Considering study object of this research which is to find the relationship between stochastic volatility and other factors with the expected returns of the companies belonging to MILA, we must start knowing the global context of this market; thus, Latin American Integrated Market emerged in 2009 with the integration of the stock exchanges of three countries; specifically, the Chilean stock markets with Santiago Stock Exchange (BCS), Colombia with Colombian Stock Exchange (BVC) and Peru with Lima Stock Exchange (BVL) starting operations on May 30, 2011, Finally, in June 2014, the process and integration of Mexico with Mexican Stock Exchange (BMV) begins its operations on December 2, 2014. It is clear that this initiative was not aimed at merger or integration of the three initially participating exchanges, but that it is a stock exchange integration at regional level that would allow its users to carry out transactions in any of the three markets as if it were a local transaction, for which it was sought to take advantage of technological resources to create a platform that allows the free trade of shares through the markets of origin, it should be clarified that, in that market, only equity securities whose main product to negotiate are negotiated are the actions. (Latin American Integrated Market)



Graph 1 Market Volume. Shares traded, total value (US $ at current prices)



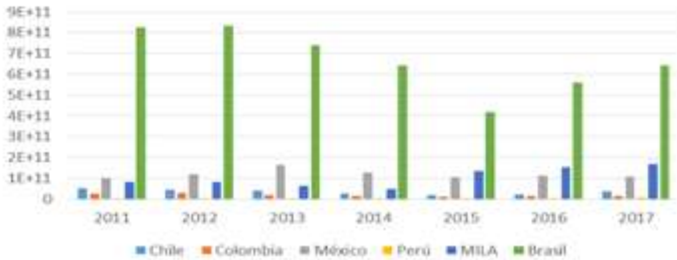
Graph 2. National Companies that are publicly traded, total

The evolution of stock exchanges that are part of this integrated market in recent years, presented an increase in the participation of issuers that give investors the opportunity to diversify their portfolio and possibly reduce the risks (see Chart 2); thus, the number of companies listed in the MILA for year 2017 (638) makes this market the largest stock market in Latin America, surpassing Brazil market represented by B3 with participation of 335 companies (NYSE Euronext, 2018). As Uribe (2014) states, MILA has grown substantially in a very short period of time, allowing countries that are part of this integration to compete efficiently with the largest stock exchange in Latin America, as the case with the integrated B3 exchange. Likewise, this integration has led to the increase in the value of the shares traded in the MILA and in each of the participating exchanges, leading to this market being the second place in market volume (642 billion dollars) as Orozco (2016) affirms, This growth is due to "… the range of execution for portfolios is increased by combining the number of issuers listed in each market and transaction costs are reduced" (see Chart 1).

B. BRAZIL BALCÃO stock Exchange - B_3

Analyzing the previous context, it can be indicated that in Latin America there are other alliances that show an expansion in the financial and stock sector, it´s the case of São Paulo Stock Exchange (BM & FBovespa) that in March of 2017, it was integrated with the Cetip, which gave its denomination firm on June 20, 2017 on behalf of the Commisão de ValoresMobiliários (CVM), thus becoming the largest and most influential in Latin America remaining with the name of Brazil Bolsa Balcão - B3. (BM & FBovespa, 2017).

Therefore, it must be considered that the integration of Latin American markets becomes an opportunity to diversify portfolios and can be a primary factor for its economic growth and for increase its competitiveness and globalization, and also, relate it to the possible risks and profitability that an investor incurs when participating in these markets. However, it should be considered that participation and possibilities of portfolio diversification in recent years to present an increase in its investment participation leading to increase the trading volume of these exchanges making Latin America a competitive market compared to other economies (see graph 3)



Graph 3 Market Volume. Shares traded, total value (US $ at current prices)
Fuente: Indicators Banco Mundial

This new trend is an opportunity for portfolio diversification and it is also intrinsically related to possible risks and profitability that an investor incurs when participating in these markets, thus, considering that this new integration trend is the one that predominated in large markets, this research sought to make a risk analysis in relation to financial assets, since for the context of these markets there is a few literature that indicates the trend and the application of economic theoretical references for the analysis of behavior of the returns of the MILA and B3 markets in Latin America applying different methodologies that allow to evaluate the behavior of these markets, it is worth clarifying that this study was carried out for Brazil´s case until the period that integration had not yet been confirmed and its mnemonic name was BM & FBovespa

Finally, as indicated above, there is the opportunity for portfolio diversification, systematic and idiosyncratic risk together with the expected return, it has always been used as a variable for decision-making before an investment, as well as for the owners of companies, as for investors in general, this is why these risks affect decisions related to portfolio management. Then, it has become necessary to develop, analyze and use economic theories as a tool that can measure the facts or events in the stock market and facilitate and simplify investigations of this type that provide tools to the investor.

III. RISK IN THE LATIN AMERICAN SHAREHOLDER MARKET

It is currently observed worldwide that the various stock markets are merging with the main objective of being more competitive, attracting more foreign investment and generating greater versatility in an increasingly globalized world. In particular, in Latin America two large shareholding structures can be mentioned, which ,according to World Bank reports (2018) are those with the highest number of issuers and the largest volume of trading in Latin America; Thus it could be indicated that these two markets have a high participation of issuers, becoming a main focus of being studied. With this categorization given by the World Bank, we can indicate that one of the main mergers in Latin America is the Latin American Integrated Market - MILA currently made up of 4 countries (Chile, Colombia, Peru and Mexico) and also the most recent in 2017 the B3 that emerged from the merger between the BM & FBovespa and the Cetip in Brazil.

Considering this new integration trend that gives investors the opportunity to diversify their portfolio, they are not oblivious possible risks that compromise the profitability that an investor may incur when participating in these markets; this diversification being directly related to possible risks; which according to the literature can be defined as the possible losses that may occur in the financial assets that are part of the trading or investment portfolio, which are caused by movements in market prices (Fama & Macbeth, 1973) Thus, defines the stock market risk, as the difference between the expected return and the return actually achieved by a financial asset over time, this difference is subject to two causes or types of risks; the first known as systematic risk, which is due to factors that affect the particular asset, but not the other assets; the second one due to the factors that do affect all assets in general, as a consequence of the company's own and specific variability, commonly known as non-systematic risk, not diversifying it, systemic risk or idiosyncratic risk.
Likewise, other authors define that the *non-systematic or idiosyncratic* risk is due to the company's own or internal factors.; It is inherent in the company and is independent of economic, political or social factors. By being intrinsic to an action, it is possible to compensate for its effects by buying shares of various firms, so that, if a firm is affected by negative causes, it is expected that the same will not happen to the others and the negative effect can be compensated (Velez, 2003).

Stock Market Risk

Stock market risk can be classified as two types, (i) known as systematic risk, which is due to factors that affect the particular asset, but not the other assets; that is to say, the risk shown by the sensitivity of the company's profitability to global forces that affect the entire market. (ii) the factors that, if they affect all assets in general, as a result of the company's own specific variability, commonly known as non-systematic risk, not diversifying it, systemic risk or idiosyncratic risk. (Rubio, 1987)

Several studies have associated factors that relate idiosyncratic risk with factors such as strikes, technological changes, etc. Being intrinsic to an action, indicating that it is possible to compensate for its effects under portfolio diversification, which means that you can invest in shares of various companies, in such a way that, if a company is affected by negative causes, it is expected that the same will not happen to the others and the negative effect can be compensated (Velez, 2003). Now if investment portfolios are well diversified in modern finance, it is suggested that idiosyncratic risk should not be taken into account or important in the valuation of risk assets (Malkiel, 2002). Thus, Malkiel in 2006 argues that diversification is very important over individual actions, but there is no evidence to support that if idiosyncratic risk has a price in the stock market. Mendonça, Klotlze, Pinto, and Montezan (2012), states that all investors should have a diversified market portfolio, to eliminate all idiosyncratic risk from the stock market. Fu (2009) argues that there is no mechanism that guarantees changes when assuming idiosyncratic risk, hence all investors end up with poorly diversified portfolios and demand compensation for the risks incurred in their investments. But as Ang, Hodrick, Xing, & Zhang (2009) shows, idiosyncratic low-risk portfolios reflect general factors that are difficult to diversify. Then it is possible that idiosyncratic volatility plays a role in explaining asset returns, since investors do not always maintain well diversified portfolios.

IV. METHODOLOGY

This research is carried out under a quantitative approach with a correlational and explanatory scope, using the methodology of Fu (2009) where it was necessary for each action to quote a minimum of 15 days during each month for sample period; thus, the sample data of the investigation are related to companies of stock market for countries belonging to MILA and BM & FBovespa (currently called B3) between 2009-2016 for a total of 96 months, considering only the ordinary shares that were present in the months of the study period. Further; following criteria for selecting a population sample of Fama and French (1993), bank´s shares, insurance and investment funds, companies with preferential actions and those that reported on December 31 a negative equity (Mendonça, Klotzle, Pinto), & Montezano, 2012) were excluded. According to above, resulting sample are 42 companies belonging to MILA and 47 companies of the BM & FBOVESPA.

In order to evaluate the relationship between idiosyncratic, systematic volatility and other factors with expected returns of companies belonging to MILA and BM & FBovespa and in order to identify which of the existing models in economic theory better predicts expected behavior of returns, 3 methodologies were used for the calculation of idiosyncratic volatility (i) Three Factors Model and French, (ii) EGARCH model and (iii) stochastic volatilities; The CAPM beta and the Economática software beta were used to calculate the systematic volatility.

A. Idiosyncratic Volatility

For calculation of idiosyncratic volatilities, the methodology of Fu (2009) is used following the three-factor model of Fama & French (1993), which seeks to explain the returns on assets through: (i) excess market return, (ii) factor that represents the companies sizeSMB (Small Minus Big), (iii) the HML factor (High Minus Low), (iv) the return of a portfolio shares with high capitalization volume *Book to Market* and the return of a portfolio shares with low capitalization volume*Book to Market* (Nieto, 2001).

$$R_{i\tau} - r_\tau = a_{it} + b_{it}(R_{m\tau} - r_t) + S_{it}SMB + h_{it}HML + \varepsilon_{it} \qquad (1)$$

where τ is the trading day, t indicates the month, $R_{i\tau}$ is return on stock i, i, $r_t$is the risk-free interest rate (10-year US treasury rate), $R_{m\tau}$ is market return (S&P MILA Andean 40 and Ibovespa market indexes), b_{it}, S_{it} and $h_{it}$are each of the three coefficients of the Fame factors and French and ε_it are the model errors which they normally distribute with zero mean and variance non-constant ε_{it} are the errors of the model which distribute normally with zero mean and non-constant variance $\varepsilon_{it} \sim N(0, \sigma_{i,t}^2)$, which represent residuals of the regression, measured as the square root used to calculate idiosyncratic volatility VI.

$$VI = \sqrt{\sigma_{\varepsilon i}^2} * \sqrt{n}(1.1)$$

On the other hand, EGARCH model was used to calculate the expected idiosyncratic volatility of the common shares of the sample, estimating a regression for each share of markets studied for 96 months, the above expressed in equation 2.

$$R_{i\tau} - r_\tau = a_{it} + b_{it}(R_{m\tau} - r_\tau) + s_{it}SMB_\tau + h_{it}HML_\tau + \varepsilon_{it}\varepsilon_{it} \sim N(0, \sigma_{i,t}^2) \qquad (2)$$

$$\ln(\sigma_{i,t}^2) = \omega + \sum_{i=1}^{p} b_{i,t}\ln(\sigma_{i,t-1}^2) + \sum_{k=1}^{q} c_{i,k}\left\{\sigma\left(\frac{u_{i,t-K}}{\sqrt{\sigma_{i,(t-k)}^2}}\right) + \alpha\left[\frac{|u_{i,t-k}|}{\sqrt{\sigma_{i,(t-k)}^2}} - \sqrt{\frac{2}{\pi}}\right]\right\}$$

Where $R_{i\tau} - r_\tau$is the excess of the monthly return of each share, $R_{m\tau} - r_\tau$excess market return, the regression used was estimated by nine (9) EGARCH (p, q), $1 \le p \le 3$and $1 \le q \le 3$, for each company in the sample, selecting the lowest Akaike criteria, taking the square root of the best model residues that correspond to the expected idiosyncratic volatility E (VI).

Now, if the errors in equation 1 are supposed to follow an autoregressive process of moving average ARMA (1,1) (Ruey, 2005), then:

$$\varepsilon_{it} - \varphi\varepsilon_{t-1} = \mu_t + \theta\mu_{t-1} \quad \mu_t \sim N(0, \sigma_\mu^2) \qquad (3)$$

the above being a way of estimating the temporary changes in volatility by means of stochastic volatility, where σ_μ^2 does not depend on the past observations of the series, but on an unobservable variable, which is usually an autoregressive stochastic process (Taylor, 1986). Following Ruiz and Veiga (2008) where the model combines the autoregressive processes of mobile average AR (1) and MA (1); As a result of the above, the monthly stochastic volatility *S (VI)* of the shares of the sample is constructed, defined as the root of variance of the residuals for equation 3 multiplied by the number of days that each share is quoted.

$$S(VI) = \sqrt{\sigma_{\mu i}^2} * \sqrt{n} \qquad (3.1)$$

B. Systematic volatility

Systematic volatility refers to the risks related to its market or segment; that is, the risk inherent in a market because it does not affect a title since it does not depend on the characteristics of this or the particular sector, but on the entire market (Friend, Westerfeld, & Granito, 1978). This risk is defined through Beta (β), which represents the amount in which the risk of a market for an asset, in addition to the variation in its performance based on variations in market performance. The systematic volatility measured through Beta is presented through: i) Economática beta, based on the observations of the variations in the share and the index during each period of the study, ii) Beta CAPM, calculated through simple linear regression (equation4)

$$R_{pi} - R_f = \propto + \beta\left(R_{mi} - R_f\right) + \varepsilon_{it} (4)$$

where $R_{pi} - R_f$ is the return of the closing price of the share discounting the risk-free rate, ∝ and β are the regression coefficients and $R_{mi} - R_f$ represents the return of the discounted market index at the risk-free rate.

C. Independent Variables of Cross-Sectional Regressions

Other financial variables that explain the expected return of an action are i) size (market value) that is measured as the market capitalization of the company at the end of the month t, ii) book-to-market which is the relationship of the book value with respect to the market value of the company, iii) momentum which is the return of a share in a period of time 5 and 3 months ago, Ret (-2, -7) and Ret (-2 , -5) respectively, iv) Beta, which was calculated by CAPM model and by the Economática software, vi) liquidity, represented by the company's ability to meet its short-term obligations.

However, following Fu 2009 methodology, if idiosyncratic and systematic volatility, as natural substitutes for idiosyncratic and systematic risk affect the expected returns of companies, the existence of some relationship between returns of assets for MILA and BM & FBovespa markets and the volatilities constructed should be expected. It is proposed to estimate the following econometric model (see equation 5)

$$R_{it+1}^* = \beta_{0t} + \beta_{it} Vol_{it} + \sum_{k=2}^{K} \beta_{kt} X_{kit} + \varepsilon_{it} \qquad (5)$$
$$i = 1,2, \dots, n \; y \; t = 1,2, \dots, 96$$

where the dependent variable is the return of the actions (R_{it+1}^*), independent variables the constructed volatilities(Vol_{it}), the control variables(X_{kit}) described in the paragraph initial and n the number of companies per market.

V. ANALYSIS AND CONCLUSIONS

We analyzed the existing relationship between volatilities analysis for MILA and BM&FBOVESPA and the expected returns of the shares of the companies listed in these markets.

A. Statistics of systematic and idiosyncratic volatilities

Table 1 shows the descriptive statistics ($\bar{X}, M_d y \sigma$)for the three types of idiosyncratic volatilities and the systematic volatilities calculated for each market. The average idiosyncratic volatility of the shares in the MILA is 9.2% for EGARCH model, 6.95% for three-factor model of Fama and French and 6.8% for stochastic volatility model and volatility systematic average is 0.59 for the CAPM model and 0.87 for beta calculated by Economática system. Now, for the BM & FBovespa stock market, average for idiosyncratic volatility of the shares in the Mila is 8.7% using the EGARCH model, 7.84% forthree-factor model of Fama and French and 6.40% for Stochastic volatility model and systematic volatility average is 0.83 for the CAPM model and 1.08 the beta calculated for Economática system.

Table 1*: Average descriptive statistics of idiosyncratic and systematic volatilities*.

Variable	*EIV*	*ln(EVIt/EVIt-1)*	*VI*	*ln(VIt/VIt-1)*	*svi*	*ln(SV It/SVI t-1)*	*betacamp*	*betaeco*
				MILA				
Average $\bar{X}$	9,240563	-0,000073	6,954996	0,000079	6,801785	-0,000042	0,593448	0,876317
Median M_d	7,773352	0,000162	6,103376	0	5,959553	-0,008431	0,550073	0,888682
Typical deviation. σ	5,771157	0,531798	3,903181	0,421802	3,73023	0,425584	0,584734	0,313737
				BM&FBOVESPA				
Average $\bar{X}$	8,7413	-0,000043	7,8423	0,035479	6,401785	-0,034459	0,837900	1,083100
Median M_d	8,1887	-0,000362	7,2668	0,000345	6,359553	-0,016432	0,852700	1,030400
Typical deviation. σ	2,9771157	0,0531798	3,0301	-0,121802	3,23023	0,125584	0,335000	0,440500

Likewise, evolution of idiosyncratic and systematic series of volatility for two analyzed markets in this study during the 96-month period (see graphs 4 and 5). It can be seen that series E (VI) calculated by the EGARCH model, in general has the same tendency as series VI and S (VI), but with values that are greater than the calculations of the other two series, this due to that EGARCH models have difficulties in overestimating the negative market news, which is graphically evident in the great peaks of the series (Engle & Ng, 1993). On the other hand, S (VI) series is the best idiosyncratic risk indicator, since, according to the financial literature, in the case of positive or negative events, its behavior is more stable compared to E (VI), showing correct values of historical risk of each market.

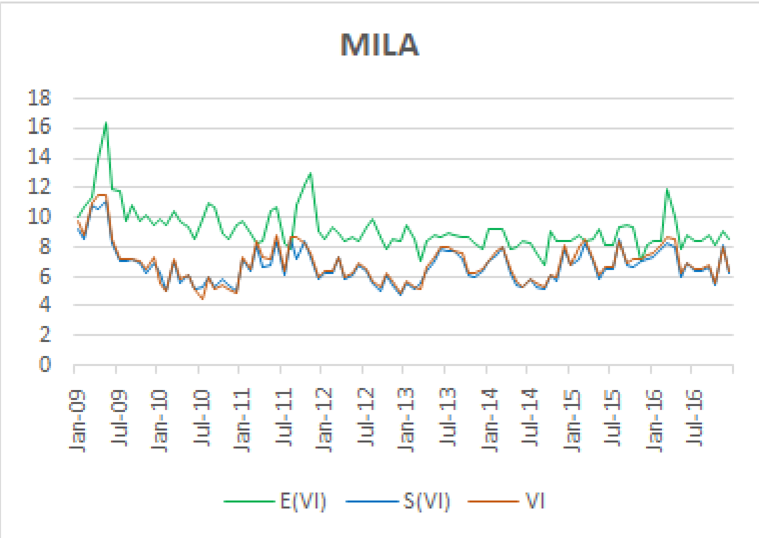


Figure 4: ***idiosyncratic volatility series***

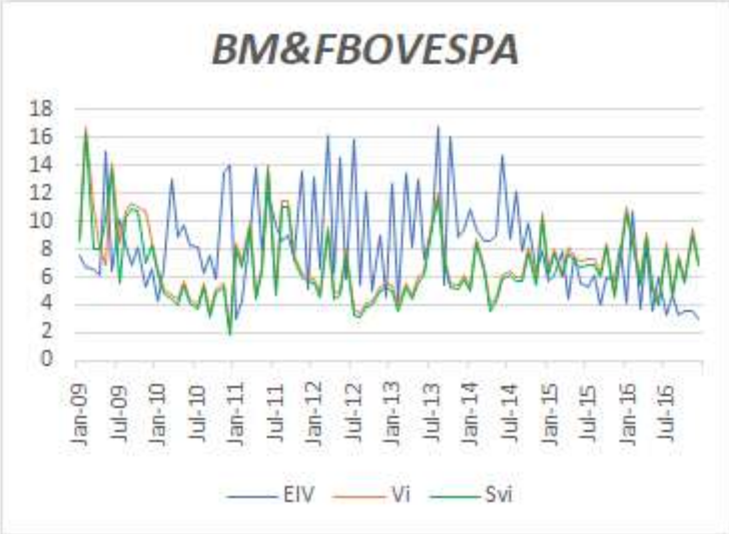


Figure 5: ***systematic volatility series***

About systematic volatility series calculated in model (*betaeco and betacapm*), their average values are generally between 0 and 1 meaning that the risk of assets is lower than market risk having a positive correlation between asset and market showing; that is to say, the assets have less systematic risk than market, less volatility than general trend and leads to changes in the market, the asset will have less loss than the whole. Regarding MILA, there is a trend in the study period similar to that described above, however, for BM & FBovespa it presents periods where beta is greater than 1 which represents that assets have a greater systematic risk than market, representing more volatile asset. The series of systematic volatility calculated by Economatica are more stable and less volatile than those for CAPM model.

Table 2*: Self-correlations in average lags of idiosyncratic volatilities*

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
						MILA						
VI	0,404	0,318	0,236	0,180	0,147	0,110	0,110	0,086	0,061	0,028	-0,007	-0,007
ln(VIt/VIt-1)	0,425	0,329	0,260	0,209	0,173	0,136	0,134	0,101	0,078	0,034	-0,011	-0,017
S(VI)	0,356	0,294	0,213	0,163	0,138	0,108	0,104	0,103	0,071	0,036	0,008	0,0057
ln(SVIt/SVIt-1)	0,38	0,306	0,235	0,185	0,16	0,132	0,13	0,114	0,091	0,049	0,0144	0,0024
						BM&FBOVESPA						
VI	0,724	0,522	0,389	0,267	0,194	0,150	0,148	0,125	0,126	0,105	0,048	0,025
ln(VIt/VIt-1)	0,436	0,239	0,177	0,107	0,116	0,100	0,096	0,066	0,052	-0,048	0,042	0,011
S(VI)	0,724	0,522	0,389	0,267	0,194	0,15	0,129	0,032	-0,015	-0,07	-0,048	-0,025
ln(SVIt/SVIt-1)	0,425	0,349	0,173	0,117	0,115	0,11	0,093	0,062	0,0552	-0,042	0,0405	0,0093

For autocorrelation results of volatilities VI and SVI for two markets (see table 2), it is generally observed that in each of the volatilities, as the number of lags increases autocorrelation approaches zero equal that in the difference of the average lags of these ln (VIt / VIt-1) and ln (SVI_t / SVI_{t-1}), indicating that idiosyncratic volatility series calculated in this study do not follow a random process, this means according to the results from Ang et al. (2006), it is not valid to use value of idiosyncratic volatility in a given month to estimate value in the following month.

B. Results of cross-sectional regressions

In analysis of the average descriptive statistics of each of the variables (see table 3, 4 and 5) used in the regression model, average correlations between each of the variables are shown in order to verify which relationship between the types of volatility described and returns on assets in both markets.

Table 3: Descriptive statistics of the independent variables of the model

Variable	*VI*	*S(VI)*	*EIV*	*lnTA*	*lnBM*	*lnliq*	*betacamp*	*betaeco*	*ret7*	*ret5*	*ret1*	*lnret1*
MILA												
Average	6,9550	6,8018	9,2406	14,3368	-0,3513	2,6616	0,5934	0,8763	5,6517	3,6896	0,3967	0,4122
Median	6,1034	5,9596	7,7734	14,4768	-0,4230	1,6969	0,5501	0,8887	2,5672	1,6460	0,0000	0,0556
Typical deviation	3,9032	3,7302	5,7712	1,7322	0,9008	3,6028	0,5847	0,3137	30,9654	22,1685	10,0941	10,0112
BM&FBOVESPA												
Average	7,8423	6,4018	8,7413	14,3964	-0,5476	3,1594	0,8379	1,0831	2,7757	4,2807	0,4713	-7,8187
Median	7,2668	6,3596	8,1887	14,4504	-0,5728	2,2602	0,8527	1,0304	1,8413	3,0761	0,3158	-7,9742
Typical deviation	3,0301	3,2302	2,9771	1,0475	0,6443	2,5314	0,3350	0,4405	13,3722	18,0027	7,0781	7,0781

Table 4: Correlation between the MILA model variables

	RET	**lnret**	**E(IV)**	**VI**	**S(VI)**	**betacamp**	**betaeco**	**ret7**	**ret5**	**lnTA**	**lnBM**	**lnliq**
RET	1	,994**	,115**	,083**	,094**	-,057**	-,060**	,383**	,515**	,052**	-,072**	0,027
		0	0	0	0	0	0	0	0	0,001	0	0,084
lnret		1	,113**	,081**	,091**	-,058**	-,065**	,388**	,519**	,051**	-,071**	0,026
			0	0	0	0	0	0	0	0,001	0	0,103
E(IV)			1	,157**	,165**	0,026	0,02	,089**	,139**	-,381**	,139**	-,109**
				0	0	0,102	0,202	0	0	0	0	0
VI				1	,939**	,212**	-,075**	-0,019	,041**	-,184**	,157**	-,104**
					0	0	0	0,225	0,009	0	0	0
S(VI)					1	,214**	-,053**	-0,003	,050**	-,192**	,178**	-,095**
						0	0,001	0,825	0,002	0	0	0
betacamp						1	,060**	-,066**	-,069**	0,017	-0,017	-0,014
							0	0	0	0,289	0,292	0,372
betaeco							1	-,121**	-,117**	,278**	-,110**	,236**
								0	0	0	0	0
ret7								1	,755**	,086**	-,171**	0,017
									0	0	0	0,267
ret5									1	,049**	-,119**	0,013
										0,002	0	0,41
lnTA										1	-,497**	,601**
											0	0
lnBM											1	-,280**
												0
lnliq												1

**. The orrelation is significant at 0.01 level (bilateral).
*. The correlation is significant at 0.05 level (bilateral).
N = 4.032

Tabla 5: correlación entre las variables del modelo BM&FBOVESPA

	RET	lnret	E(IV)	VI	S(VI)	betacamp	betaeco	ret7	ret5	lnTA	lnBM	lnliq
RET	1	1,000**	,410**	,491**	,492**	,318**	0,008	,359**	,509**	-0,157	0,13	-0,089
		0	0	0	0	0,002	0,936	0	0	0,126	0,207	0,389
lnret		1	,408**	,489**	,489**	,316**	0,009	,359**	,508**	-0,155	0,128	-0,088
			0	0	0	0,002	0,932	0	0	0,131	0,215	0,395
E(IV)			1	,541**	,540**	,570**	,304**	,477**	,582**	-,620**	,546**	-,433**
				0	0	0	0,003	0	0	0	0	0
VI				1	1,000**	,553**	0,028	0,172	,285**	-,401**	,409**	-0,183
					0	0	0,786	0,095	0,005	0	0	0,075
S(VI)					1	,552**	0,026	0,171	,285**	-,401**	,409**	-0,182
						0	0,799	0,097	0,005	0	0	0,076
betacamp						1	,384**	,221*	,353**	-,581**	,509**	-,428**
							0	0,03	0	0	0	0
betaeco							1	0,124	0,106	-,548**	,422**	-,524**
								0,23	0,306	0	0	0
ret7								1	,682**	-0,078	0,025	-0,095
									0	0,448	0,813	0,359
ret5									1	-0,139	0,091	-0,102
										0,177	0,376	0,324
lnTA										1	-,972**	,859**
											0	0
lnBM											1	-,846**
												0
lnliq												1

**. The orrelation is significant at 0.01 level (bilateral).
*. The correlation is significant at 0.05 level (bilateral).
N = 4.512

Correlation for MILA market between 3 idiosyncratic volatilities and returns in continuous time is positive and significant at the 1% level, although the most correlated of 3 is the expected volatility E (VI), in volatility Systematically case, correlation is negative and significant at 1% level for two constructed betas, however the most significant is the one calculated by the Economática system, in relation to the other independent variables it is observed that the only not significant variable at 1 % or 5% with returns is liquidity (lnliq). However, correlation between three volatilities is significant, being better correlated VI and S (VI). The two variables taken as momentum are also correlated with returns, although Ret5 has better significance than Ret7. Compared to BM & FBovespa market, the 3 idiosyncratic volatilities have a positive and significant 1% correlation with returns, although the best correlation is stochastic volatility S (VI), in case of systematic volatility the only one that is significant is beta calculated by CAPM model positively at 1% significance, of independent variables the only significant ones are Ret5 and Ret7 momentum, with Ret5 being the best correlated.

The last stage of this study included linear regressions between research variables, where for each company in the sample a linear regression was made between monthly return (Ret1 and lnRet1) and other variables that according to correlation tables 4 and 5 were significant with returns. For each model beta coefficients of each variable were calculated, as well as their individual significance, the R-square and global significance, tables 6 and 7 summarize average statistics of each model in the 96-month period.

Model 1 is based on Fama and French model (1992), which evaluates relationship between variables: beta, market value and book-to-market index with returns, in case of MILA, the variable used as beta it was betaeco and for BM & FBOVESPA it was betacapm, since these showed more significant results in tables 4 and 5 respectively. In MILA market, beta explains variations in returns because its coefficient is significant, a similar case occurs in Brazilian market where coefficient is significant with a p-value close to zero. In results of

Fama and French (1992) a negative relationship between market value (lnTA) of a company and return on its action is identified, in case of the two markets studied this condition is satisfied, but none of 2 coefficients is significant. In relation to model 2, unlike model 1, one of the momentum variables that best correlates with returns is included, in both markets variable Ret5 is used, this indicates cumulative return from month t-5 to month t- 2, for both it is significant and its p-value is less than 1%

In addition to four variables included in Model 2, Model 3,4 and 5 included variables VI, S (VI) and E(VI), in general the significance of the models is significant and only improves in case of VI for MILA and S (VI) for Brazilian market BM & FBOVESPA, wheredetermination coefficientR^2, like the F statistic, were higher than model 2. The coefficients of respective volatilities were positive and significant at 1%, additionally variable that represents systematic risk (betaeco) in MILA was significant in each of the three models, contrary to happened in Brazilian market where betacapm is not significant.

In models 6,7 and 8,betaeco and betacapm variable are excluded from models for MILA and BM & FBovespa markets, respectively, it can be observed that in case of first market significance of models decreases, indicating the importance of this type of risk in forecast of expected returns of companies. Now, in second market case, models improve their significance, indicating that expected returns in this market have little influence of systematic risk, therefore to a large extent returns of the assets of Brazilian market are explained by idiosyncratic risk. Thus, model 9 was constructed in order to analyze the impact of independent variables that best correlated with returns, since in MILA chaos the momentum variable and book to market index are significant and with positive average betas, For Brazilian market, only the variable chosen as momentum was significant and with a positive beta coefficient. The foregoing indicates that in conformation of expected returns, other financial factors must also be taken into account other than the two types of risk (systematic and idiosyncratic) to which the assets of these two markets are exposed.

Table 6: Return regression models in relation to idiosyncratic volatility, systematic volatility and other specific variables BM & FBOVESPA

Modelo	*Variables*	ret1						lnret1					
		β average	t- Statistic	P- Value	R^2	F- Statistic	P- Value (F)	β average	t- Statistic	P- Value	R^2	F- Statistic	P- Value (F)
	betacamp	6,914	2,639	0,010				6,871	2,624	0,010			
1	***lnTA***	-0,467	-0,078	0,938	0,102	3,493	,019[b]	-0,548	-0,092	0,927	0,101	3,455	,020[b]
	lnBM	-1,240	-0,173	0,863				-1,357	-0,189	0,851			
	betacapm	3,368	1,362	0,177				3,327	1,346	0,182			
2	***lnTA***	1,391	0,257	0,797	0,281	8,890	,000[b]	1,309	0,242	0,809	0,280	8,850	,000[b]
	lnBM	1,800	0,277	0,782				1,681	0,259	0,796			
	Ret5	0,138	4,756	0,000				0,138	4,754	0,000			
	betacapm	3,095	1,249	0,215				3,059	1,235	0,220			
	lnTA	5,233	0,836	0,406				5,076	0,811	0,420			
3	***lnBM***	5,154	0,730	0,467	0,292	7,437	,000[b]	4,969	0,704	0,483	0,291	7,389	,000[b]
	Ret5	0,119	3,566	0,001				0,119	3,575	0,001			
	EIV	0,210	1,204	0,232				0,206	1,180	0,241			
	betacapm	-1,146	-0,454	0,651				-1,164	-0,461	0,646			
	lnTA	-3,355	-0,657	0,513				-3,414	-0,668	0,506			
4	***lnBM***	-5,026	-0,810	0,420	0,397	11,846	,000[b]	-5,111	-0,823	0,413	0,395	11,754	,000[b]
	Ret5	0,120	4,447	0,000				0,120	4,444	0,000			
	VI	1,015	4,159	0,000				1,010	4,136	0,000			
	betacapm	-1,147	-0,451	0,551				-1,159	-0,461	0,646			
	lnTA	-3,255	-0,652	0,412				-3,314	-0,668	0,506			
5	***lnBM***	-5,015	-0,610	0,410	0,407	12,542	,000[b]	-5,111	-0,823	0,413	0,495	11,754	,000[b]
	Ret5	0,110	4,347	0,000				0,120	4,444	0,000			
	S(VI)	1,011	4,059	0,000				1,010	4,136	0,000			
	lnTA	3,015	0,500	0,618				2,884	0,479	0,633			
6	***lnBM***	3,464	0,499	0,619	0,280	8,851	,000[b]	3,298	0,475	0,636	0,279	8,804	,000[b]
	Ret5	0,128	3,918	0,000				0,128	3,925	0,000			
	E(VI)	0,230	1,320	0,190				0,225	1,295	0,199			
	lnTA	-2,346	-0,513	0,609				-2,389	-0,522	0,603			
	lnBM	-4,094	-0,702	0,484				-4,164	-0,714	0,477			
7	***Ret5***	0,118	4,466	0,000	0,396	14,886	,000[b]	0,118	4,462	0,000	0,394	14,767	,000[b]
	VI	0,967	4,410	0,000				0,961	4,381	0,000			
	lnTA	-2,346	-0,513	0,609				-2,389	-0,522	0,603			
8	***lnBM***	-4,094	-0,702	0,484	0,396	14,886	,000[b]	-4,164	-0,714	0,477	0,394	14,767	,000[b]
	Ret5	0,118	4,466	0,000				0,118	4,462	0,000			
	S(VI)	0,967	4,410	0,000				0,961	4,381	0,000			
	lnTA	-1,444	-0,288	0,774				-1,492	-0,298	0,766			
9	***lnBM***	-0,404	-0,064	0,949	0,266	11,132	,000[b]	-0,497	-0,079	0,937	0,266	11,098	,000[b]
	Ret5	0,150	5,394	0,000				0,150	5,388	0,000			

Table 7: Regression models of returns in relation to idiosyncratic volatility, systematic volatility and other specific MILA variables

Model o	Variables	Ret1						lnRet1					
		β average	t-Statistic	P-Value	R^2	F-Statistic	P- Value (F)	β average	t-Statistic	P-Value	R^2	F-Statistic	P- Value (F)
1	***betaeco***	-2,333	-4,434	0,000	0,0069	9,334	0,000	-2,379	-4,559	0,000	0,0072	9,680	0,000
	lnTA	0,242	2,220	0,026				0,240	2,221	0,026			
	lnBM	0,611	3,012	0,003				0,603	2,998	0,003			
2	***betaeco***	-2,052	-3,871	0,000	0,0108	10,983	0,000	-2,095	-3,986	0,000	0,0112	11,388	0,000
	lnTA	0,232	2,132	0,033				0,230	2,131	0,033			
	lnBM	0,697	3,422	0,001				0,690	3,415	0,001			
	Ret5	0,029	3,978	0,000				0,029	4,050	0,000			
3	***betaeco***	-2,296	-4,272	0,000	0,0113	10,230	0,000	-2,334	-4,380	0,000	0,0129	10,520	0,000
	lnTA	0,357	3,016	0,003				0,353	3,002	0,003			
	lnBM	0,723	3,551	0,000				0,716	3,543	0,000			
	Ret5	0,025	3,407	0,001				0,025	3,483	0,001			
	EIV	0,082	2,674	0,008				0,080	2,642	0,008			
4	***betaeco***	-2,016	-3,807	0,000	0,0137	11,165	0,000	-2,059	-3,922	0,000	0,0141	11,474	0,000
	lnTA	0,275	2,513	0,012				0,273	2,509	0,012			
	lnBM	0,638	3,127	0,002				0,632	3,120	0,002			
	Ret5	0,027	3,781	0,000				0,028	3,853	0,000			
	VI	0,142	3,432	0,001				0,140	3,420	0,001			
5	***betaeco***	-2,060	-3,888	0,000	0,0122	9,951	0,000	-2,103	-4,002	0,000	0,0125	10,224	0,000
	lnTA	0,264	2,404	0,016				0,261	2,396	0,017			
	lnBM	0,646	3,156	0,002				0,640	3,154	0,002			
	Ret5	0,028	3,798	0,000				0,028	3,873	0,000			
	S(VI)	0,105	2,404	0,016				0,101	2,350	0,019			
6	***lnTA***	0,204	1,805	0,071	0,0081	8,189	0,000	0,197	1,757	0,079	0,0082	8,316	0,000
	lnBM	0,700	3,431	0,001				0,692	3,419	0,001			
	Ret5	0,030	4,142	0,000				0,031	4,236	0,000			
	E(VI)	0,059	1,971	0,049				0,057	1,921	0,055			
7	***lnTA***	0,169	1,590	0,112	0,0101	10,298	0,000	0,164	1,556	0,120	0,0103	10,459	0,000
	lnBM	0,622	3,045	0,002				0,615	3,036	0,002			
	Ret5	0,031	4,315	0,000				0,031	4,402	0,000			
	VI	0,145	3,502	0,000				0,144	3,492	0,000			
8	***lnTA***	0,153	1,445	0,148	0,0085	8,630	0,000	0,148	1,406	0,160	0,0086	8,742	0,000
	lnBM	0,631	3,081	0,002				0,626	3,076	0,002			
	Ret5	0,031	4,349	0,000				0,032	4,439	0,000			
	S(VI)	0,104	2,375	0,018				0,100	2,321	0,020			
9	***lnTA***	0,123	1,165	0,244	0,0071	9,617	0,000	0,118	1,133	0,257	0,0073	9,852	0,000
	lnBM	0,682	3,344	0,001				0,675	3,335	0,001			
	Ret5	0,033	4,528	0,000				0,033	4,615	0,000			

it can be concluded that relationship between idiosyncratic volatility, systematic volatility and other factors with the expected returns of the companies belonging to MILA and BM & FBovespa is significant and these are an explanatory factor of returns, identifying this result in correlation analyzes and statistics of estimated models; however, there is a high significance in some factors more than others; since idiosyncratic risk is present in two stock markets studied regardless how it is estimated since the three models are significant, however, in BM & FBovespa market it has more presence, while in MILA the systematic risk is more significant. However, in order to evaluate the behavior of expected returns of assets, not only calculated volatilities must be taken into account, but also other financial variables such as size of the company, book to market and momentum variable that are significant predicting expected returns, also in this study it was identified that stochastic volatility behaves very similar to Fama and French (1992), nevertheless the most representative variable to predict returns is idiosyncratic volatility calculated by stochastic models given that its conformation It depends on exogenous and endogenous variables unlike the other two volatilities.

References

[1]. Ang, A., Hodrick, R., Xing, Y., & Zhang, X. (2006). The cross-section of volatility and expected returns. Journal of Finance, 61(1), 259-299.

[2]. Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further U.S. evidence. Journal of Financial Economics, 91(1), 1–23. http://doi.org/10.1016/j.jfineco.2007.12.005

[3]. Angel, V. (2000). Turbulencias financieras t riesgos de mercado.Madrid: Finacial times, Prentice Hall.

[4]. Angelidis, T. (2010). Idiosyncratic Risk in Emerging Markets, 45, 1053–1078.

[5]. Banco Mundial. (2018, Junio). Banco Mundial. Retrieved from https://datos.bancomundial.org/indicador

[6]. BM&FBovespa. (2017). Informe Anual BM&FBovespa 2017. Sao Paulo: BM&FBovespa.

[7]. Brown, S., & B, W. (1980). Measuring security price performance. Journal of Financial Economics, 8(3), 205-258.

[8]. Engle, R., & Ng, V. (1993). Measuring and testing the impact of news on volatility. Journal of Finance, 48, 1749-1778.

[9]. Fama, E., & French, K. (1992). The Cross-Section of Expected Stock Returns. The Journal of Finance, XLVII(2), 427-465.

[10]. Fama, E., & French, K. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33(1), 3-56. doi:http://doi.org/10.1016/0304-405X(93)90023-5

[11]. Fama, E., & Macbeth, J. D. (1973). Risk, return and equilibrium: empirical tests. Journal of Political Economy, 81(3), 607-636.

[12]. Friend, Westerfeld, & Granito. (1978). New Evidence on the Capital Asset Pricing Model. Journey of Finance.

[13]. Fu, F. (2009). Idiosyncratic risk and the cross-section of expected stock returns. Journal of Financial Economics, 91(1), 24-37. doi:http://doi.org/10.1016/j.jfineco.2008.02.003

[14]. Han, Y., & Lesmond, D. (2011). Liquidity biases and the pricing of cross-sectional idiosyncratic volatility. Review of Financial Studies, 24(5), 1590–1629. http://doi.org/10.1093/rfs/hhq140

[15]. Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. The Review of Economics and Statistics, 47(1), 13–37. http://doi.org/10.2307/1924119

[16]. Mackinlay, A. C. (1997). Event studies in economics and finance. Journal of Economic Literature, 35, 13-39.

[17]. Malkiel, B. and X. (2002). Idiosyncratic Risk and Security Returns. Working Paper, Pricenton University.

[18]. Mendonça, F., Klotzle, M., Pinto, A., & Montezano, R. (2012). A relação entre risco idiossincrático e retorno no mercado acionário brasileiro. Revista Contabilidade & Finanças, 23(60), 246-257.

[19]. Merton, R. (1987). A simple model of capital market equilibrium with incomplete information. The Journal of Finance. http://doi.org/10.1111/j.1540-6261.1987.tb04565.x

[20]. Mustapha, S. A. (2013). ASSET VOLATILITY AND PRICING IN THE NIGERIAN STOCK MARKET Saidi Atanda MUSTAPHA. Research Consurtium (AERC) in Nairobi.

[21]. Nartea, G. V, & Ward, B. D. (2009). Does Idiosyncratic Risk Matter ? Evidence from the Philippine Stock Market, 2, 47–67.

[22]. Nieto, B. (2001). Los modelos multifactoriales de valoración de activos: Un análisis empírico comparativo. IVIE Working Paper, 29(WP-EC 2001-19).

[23]. Núñez, M., & Cano, R. (2002). LAS TRES CARAS DEL RIESGO ESTRATÉGICO: RIESGO SISTEMÁTICO, RIESGO TÁCTICO Y RIESGO IDIOSINCRÁSICO.

[24]. NYSE Euronext. (2018, Junio). NYSE Euronext. Retrieved from https://www.nyse.com/index.

[25]. Orozco, A., & Ramírez, L. (2016). Análisis comparativo de los mercados bursátiles que integran el MILA. Revista Contexto, 5, 53-62.

[26]. Pukthuanthong-Le, K., & Visaltanachoti, N. (2009). Idiosyncratic volatility and stock returns: a cross country analysis. Applied Financial Economics, 19(16), 1269–1281. http://doi.org/10.1080/09603100802534297

[27]. Ruey, S. (2005). Analysis of Finalcial Time Series. Chicago: Wiley-Interscience.

[28]. Rubio, F. (1987). CAPM y APT: una nota técnica, 26. Retrieved from http://128.118.178.162/eps/fin/papers/0402/0402007.pdf

[29]. Ruiz, E., & Veiga, H. (2008). Modelos de Volatilidad Estocástica: una alternativa atractiva y factible para modelizar la evolución de la volatilidad. Anales de estudios económicos y empresariales, 28, 9-68.

[30]. Sharpe, W. F. (1964). Capital asset prices: A theroy of market equilibrium under conditions of risk. The Journal of Finance, 19(3), 425–442. http://doi.org/10.2307/2329297

[31]. Taylor, S. (1986). Modelling financial time series (2 ed.). Lancaster, UK: World Scientific.
[32]. Ugedo, M. (2003). Metodología de los estudios de sucesos: una revisión. Investigaciones Europeas de Direccion y Economia de La Empresa, 9, 197–244.
[33]. Uribe, J., & Mosquera, S. (2014). Efectos del MILA en la eficiencia de portafolio de los mercados de acciones colombiano, peruano y chileno. Cuadernos de Administración, 30(52), 75-83.
[34]. Velez, I. (2003). Portfolio Analysis (Análisis De Portafolio). Documento de trabajo. doi:http://dx.doi.org/10.2139/ssrn.986978