The Nonlinear Effect of Internal Financial Factors on Stock Return: The Case of Vietnam’s Banks and Insurance Companies

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Abstract

This study explores the effects of internal financial factors on stock return of Vietnamese Banks and Insurance companies during 2008-2014 periods. The EGARCH-M (1,1) model with hetero-variance is used to analyze the predictive power of these internal factors to stock returns in the short run and the co-integration test and causality test are used to find their long run relationship. It is found that the higher stock return is significantly caused by lower debt ratio, higher short term account receivables, higher total asset and higher risk. These relationships evidently exist in both short-term and long-term in this group. This phenomenon is consistent with the case of other countries, except for account receivables. The empirical results of this study prove the efficient of Vietnamese stock market; at least it is right for the group of Banking and Insurance Companies.

Keywords: Stock return, Bank, Insurance companies, Vietnam

JEL : G21; G28; G30; G32; G3

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1. INTRODUCTION

Vietnam has made amazing progress over the past decade with annual GDP growth averaging 6.3%, only behind China in Asia, and achieved a remarkably high GDP per capita Compounded Annual Growth rate of 14%. The main factors supporting Vietnam’s impressive growth are political stability (only behind Singapore and Brunei in South East Asia), favorable demographics with 65% population at working age, highly competitive labor cost, and a booming consumers’ market.

Along with maintaining high growth and macroeconomic stability, there is a strong increase in domestic income and the demand for banking services. In the context of international economic integration, the activities of financial institutions have fundamentally altered both the quantity and quality. The banking and insurance sector in Vietnam experienced an impressive growth over the past decade. As a potential market, this sector has grown rapidly in terms of market size.

Banking and Insurance sector play an important role in the process of economic growth in Vietnam. Movements in the stock market may have a profound economic impact on the economy and everyday people. The movement of share prices and in general of the stock indexes can be an indicator of the general trend in the economy. Share prices rise and fall depending, largely, on market forces, which tend to rise or remain stable when companies and the economy in general show signs of stability and growth. An economic recession, depression, or financial crisis could eventually lead to a stock market crash.

The effects are proved by some studies that researchers found the significant and positive correlation between stock market volatility and economic growth (Campbell et al. 2001), Ahmed & Samad, 2008; Levine & Zervos, 1998). Although the importance of stock market volatility on economic growth has received much attention, a highly inadequate number of research works have been done to investigate the factors driving share prices, there are so few studies on the subject in Vietnam.

Although factors affecting the stock return on the market are varied. The most basic factors that influence of share price are demand and supply. While government policies, firm’s as well as industry’s performance and potentials have effects on demand behavior of investors, both in the primary and secondary markets. Generally, the factors affecting the share price can be viewed from the macro and micro economic perspectives. Macro-economic factors include inflation, interest rates, exchange rates, etc.

This study tries to find internal financial factors that affect the stock return of Vietnamese Banking and Insurance sectors in short-run and long-run. It contributes to the existing literature in several ways: (1) as far as it can be ascertained, this is the first study exploring the internal financial factors affecting the stock return of
Banking and Insurance sectors in Vietnam; (2) The EGARCH-M (1,1) model with hetero-variance is used to analyze the predictive power of these factors to stock returns in the short run; (3) The co-integration test and causality test are used to find their long run relationship.

Stock return is the measurement of a stock’s ability to increase or decrease the wealth of its shareholders. Return is typically measured by its fluctuation in price. When the stock price increases, the stock shows good return. Conversely, a decrease in price is a poor return. This study uses the financial data and the stock index of Banking and Insurance group including 16 units posted on Ho Chi Minh Stock Market (HOSE) over the period of 7 years from 2008 to 2014, for finding the factors effecting the stock return in both short-run and long-run. It is found that the higher stock return is significantly caused by lower debt ratio, higher short term account receivables, higher total asset and higher risk. These relationships evidently exist in both short-term and long-term in this group.

The outline of the study is as follows. Section 1 presents the motivation, purpose as well as contribution. Section 2 is literature review, Section 3 introduces the methodology, description of the data. Section 4 presents the empirical result and analysis. Section 5 concludes.

2. LITERATURE REVIEW

Stock return is measured by a stock's ability to increase or decrease the wealth of its shareholders. Return is typically measured by its price volatility. When the stock price increases, the stock shows good performance. Conversely, a decrease in price is a poor performance.

There are many factors affecting a stock’s return on the market. These factors are mainly divided into two groups, corporate governance and macroeconomic variables. In other words, a firm’s stock return depends on the health of the company issuing the stock and the overall health of the economy. The return of a stock is often tied to the performance of a company. Stock market prices generally respond over long time intervals to the earnings of the companies. The greater their rate of profit, the better their performance as measured by capital gains and losses.

Several studies have proved that the size of a firm can also play a role in its performance. Castany et al. (2005) and Van (2005) show that larger firms are more productive than smaller ones due to factors such as better access to technology, managerial skills, finance, and learning. At the other extreme, the flexible, non-hierarchical structure of small firms can give these firms a productivity advantage. Indeed, several empirical studies have shown a decrease in productivity as size increases (Geroski (1998); Tybout (2000)).

Al-Khazali and Zoubi (2005) suggest that firm size has been used for several purposes, to proxy for many different constructs such as the political costs,
information production costs, and competitive advantages, moreover it is used to examine if affecting the stock returns. Fama-French (1992) analyze 25 stock portfolios from July 1963 to December 1991 on the basis of size and book-to-market equity and argue that the cross section of average returns on US can be explained by the excess market return, a size factor, and a book-to-market equity factor.

Vos and Pepper (1997) use a smaller sample size over period 1991 to 1995 and find that size is a strong explanatory variable of returns in New Zealand stock market. Connor and Sehgal (2001) find that relation between value and average return is positive for small stocks, but negative for big stocks in Indian market. This is different from US findings (Fama and French (1992), (1993)) of a strong positive relation between value and average returns irrespective of size. Moreover, some studies of the stock in China such as Wong, Tan and Liu (2006) find that smaller companies and value stocks produced excess returns in the Shanghai Stock Exchange, smaller companies and value stocks perform better. This study explores the cross-sectional stock return behavior on the A-share market of the Shanghai Stock Exchange. They find that smaller companies and value stocks perform better. Systematic risk is negatively significant in down markets. The proportion of floating equity has no direct effect on stock returns.

Leverage ratio can be affected by many other factors such as security issuance, share repurchase, earnings accumulation, use or provision of trade credit, payment or use of existing credit lines, and dividend payment, etc. The overall effect of the change in leverage ratio on stock prices is a general setting. The negative effect of leverage change on stock prices appears to be consistent with the debt overhang theory of Myers (1977). Dimitrov and Jain (2008) find a negative relation between the annual change in leverage and the current-year and next-year stock returns. Eckbo, Masulis, and Norli (2007) review the literature of exchange offers and show that leverage decreasing (increasing) activities generally have lower (higher) announcement returns, likely due to asymmetric information.

Accounts receivables management is a crucial filed of corporate finance because of its effects on a firm’s profitability and risk, and consequently on the firm's value. Many studies analyze accounts receivable individually, but mostly as a part of working capital management, from various points of view. Bougheas et al. (2009) focuses the research on the response of accounts receivable to changes in the cost of inventories, profitability, risk and liquidity. The other authors explore the impact of an optimal receivables management. Researches realized by Deloof (2003), Laziridis and Tryfonidis (2006), Gill et al (2010), Garcia-Teruel and Martinez-Solano (2007), Samiloglu and Demirgunes (2008) and Mathuva (2010) all point out to a negative relation between accounts receivables and firm profitability. In other words, having an accounts receivable policy which leads to a low as possible accounts receivables has as a result of the highest profitability.
The existing studies tend not to focus on asymmetric information and volatility clustering of the stock return as well as internal financial factors, which could impact greatly on empirical results. In particular, to the best of our knowledge, there is no study investigating the nonlinearity relationship between stock return and these internal factors along with these phenomena. The present paper takes all the above mentioned deficiencies into consideration in the investigation of the effect of internal factors on stock return for the group of Banking and Insurance Companies in Vietnam.

3. DATA AND EMPIRICAL MODELS

3.1. Data

The data used for analysis are collected from several sources. The financial statements and firm information are obtained from a large brokerage house. The stock index of Banks and Insurance Companies is obtained from Ho Chi Minh Stock Exchange (HOSE). HOSE is selected as most big capital enterprises have listed for a longer time. Although the Vietnamese stock exchange market was established in July 2000, the data for analysis are only available from January 2008 to December 2014. The definition and measurement of the variables are as mentioned in Table 1.

<table>
<thead>
<tr>
<th>Table 1 Description of the variables.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stock Return (RET)</strong></td>
</tr>
<tr>
<td>Stock Return: estimated by the equation [Price(t)-Price(t-1)]/Price(t-1).</td>
</tr>
<tr>
<td><strong>Internal Financial Factors (IFs)</strong></td>
</tr>
<tr>
<td>DBT : The total liabilities as percentage of total assets.</td>
</tr>
<tr>
<td>SAR : The short term account receivables as percentage of total assets.</td>
</tr>
<tr>
<td>TA  : The natural logarithm of total asset.</td>
</tr>
</tbody>
</table>

3.2. Research Methodology

Figure 1 depicts results of the nearest neighbor fits with bandwidth spans 0.15, polynomial degree 1 and the iteration number 4, as specified in Cleveland (1993). It is obvious that the relationships between Stock Returns (RET) and 3 Internal Factors (DBT, SAR and TA) are characterized with non-linearity and asymmetry. Therefore, the model fitted for analyzing the relationship between Stock Returns (RET) and the Internal Factors (IFs) should be a non-linearity model.
Figure 1  The non-linear relationship between Stock Returns (RET) and Internal Factors (DBT, SAR and TA)

For the purpose of empirical analysis, this study uses the EGARCH-M model and co-integration test for finding the factors affecting the stock return in short-run and long-run, respectively. The variables and their description in this study are shown in Table 1. The empirical models utilized to test for the effect of these variables on stock return are introduced in the part of Empirical models.

3.3. Empirical models

The stock market of Vietnam, especially the stock of Bank and Insurance Companies, is fledgling, which has been severely influenced by the “herd” syndrome and psychological effects of domestic investors, which can cause regime shifts in the unconditional variance of stock return. Therefore a stable GARCH process assumed to have the constant unconditional variance is not applicable. The EGARCH-M model that allows for asymmetric effects between positive and negative returns is more appropriate for analyzing the relationship of Stock Returns
(RET) and Internal Factors (DBT, SAR and TA) of Bank and Insurance Companies.

Taking the influence of conditional variance, asymmetric information and time into consideration, the EGARCH –M framework is applied to carry out the analysis. In order to analyze the effect of Risk and Internal Factors (DBT, SAR and TA) on stock returns, the autoregression (AR) and the moving average (MA) with lags are added to rectify the remained auto correlation. the EGARCH-M process is designed as follows:

\[
\text{RET}_t = \alpha + \beta_1 \text{DBT}_t + \beta_2 \text{TA}_t + \beta_3 \text{SAR}_t + \varphi \sigma^2_t + \sum_{i=1}^{p} \alpha_i \text{RET}_{t-i} + \varepsilon_t, \varepsilon_t \sim N(0, \sigma^2_t)
\]

\[
\log(\sigma^2_t) = \omega + \delta \log(\sigma^2_{t-1}) + \sum_{i=1}^{q} \beta_i \varepsilon_{t-i} + \gamma \varepsilon_{t-1} + \epsilon_t
\]

where RET\(_t\) represents the stock return of period \(t\). DBT\(_t\) is the total liabilities as percentage of total asset, SAR\(_t\) is the short term account receivables as percentage of total asset and TA\(_t\) is the natural logarithm of total asset at period \(t\). \(\sigma^2_t\) denotes the conditional variable (aka the unsystematic hetero-risk) at period \(t\). The \(\log(\sigma^2_t)\) is modeled then the significant advantage of EGARCH models is that even if the parameters are negative \(\sigma^2_t\) will be positive (Chang Su, 2010). \(\alpha, \beta, \varphi\) are the parameters of mean equation. \(\omega, \delta, \sum, \text{and } \gamma\) are the parameters of variance equation.

In the mean equation, DBT, SAR and TA are provided as the leading indicators of stock price if \(\beta>0\) and \(\beta<0\) are significant. The parameter \(\varphi\) implies the effect of the conditional variance on stock return. The significant positive \(\varphi\) means that the effect of stock return uncertainty on stock return is positive and vice versa.

In the variance equation, the \(\gamma\) parameter measures the asymmetry of the leverage effect. \(\gamma=0\), showing the asymmetry of the model. \(\gamma<0\), implying the positive shocks (good news) generate less volatility than negative shocks (bad news). If \(\gamma>0\), meaning that the positive innovations are more destabilizing than negative innovations. Besides, \(\sum\) captures the sign or direction of the shock. \(\sum \neq 0\) demonstrates the existence of information asymmetry, when \(\sum > 0\), positive shocks generate higher volatility than negative shocks of the same magnitude, and vice versa.

The maximum likelihood method used to estimate the EGARCH-M model and the maximum likelihood model is as follows:
\[
\log L = -(T/2) \log(2\pi) - (1/2) \sum_{t=1}^{T} \log(\sigma_t^2) - (1/2) \sum_{t=1}^{T} (e_t^2 / \sigma_t^2)
\]  

Before fitting with EGARCH-M (1, 1) model, four series should be stationary. Recent literature suggests that panel-based unit root tests have higher power than unit root tests based on individual time series. Therefore the panel unit root tests including Fisher-type tests using ADF and PP tests (Maddala and Wu (1999) and Choi (2001)) and Levin, Lin & Chu t* (2000) are applied to test for the unit root of the panel. The results of these three tests displayed in Table 2 show the rejection of the null hypothesis for all variables.

The concept of co-integration has attracted a lot of attention in the literature. According to Engle and Granger (1987), a set of variables is defined as co-integrated if a linear combination of them is stationary. Many time series are non-stationary but “move together” over time – that is, there exists some influences on the series, which imply that the two series are bound by some relationship in the long run. A co-integrating relationship may also be seen as a long-run or equilibrium phenomenon, since it is possible that co-integrating variables may deviate from their relationship in the short-run, but their association would return in the long-run. This study implements the co-integration test with linear trend and intercept developed by Johansen (1991, 1995) as follows:

\[
H_1 (\rho) : \Pi y_{t-1} + B x_t = \alpha (\beta y_{t-1} + \rho_0) + \alpha \gamma_0
\]  

The empirical results of unit root test, EGARCH-M (1, 1) model for the short-run relationship and the co-integration for the long-run relationship are presented in the next part of Empirical results and Analysis.

4. EMPIRICAL RESULTS AND ANALYSIS

The descriptive statistics of stock return, risk and companies’ financial variables are presented in Table 2. The stock return variable shows that both the average and median are -0.3% and -0.6%, respectively, which indicates that the stock of Bank and Insurance Companies have not generated returns during the time of 2008-2012. The mean, minimum and maximum of companies size (TA) variable are 20.485, 13.94 and 21.43 respectively, revealing that the difference between the scale of listed Banks and Insurance Companies is not large. The figure of debt ratio is rather impressive with the mean of 85.6% and the maximum 94%. The short term account receivables (SAR) are rather high with the mean of 0.500.
Table 2 Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>RET</th>
<th>DBT</th>
<th>SAR</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.003</td>
<td>0.856</td>
<td>0.500</td>
<td>20.485</td>
</tr>
<tr>
<td>Median</td>
<td>-0.006</td>
<td>0.909</td>
<td>0.530</td>
<td>21.065</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.056</td>
<td>0.940</td>
<td>0.605</td>
<td>21.443</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.040</td>
<td>0.187</td>
<td>0.148</td>
<td>13.946</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.024</td>
<td>0.174</td>
<td>0.111</td>
<td>1.579</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.685</td>
<td>-3.137</td>
<td>-1.949</td>
<td>-3.183</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>3.006</td>
<td>11.543</td>
<td>6.176</td>
<td>13.475</td>
</tr>
</tbody>
</table>

Note: DBT: total liabilities as percentage of total assets; SAR: short term account receivables; TA: natural logarithm of total asset.

Table 3 reports the test of panel unit roots. The optimal lags are selected according to SIC. The result of this test suggests that all variables are significant stationary and reject the null hypothesis of unit root.

Table 3 Panel Unit Root Test

<table>
<thead>
<tr>
<th></th>
<th>ADF</th>
<th>PP</th>
<th>Levin, Lin &amp; Chu t*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic value</td>
<td>Statistic value</td>
<td>Statistic value</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>32.46***</td>
<td>35.45***</td>
<td>-1.43*</td>
</tr>
<tr>
<td>Intercepts and trends</td>
<td>31.03***</td>
<td>35.60***</td>
<td>-2.32***</td>
</tr>
</tbody>
</table>

Note: The optimal lags are selected according to SIC. *** indicates the 1% significant level. Probabilities for ADF and PP test are computed using an asymptotic Chi-square distribution. Levin, Lin & Chu t* test assume asymptotic normality. The null hypothesis is to have a unit root.

Based on the stationary of data, the EGARCH (1, 1)-M model is found to be most fitted for the data. Table 4 reports the estimations of EGARCH-M (1,1) models fitted for the relationships of RET, DBT, SAR and TA. In order to simplify the model and retain more freedom degree, the autoregressive (AR) model is added to the mean equation to delete the insignificant coefficients of independent variables.

Table 4 EGARCH (1, 1)-M model and estimations

\[
\text{RET}_t = \alpha + \beta_1 \text{DBT}_t + \beta_2 \text{TA}_t + \beta_3 \text{SAR}_t + \varphi \sigma^2_t + \sum_{i=1}^{p} a_i \text{RET}_{t-i} + \varepsilon_t, \varepsilon_t \sim N(0, \sigma^2_t)
\]

\[
\log(\sigma^2_t) = \omega + \delta \log(\sigma^2_{t-1}) + N\left(\frac{\varepsilon^2_{t-1}}{\sigma^2_{t-1}}, \gamma \frac{\varepsilon_{t-1}}{\sigma^2_{t-1}}\right)
\]
Q10(uh^{-1/2}) and Q10(u^2h^{-1}) are the diagnostic tests, which represent the Ljung-Box Q-statistic with 10 lag-lengths of the standardized and squared residuals, respectively. These tests used to check for the serial correlation. It is found that not only the standardized value but also the squared value does not show the remaining autocorrelation. Moreover, all results of Lagrange multiplier (LM) testing for autoregressive conditional heteroskedasticity (ARCH) (Engle 1982), which is employed to test for the heteroscedasticity of residual. The values inside (.) are p-values.

Table 4 also provides the $\beta_1$, $\beta_2$ and $\beta_3$ value of mean equation. DBT significant negatively influences VNIG (-0.1563); while SAR and TA positively influences RET (0.0078 and 0.2196). These results prove that the Stock Returns (RET) are affected by all three internal factors. In other words, DBT, SAR and TA work as the leading indicator of stock returns (RET). This phenomenon implies that stock investors are very rational before deciding to invest into stock of Bank and Insurance Companies.

The effect of variance ($\varphi$), aka the total risk, on stock returns (RET) is positively significant during studying period. Furthermore, the value $\gamma$ of the
The Nonlinear Effect of Internal Financial Factors on Stock Return: The Case of Vietnam’s Banks and Insurance Companies

The variance equation of model (1) are significantly smaller than 0, presenting positive shocks generate lower volatility than negative shocks of the same magnitude.

The empirical results for the long-run relationship developed by Johansen cointegration test linear trend and intercept between stock return (RET) and debt ratio (DBT), short term account receivables (SAR), total asset (TA) are summarized in Table 5. The result shows that there are cointegrations was found between these three couple variables. All the coefficients are significant with rank=0 and rank £ 1 . Thus, we can reject H0. This suggests that the long-run relationship between stock return (RET) and debt ratio (DBT), short term account receivables (SAR), total asset (TA) obviously exist.

Moreover, Granger Causality Test reported in Table 5 also proves the bi-direction causality between stock return (RET) and debt ratio (DBT), stock return (RET) and short term account receivables (SAR), between stock return (RET) and total asset (TA).

**Table 5  Co-integration Test with Linear trend and Intercept and Causality Test**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rank</th>
<th>( r = 0 )</th>
<th>( r \leq 1 )</th>
<th>Causality Direction</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RET &amp; DBT</td>
<td>24.59</td>
<td>0.0016</td>
<td>15.49471</td>
<td>DBT</td>
<td>0.491</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.487</td>
</tr>
<tr>
<td>RET &amp; SAR</td>
<td>27.70019</td>
<td>0.0005</td>
<td>15.49471</td>
<td>SAR</td>
<td>0.809</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.458</td>
</tr>
<tr>
<td>RET &amp; TA</td>
<td>27.69027</td>
<td>0.0005</td>
<td>15.49471</td>
<td>TA</td>
<td>0.910</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.488</td>
</tr>
</tbody>
</table>

**Notes:**
1. \( T_1(r) \) denotes the Trace-test statistics for the null of \( H(r) \) versus the alternative of \( H(p) \) of Johansen’s model.
2. \( C_s(5\%) \) is the 5% critical values for Johansen’s model, which are extracted from MacKinnon-Haug-Michelis (1999), p-values are based on MacKinnon-Haug-Michelis (1999).
3. The null hypothesis of Granger Causality Test is “X does not Granger Cause Y”.

Banks and Insurance companies are what make financial market work. Without them, financial markets would be able to move funds from people to have productive investment opportunities. This study finds that the effect of debt ratio (DBT), short term account receivables (SAR) and total asset (TA) on stock return (RET) are evident in Vietnam’s Banking and Insurance group in both short-run and long-run. In other words, the indicators of stock return are the debt ratio, short term account receivables and total asset. Generally, the stock price is reflected by
financial information, hence this phenomenon is consistent with the case of other countries, except for account receivables.

Although the Vietnamese financial market is immature, the publicly available information is efficiently reflected in share prices of Banks and Insurance companies. The empirical results of this study prove the efficient of Vietnamese stock market; at least it is right for the group of Banking and Insurance companies.

5. CONCLUSIONS

The Stock Exchange provides companies with the facility to raise capital for expansion through selling shares to the investing public. By having a wide and varied scope of owners, companies generally tend to improve on their management standards and efficiency in order to satisfy the demands of these shareholders and the more stringent rules for public corporations imposed by public stock exchanges and the government.

This study explores how the internal financial factors influencing the stock return of Banks and Insurance companies in Vietnam. It is found that the higher stock return is significantly caused by lower debt ratio, higher short term account receivables, higher total asset and higher risk. These relationships evidently exist in both short-term and long-term in this group. This phenomenon is consistent with the case of other countries except for account receivables. The empirical results of this study prove the efficient of Vietnamese stock market; at least it is right for the group of Banking and Insurance companies.

This analysis is conducted with the non-linear and asymmetric techniques and therefore somewhat different from the results restricted in linear model that may be found and analyzed using this methodological techniques.
References


內部財務因素對股票收益之非線性影響
—以越南銀行與保險業為例

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摘要

本文探討越南銀行與保險業之內部財務因素如何影響其股票收益。本文採用非線性 GARCH (1,1) 模型進行實證內部因素對股票收益的短期預測能力，並透過共整合檢定與 Granger 因果關係檢定來檢驗其長期預測能力。以 2008 年至 2014 年之資料為樣本進行實證分析，檢定結果顯示較低的負債率、較高的短期應收帳款、較高的總資產和風險決定高股票收益，其關係明顯存在於短期和長期。除了應收帳款因素，此現象與其他國家的情況大致相同，本文經實證與驗證結果初步證明，越南股市是有效性的;至少對於其銀行和保險業。

關鍵字：股票報酬、銀行、保險業、越南

JEL：G21; G28; G30; G32; G3