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Factors Affecting Systematic Risk: Empirical Evidence from Non-Financial Sectors of Vietnam

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Abstract: This research aimed at advancing empirical evidences on the topic of determinants of systematic risk in frontier markets, such as Vietnam, and providing practical implications to investors and executives. Five financial variables, including liquidity, financial leverage, profitability, operating efficiency, and firm size, of 226 non-financial companies listed on Ho Chi Minh Stock Exchange (HOSE) over the period of three years from 2014 to 2016 were examined as determinants of systematic risk. Random effect model was employed in analyzing panel data in order to account for individual-specific or time-specific error variance components in the data set. Results of data analysis indicate that financial leverage and profitability inversely affect systematic risk while firm size positively affects systematic risk. These results are partly consistent with the findings of several prior studies in developed and emerging market. The findings of this paper allows investors to better evaluate the nature of risk of their investments, and to predict their cost of capital, expected return, and intrinsic value of stocks more precisely. In addition, these findings also aid executives, managers, and financial officers in measuring the consequences of their policies with regard to financial leverage, operating efficiency, and size, on the company's systematic risk.

Keywords: Systematic risk (Beta), determinants, non-financial companies, frontier markets, HOSE.

I. INTRODUCTION

1.1. Background

As stated by Graham and Harvey (2001), the essence of investment management lies on risk management, not return management. In reality, many enterprises are currently spending a large amount of money and time on establishing risk management strategies to manage the risks associated with their operating, investing and financing activities. An important component of the total risk is systematic risk. Systematic risk is a crucial factor in the stock exchange market and is widely used for quantifying stock's sensitivity towards the market, and predicting stock returns (Ajum, 2014). Investors and financers use information relating to systematic risk to evaluate the nature and level of risk associated with the asset to make investment decisions (Gu and Kim, 2002). Managers and directors base on systematic risk to measure the cost of equity to make financing decision (Gu and Kim, 2002). Given that systematic risk is proportional to the cost of equity, determinants of systematic risk also affects the cost of equity and value of the firm (Sharif *et al.*, 2016). Therefore, determining factors affecting systematic risks is of great importance to investors, financers, and companies' executives.

1.2. Problems and Objectives

Systemic risk and its determinants have been widely studied in developed markets by many researchers, including Park and Kim (2014), Biase and Elisabetta (2012), Lee and Jang (2007), Kim *et al.* (2002), to mention a few. However, in emerging markets and frontier markets, there have been limited literatures on this topic, for instance, the study of Adhikari (2015) on Nepal stock exchange, and that of Sharif *et al.* (2016) on companies in Pakistan. To the best of my knowledge, there has been no research on this topic in Vietnam. Therefore, this research aims at enhancing the empirical evidence from previous literatures by defining significant financial determinants of systematic risk in a frontier market such as Vietnam.

In addition, most of previous studies applied linear regression and multiple regressions or pooled OLS for panel data. In particular, Adhikari (2015) used multiple regression method, while Sharif *et al.* (2016) employed both linear regression and pooled OLS in their study to analyze panel data. According to Cameron and Trivedi (2005), pooled OLS ignores the structure of panel data, and assumes that there is no difference in individual-specific or time-specific error variance components, leading to inflated t-statistic and underestimated standard error. To fill this theoretical gap, this paper employed random effect model to analyze panel data, after selecting the best fit estimation method among pooled OLS, fixed effect, and random effect models. By employing random effect model, this research aims at increasing the reliability and validity of its findings (Cameron and Trivedi, 2005).

1.3. Implications

From a theoretical perspective, this paper has enhanced empirical evidence of systematic risk's determinants in frontier markets, and increased the reliability and validity of its findings by using random effect model for panel data analysis.

From a practical perspective, the findings of this paper are of great importance to investors, financers, and companies' executives. Investors and financers may additionally base on factors affecting systematic risk to better evaluate the nature of risk of their investments, and to predict their cost of capital, expected return, and intrinsic value of stocks more precisely. Managers, executives and directors may consider the determinants of systematic risk to measure the possible consequences of their new policies and strategies regarding financial leverage, operating efficiency, and size of the company.

II. LITERATURE REVIEW

2.1. Systematic risk

Investment risk is defined as the possibility that deviations exist between expected returns and actual returns (Rãzvan-Gabriel, 2005). As suggested by Capital Asset Pricing model (CAPM), the total investment risk consists of two distinct types of risk: systematic and unsystematic risks (Sharpe, 1964). Systematic risk, sometimes called market risk, has wide effects on the market while unsystematic risk, also called specific risk, is associated with individual asset or a small group of assets (Rowe and Kim, 2010). Unlike unsystematic risk, which can be reduced or even eliminated by diversification, systematic risk is unable to be reduced or eliminated by diversification, and therefore, is a relevant factor in determining expected return (Sharpe, 1964). Estimated through beta (ß), systematic risk reflects the risk of an asset in relation to the market risk (Gu and Kim, 2002). A beta of 1 indicates that the asset changes by the same amount, same direction with the market, and has the same volatility as the market's volatility. A beta greater than 1 indicates that the asset changes by a larger amount, same direction with the market, and has greater volatility than the market's volatility. A beta from 0 to 1, likewise, indicates that the asset has lower volatility than the market does. However, a negative beta indicates that the asset moves in an opposite direction with the market. Unlike unsystematic risk, which can be reduced or even eliminated by diversification, systematic risk is unable to be reduced or eliminated by diversification (Sharpe, 1964; Lintner, 1965). Since systematic risk is undiversifiable, CAPM suggested that systematic risk, instead of unsystematic risk, is a relevant factor in determining expected return (Sharpe, 1964; Lintner, 1965). The CAPM mode implies a positive relationship between risk and the expected return: higher expected returns are often associated with higher level of risk; lower expected returns are often associated with lower level of risk (Sharpe, 1964; Lintner, 1965). The CAPM model is described as follows:

$$E\ (Ri) = Rf + ßo\ [E\ (Rm) - Rf]$$

Where: E (Ri): Expected return

Rf: Risk-free rate

ßo: Systematic risks

E (Rm): Market return

Sharpe (1964) and Lintner (1965) suggested that investors should be compensated for the time value of money and for taking risks. The time value of money is represented by the risk-free rate in the formula and it compensates the investors for placing money in any investment over a period of time. The remaining of the formula indicates the risk or the amount of compensation the investor needs for taking on an additional risk. This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium (Rm-Rf).

2.2. Determinants of systematic risk and hypothesis development

To identify the determinants of systematic risk, many researchers focused on discovering the relationship between beta and some financial factors such as liquidity, financial leverage, profitability, operating efficiency and firm size variable. They used several technical methods such as linear regression, multiple regression and common effects model with beta as dependent variable and financial factors as independent variables.

Liquidity: Liquidity refers to the ease to convert assets into cash. Liquidity ratios measure a firm's ability to cover its short-term debt. Most of the researchers found an inverse effect of liquidity on systematic risk. In particular, Biase and D'Apolito (2012) argued that relatively high liquidity not only reflects that company has the ability to cover its short-term obligations, but also indicates that the company is in a relatively stable financial condition and has a higher level of adaptation to environmental changes. Therefore, it could create a lower degree of uncertainty and risk (Dhingra, 1982). Consequently, it was proved in a logical fashion that the more liquid the company, the smaller the risk, or to make it clearer, the high level of liquidity should reflect that the company has a low risk. In addition, Eldomiaty *et al.*, (2009), Lee and Jang (2006), Gu and Kim (2002), and Chun and Ramasamy (1989) also proved that liquidity variables negatively affect systematic risk. Studies conducted in developing markets such as Indonesia (Puspitaningtyas, 2017) and Malaysia (Chee-Wooi and Brooks, 2015) also gave the same result. Therefore, liquidity is hypothesized to have a negative effect on systematic risk in this research.

H1: Liquidity has a negative effect on systematic risk.

Financial Leverage: Financial leverage refers to the use of debt financing of companies in acquiring assets. Dhingra (1982) suggested that financial leverage is an important variable that has a significant effect on systematic risk. As suggested by the majority of prior studies, there is a positive association between financial leverage and systematic risk. In particular, Shahzad *et al.* (2015) clearly pointed out that the higher level of debt in the company's capital structure directly leads to higher volatility of company's earnings, and hence, increasing the level of risk the company has to suffer. In addition, numerous empirical studies, such as those of Ibrahim and Haron (2016), Shahzad *et al.* (2015), Olibe *et al.* (2008), Kim *et al.* (2002), also suggested a positive relationship between financial leverage and systematic risk. They revealed that the higher the financial leverage ratio is, the higher level of debt burden the company has, reflecting the higher level of systematic risk. Therefore, financial leverage is hypothesized to have a positive effect on systematic risk in this research.

H2: Financial leverage has a positive effect on systematic risk.

Profitability: Profitability ratios measure the performance or the ability of a company to generate profits. Tandelilin (1997) argued that higher profitability will lead to a higher level of risk tolerance and willingness, which is usually found in the case of financial companies. However, most of researches focusing on non-financial companies concluded that there is an inverse relationship between profitability and systematic risk (Lee *et al.*, 2015; Kim *et al.*, 2002). These findings are consistent with the investment theory of Dhingra (1982). This research focuses on non-financial companies and bases on the suggestion of Rowe and Kim (2010) that as the level of profitability illustrates the effectiveness of business operations in making profits, higher profitability enables the business to reduce its financial instability, and thus, lessen the level of systematic risk. Therefore, profitability is hypothesized to have a negative effect on systematic risk.

H3: Profitability has a negative effect on systematic risk.

Operating efficiency: Chee-Wooi and Chyn-Hwa (2010) based on the "skimping" hypothesis of Berg *et al.* (1992) to argue that in order to increase their operating efficiency, some companies try to cut costs aggressively, leading to higher systematic risk. However, most of previous researchers found an inverse relationship between operating efficiency and systematic risk, including Alaghi (2013), Eldomiaty *et al.* (2009), and Kim *et al.* (2002), to mention a few. They contended that the ability to utilize assets efficiently to generate profit helps companies reduce the risk of loss and hence lessen the level of systematic risk. As suggested by Logue and Merville (1972), companies with higher degree of operating efficiency tend to maintain a more stable level of output and operating performance, resulting in lower systematic risk. As higher operating efficiency means lower probability to suffer bankruptcy risk, operating efficiency is hypothesized to have a negative effect on systematic risk.

H4: Operating efficiency has a negative effect on systematic risk.

Firm size: Many researchers believed that larger enterprises tend to have a broader scope of activities, diversify its portfolio more efficiently, achieve economies of scale, and obtain stronger financial ability to defence financial risk, and therefore have lower level of systematic risk (Asgari *et al.*, 2015; Gu and Kim, 2002; Olibe *et al.*, 2008). Beaver *et al.* (1970) made the size of company as a proxy for determining its level of risk. They suggested that large firms tend to report low risk, indicating a negative effect of firm size on systematic risk. Therefore, this research hypothesizes that there is an inverse effect of firm size on systematic risk because the companies with larger scales tend to be more efficient in operating, financing, adjusting to chances, and have lower probability to face financial distress.

H5: Firm size has a negative effect on systematic risk

III. THE METHODOLOGY AND MODEL

3.1. Sampling method

The sample of this study consists of 678 observations collected from 226 firms listed on Ho Chi Minh Stock Exchange (HOSE) in three year period from 2014 – 2016 after the removal of outliers. HOSE is the official largest securities trading centre in Vietnam, in terms of market capitalization. In addition, HOSE also has the highest requirements for listing on this exchange. Therefore, only listed companies on HOSE are included in the sample to ensure the generalization, reliability and validity of this research. In terms of the sample size, a sample of 678 observations from 2014 - 2016 meets the requirements for precise generalization (Cooper et.al., 2006; Charter, 1999). The criteria by which the companies are included in the sample are:

(i) All companies in the financial sectors, including banking, insurance, real estate and security brokerage, are excluded from the sample due to the significant difference in their capital structure and revenue models.

(ii) The companies must have been listed on HOSE before the aforementioned period of time and must have been actively traded.

(iii) The companies must have available audited financial and trading data during the period of 2014-2016.

3.2. Variables

According to Puspitaningtyas (2015) and Tandelilin (1997), there are two stages in estimating beta, that is:

Stage 1: determining the return of individual securities (Ri) and market return (Rm)

$R_{i,t} = (P_{i,t} - P_{i,t-1})/P_{i,t-1}$

$R_{m,t} = (P_{m,t} - P_{m,t-1})/ P_{m,t-1}$

Where:

$R_{i,t}$: daily return of stock i

$P_{i,t}$: daily closed price of stock i

$R_{m,t}$: daily market return

$P_{m,t}$: daily closed price of the market at time t

Stage 2: running the regression between stock returns (Ri,t) and the market return (Rm,t) in the period t, and find Beta:

$$R_{i,t} = \alpha_i + \beta_i (R_{m,t})$$

Liquidity (LIQ): Independent variable (IV). LIQ, measured by quick ratio, indicates the ability of a company to cover short-term financial obligation by using available current assets. Ismail (2016) and Putra *et al.* (2014) used quick ratio to measure liquidity as it provides a more rigorous assessment, compared to current ratio, of a company's ability to pay its current liabilities

Quick ratio = (Current Assets – Inventories) / Current Liabilities

Financial Leverage (FL): Independent variable (IV). FL measures the financial risk of a company. One way to measure FL is to use total debt ratio, which shows the proportion of total assets that is financed by debt (Puspitaningtyas, 2017; Shahzad *et al.*, 2015; Artikis and Nifora, 2013).

Debt Ratio = Total Debts / Total Assets

Profitability (PRO): Independent variable (IV). PRO assesses a business's efficiency in using its total assets to generate earnings. PRO is measured by return on assets (ROA) (Ismail, 2016; Jami and Bahar, 2016; Rajdev, 2013)

ROA = Net Income / Total Assets

Operating efficiency (OE): Independent variable (IV) which is calculated by measuring total assets turnover, illustrating how efficiently a company can deploy its total assets to generate sale revenues (Shahzad *et al.*, 2015; Artikis and Nifora, 2013).

Asset Turnover = Sale Revenues / Total Assets

Firm size (FS): Independent variable (IV). FS is measured by using the logarithm of total assets in order to condense the skewness's effect (Iqbal and Shad, 2012). It is considered as an important determinant in predicting systematic risk (Olibe *et al.*, 2008; Titman and Wessels, 1998; and Logue and Merville, 1972).

Data were extracted from trading reports, audited annual reports, and were processed manually to obtain relevant measures of the financial factors and to ensure the accuracy of the data. In particular, Beta was calculated using trading data from the official website of HOSE (hose.vn). LIQ, FL, PRO, OE, FS were calculated using the data of total assets, total liabilities, current assets, current liabilities, inventories, sale revenues, and net income in the audited annual reports downloaded from the home website of each company.

3.3. Regression Model Specification

In order to identify the relationship between systematic risk of companies listed on Ho Chi Minh Stock Exchange (HOSE) and five possible predictors, the following model is developed:

$$ß_{i,t} = α_0 + α_1 LIQ_{i,t} + α_2 FL_{i,t} + α_3 PRO_{i,t} + α_4 OE_{i,t} + α_5 FS_{i,t} + σ_{i,t}$$

Where:

$ß_{i,t}$: systematic risk of of i^{th} firm at time t

LIQ_{it}: liquidity of i^{th} firm at time t;

FL_{it}: financial leverage of i^{th} firm at time t;

PRO_{it}: profitability i^{th} firm at time t;

OE_{it}: operating efficiency of i^{th} firm at time t;

FS_{it}: firm size of i^{th} firm at time t",

$α_0$: a constant,

$αi$ (i= 1,...,5): regression coefficients of each independent variable,

$σ_{i,t} = u_i + e_{i,t}$: the error components

3.4. Estimation Strategy

Before choosing the best estimation method, Variance Inflation Factor (VIF) and correlation test are conducted to ensure there is no existence of multicollinearity. Multicollinearity exists when independent variables are highly correlated with each other, causing the statistical significance of the regressors undermined (Allen, 2007). Theoretically speaking, the regression model cannot produce precise results if the absolute value of correlation coefficient exceeds 0.8 (Hair *et al.*, 2005), and VIF value of IV is smaller than 0.4 (Tuffery, 2011) or larger than 10 (Besley *et al.*, 2005). According to **Table 1**, correlation coefficients of predictors are between -0.5734 and 0.3816; whereas in **Table 2,** VIF value of explanatory variables fluctuates from 1.1 to 1.83. These results confirm that multicollinearity does not exist in the dataset.

To select the best estimation method among pooled OLS, fixed effect and random effect models for this study, F-test, Breusch-Pagan Lagrangian Multiplier test, and Hausman test are conducted as follows:

F-test: is applied to determine the existence of fixed effect in the dataset. The test's null hypothesis is that all intercepts are the same or all dummy parameters equal to zero (Kennedy, 2008). If the null hypothesis is rejected, it means that individual effect, or heterogeneity exists in the dataset and hence, fixed effect should be employed to model heterogeneity. From the F-statistic of 3.24 and the p value of 0.0000 of unreported model, there is enough evidence to reject null hypothesis and conclude that there is a significant fixed effect, and fixed effect is a better model than pooled OLS.

Breusch-Pagan LM test: is conducted to test the presence of random effect. The test's null hypothesis is that the variance of individual (or time) specific error component equals to zero (Breusch and Pagan, 1980). If the null hypothesis is rejected, random effect model should be employed to deal with heterogeneity. From the result illustrated in **Table 3**, a p value of 0.0000 is enough to reject the null hypothesis and to confirm the existence of random effect.

Hausman test: is conducted afterwards to choose between fixed effect and random effect models. The major difference between fixed effect model and random effect model is the use of dummy variables. While in the fixed effect model, individual differences are incorporated into intercepts through dummy variables, in the random effect model, individual effects are a part of error components (Kennedy, 2008).

As a result, random effect model assumes that individual effects are not correlated with any regressor (Kennedy, 2008). According to Hausman (1978), the test's null hypothesis is that there is no correlation between the individual effects and any regressor in the model. If the null hypothesis is rejected, it means that individual effects and regressors are related with each other, rendering the results of random effect biased. The p value of 0.1267 in **Table 4** indicates that there is not enough evidence to reject the null hypothesis. Therefore, the random effect model is more efficient than fixed effect model. In addition, $R^2 = 0.1944$ and $R^2=0.1546$ of random and fixed models respectively also confirms that random effect model is better than fixed effect model in this study.

Table 1
Correlation matrix of Explanatory variables

	Beta	*LIQ*	*FL*	*PRO*	*OE*	*FS*
Beta	1					
LIQ	0.042	1				
FL	0.041	-0.5734	1			
PRO	-0.1208	0.1588	-0.3253	1		
OE	-0.0948	-0.1401	0.1036	0.1109	1	
FS	0.3816	-0.1822	0.313	0.079	-0.1492	1

Table 2
Variance Inflation Factor of Explanatory variables

Variable	*VIF*	*1/VIF*
FL	1.83	0.546163
LIQ	1.51	0.664139
FS	1.22	0.819135
PRO	1.21	0.82331
OE	1.1	0.905983
Mean VIF	*1.38*	

Table 3
Breusch and Pagan Lagrangian multiplier test for random effects

Beta[ID,t] = Xb + u[ID] + e[ID,t]

Estimated results:

	Var	*sd= SQRT(Var)*
Beta	0.1834016	0.4282541
e	0.0848081	0.2912182
u	0.0636288	0.2522475

Test: Var(u) = 0

chibar2(01) = 118.17

Prob > chibar2 = 0.0000

Table 4
Hausman test

	Coefficients			
	(b) *Fe*	*(B)* *re*	*(b-B)* *Difference*	*sqrt(diag(V_b - V_B)* *S.E.*
LIQ	-0.001727	0.0061238	-0.007851	0.005566
FL	-0.181329	-0.244923	0.0635942	0.2082228
PRO	-0.465692	-0.674951	0.2092594	0.1242209
OE	0.0488588	0.0094165	0.0394423	0.0433668
FS	0.1062483	0.1529694	-0.046721	0.0623278

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 8.59

Prob>chi2 = 0.1267

IV. FINDINGS AND DISCUSSION

Table 5 presents the descriptive statistics of Beta and its five possible predictors from 226 listed non-financial companies in 3 year period. Beta, the only DV of this research, fluctuates from -0.3579 to 1.7820 with an average value of 0.5299 and standard deviation of 0.4282. Liquidity, the first IV, has an average score of 2.4543, demonstrating that selected companies generally have the ability to cover its current liabilities by using current liquid assets. The mean value of 0.4719 of financial leverage implies that in average, 47.19% of the assets in the observed firms are financed by debt. Regarding profitability, which is measured by ROA, the mean value of 0.0637 indicates that averagely, selected companies are able to generate $0.0637 profit from $1 total assets. Meanwhile, operating efficiency has mean values of 1.1619, meaning that for each $1 of assets, companies can generate $1.1619 in revenue. In terms of firm size, the mean value is 13.96, and standard deviation is 1.1145.

Table 5
Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Beta	678	0.5299648	0.4282541	-0.3579818	1.782022
LIQ	678	2.454396	2.984633	0.4	23.26
FL	678	0.471955	0.226218	0.01	0.97
PRO	678	0.0637895	0.1124998	-1.424554	0.5523386
OE	678	1.161964	1.114504	0.0212304	8.883355
FS	*678*	*13.96088*	*1.227834*	*9.725974*	*17.85423*

Table 6 presents the results of hypothesis tests by random effect model. The overall R squared of the estimation model is 0.1944, indicating that 19.44% of the variance in systematic risk can be explained by

the model. The significant Wald Chi-Squared statistic demonstrates the model fitness. From the results, financial leverage is statistically significant at 5% level, while profitability and firm size are statistically significant at 1% level. P-values of liquidity and operating efficiency are larger than 0.05, giving not enough evidence to reject the null hypotheses. Therefore, liquidity and operating efficiency are found not to be statistically significant. Among the statistically significant explanatory variables, financial leverage and profitability have a negative effect on systematic risk, with coefficients of -0.2449 and -0.6749, respectively, whereas firm size positively affects systematic risk with a coefficient of 0.1529.

Table 6
Random Effect Model

Beta	*Coef.*	*Std. Err.*	*z*	*P>z*
LIQ	0.0061	0.0064	0.9600	0.3360
FL	-0.2449	0.1068	-2.2900	0.0220*
PRO	-0.6750	0.1498	-4.5100	0.0000**
OE	0.0094	0.0178	0.5300	0.5970
FS	0.1530	0.0175	8.7200	0.0000**
_cons	-1.4729	0.2392	-6.1600	0.0000**
Observations	678			
R-sq	0.1944			
Wald chi2(5) =	89.10			
Prob > chi2 =	0.000			

* Significant at 5%

** Significant at 1%

In **H1**, the coefficient of liquidity has negative sign, which is consistent to prior expectation, but is not statistically significant. The results also reveal a negative sign of financial leverage's coefficient, which is contrary to **H2**. However, the negative relationship between financial leverage and systematic risk moves in line with findings of Sharif *et al.* (2016), Iqbal and Shad (2012) conducted in Pakistan, an emerging market. Baker and Wurgler (2016) explained this negative association by proposing risk anomaly trade-offs, which suggests that companies with low-risk assets tend to rely more on debt financing. Similarly, the optimal capital structure of firms with higher-risk assets is found at lower level of leverage (Baker and Wurgler, 2016). In other words, financial leverage and systematic risk are inversely correlated. Regarding **H3**, coefficient of profitability is consistent with the hypothesis and statistically significant. This result confirms the findings of Kim *et al.* (2002), Lee *et al.* (2015), Rowe and Kim (2010), conducted in U.S; yet it is contrary to studies of Shariff *et al.* (2016), Adhikari (2015), Iqbal and Shad (2012) in emerging markets. As far as **H4** is concerned, the positive coefficient of operating efficiency is consistent to prior prediction, yet it is found not to be statistically significant. According to **H5**, firm size has an inverse effect on systematic risk. However, the result from random effect model has provided a positive significant coefficient of firm size. Although it is contrary to our expectation, this positive relationship move in line with previous findings of Li and Purice (2016), Shariff *et al.* (2016), Adhikari (2015), Iqbal and Shad (2012), Lee and Jang (2007), Daves *et al.* (2000) in both developed and emerging markets. According to Daves *et al.* (2000), this positive association is not due to differences in capital structure, or in nature of industry, but is due to differences in projects undertaken by large and small companies. Specifically, managers in large firms tend to have higher level of risk tolerance than ones in small firms, and therefore, tend to undertake projects that are riskier (Daves *et al.*, 2000). Therefore, this explanation supports the positive association between firm size and systematic risk.

V. CONCLUSIONS

This paper reveals that financial leverage and operating efficiency inversely affect systematic risk, while firm size positively affects systematic risk of companies listed in HOSE from 2014 to 2016. Firm size is found to be the most important determinant of systematic risk. By employing random effect model for panel data, this study has overcome the drawbacks of previous study, and enhanced the validity and reliability of the findings. Besides from enhancing empirical evidences and filling theoretical gaps in the context of Vietnam and frontier markets, this study is believed to provide practical implications to investors and corporate managers. Particularly, the findings of this paper allows investors to better evaluate the nature of risk of their investments, and predict their cost of capital, expected return, and intrinsic value of stocks more precisely. In addition, it also aids executives, managers, financial officers in measuring the consequences of their policies with regard to financial leverage, operating efficiency, and size, on the company's systematic risk. To enhance the model's coefficient of determinants, further studies should be carried out to examine the effects of other explanatory variables on systematic risk. Furthermore, further studies can be conducted in other frontier markets to confirm the present findings.

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