

The impact of financial risk on systematic risks: international evidence

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Abstract

The study focused on the impact of the short-term and long-term financial risk on systematic risks through analyzing 120 corporations listed in the international and emerging stock exchange markets of the United States, Germany, South Korea, and Egypt, (30 corporations from each country). The variability in common stock's systematic risks was explained by 93.58% according to short and long-term financial risk under two control variables which are market capitalization of the corporation and the efficiency of the stock exchange. When our results were compared to those of Hamada, 1972, Lee and Jang, 2007, and Alaghi, 2011, the study found that short-term financial risk increased which was explained by common stock's systematic risk. Finally, the study found a relationship between each the short and long-term financial risk on one hand and a common stock's systematic risk on another hand.

JEL classification numbers: G32

Keywords: Financial Risk, Systematic Risks

1. Introduction

1.1 Introduce the Problem

Under the research activities in the field of the finance as general and the asset pricing models specially, the required rate of return to any investor will always be a mix of the risk-free rate and risk prime according to one factor (see: the capital asset pricing model-CAPM) or more (arbitrage pricing theory-APT); with a

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Hypotheses of the Modigliani and Miller (MM) theory, borrowing, from whatever source, while maintaining a fixed amount of equity, increases the risk to the investor. Therefore, in the mean-standard deviation version of the capital asset pricing model, the covariance of the asset's rate of return with the market portfolio's rate of return should be greater for the stock of a firm with a higher debt-equity ratio than for the stock of another firm in the same risk-class with a lower debt-equity ratio. so, the systematic risk of common stocks can be explained merely by the added Corporate leverage (Hamada, 1972).

This study attempted to tie together some of the nations associated with the financial field of corporations with risk of the common stock, as (Hamada, 1972). Risk-return trade-off is one of the fundamentals in finance theories and models. Portfolio Theory and the following theories and models such as capital market line (CML), Securities market line (SML) and Arbitrage Pricing Theory (APT) agreed on classification total risk for two types, this Systematic and Unsystematic Risks. In contrast, other models and theories indirectly refer to the relationship between Systematic and Unsystematic Risks, Has emerged clearly in the light of attempts to point to the imperfections of the capital asset pricing model (see: Blume & Husic, 1973; Van Horne et al., 1975; Banz, 1981) ; This was followed by a new methodology in interpreting the relationship between return and risk such as A three factor asset pricing model (Fama & French 1995), A five-factor asset pricing model (Fama & French 2015); This model including both Systematic and its parameters include Unsystematic Risks.

There are many studies dealing with stock returns & risks (total, systematic and unsystematic), According to (Patro et al., 2013) the systematic risk has changed over time, what is the reason for this change? The study believes that the reason behind the change in unsystematic risk; the unsystematic risks including operational risk, financial risk and event financing, the event risk is non-recurring risk, In contrast, operational risk is stable, but the financial risk changes according to the Policies of working capital in short-term in addition capital structure in long-term, so the corporates have a change in financial risk over time, this change has impact on systematic risk.

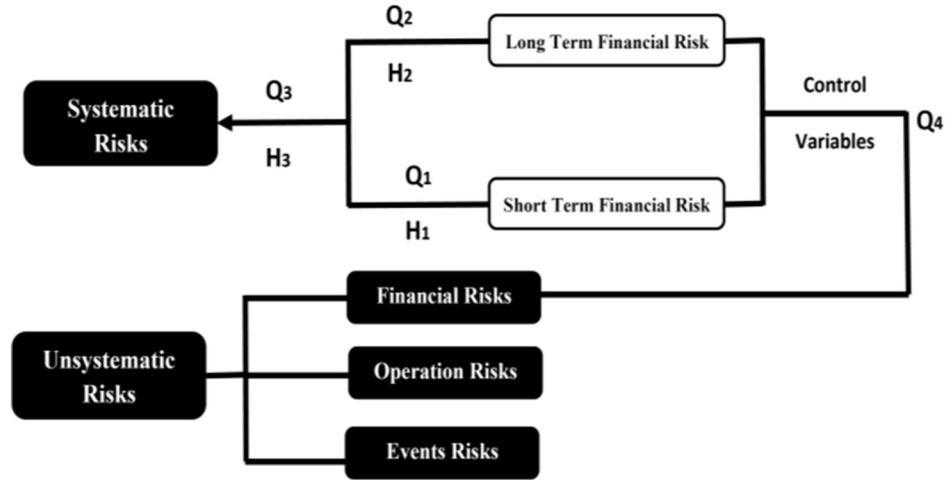


Figure 1: Study Layout

1.2 Literature Review

Table (1): Literature review

The following table contains a summary of studies related to Systematic and Unsystematic Risks

Authors	Study Period & Population	Variables	Conclusion
Hamada 1972	1948-1967 USA	systematic risk, capital structure	The study found that 21% to 24% of the observed systematic risk of common stocks is results of MM corporate tax leverage propositions are correct. This is demonstrated by the added financial risk taken on by the firm with its use of preferred stock and debt.
Huffman, 1983	1981 USA	business risk, outstanding debt, Operating leverage, financial leverage, and equity risk	The study concluded that an increase in outstanding debt caused an increase in the equity risk which is reduced to some extent by the capacity decision this effect is decreased by increasing the size of the outstanding debt. Also, the study found that the capacity decision reduces the effect of the increase in the business risk but the magnitude of this effect decreased if the revenues decreased or if the level of outstanding debts increased.
Lewis, Rogalski, & Seward, 2002	1979-1990 USA	systematic risk, unsystematic risk, financial leverage and the cost of capital	The study found that information about systematic and unsystematic risk is reflected from convertible debt offers, the equity risk decreased without a great increase in financial leverage, industry factors cause an increase in the unsystematic risk. high costs of adverse selection and capital structure considerations force some firms to raise investment capital outside the equity markets.
Tang, & Shum, 2003	1991–2000 France, Germany, Netherlands, UK, Japan, Canada, USA, Belgium, Denmark, Switzerland, Hong Kong, Singapore, and Taiwan	Unsystematic risk, systematic risk, total risk and Return	The study showed that Unsystematic risk and total have great effect on pricing the international stock returns, beta is still a good measure of risk and other statistical risk measures are also useful in explaining cross-sectional variations in stock returns the study has examined the link between stock returns and beta other statistical risk measures during up and down markets and It has also been mentioned in the literature that other factors like size and P/E ratio have explanatory power significant effect on cross-sectional variations in stock returns.

Authors	Study Period & Population	Variables	Conclusion
Rosenberg 2004	1986-2000 Sweden	Total risk, unsystematic risk, systematic risk, employment growth and investment decisions	The study found that investment intensity of the company is negatively related to the firm's systematic and unsystematic risk. The capital investment decisions are not forced by systematic risk. Also the study found that employment growth is negatively related to firm's risk. If total risk increases the possibility to raise employment and investment decisions will decrease however systematic risk didn't affect these decisions.
Lee & Jang, 2007	1997-2002 USA	the systematic risk, profitability, growth, the debt leverage and firm size	The study concluded that there is a negative relation between profitability, growth, and safety and systematic risk this is consistent with previous studies, while there is a positive relation between the debt leverage and firm size and risk which is not consistent to the relevant finance theory and previous studies.
Kleidt & Schierreck, 2009	2000-2001 USA	Equity return and systematic risk	The study concluded that most reservations investors may have around the time of the issue are not found this will lead to the difficulty of detecting systematic equity risk by equity issuers. This will lead to a decrease in the earnings of convertible debt issuers, the reduction of the market value of equity in the post issue will signal a raise in cost of capital.
Alaghi 2011	2006-2009 Tehran	Financial leverage and systematic risk	The study concluded that there is a positive relationship between financial leverage and the firms risk profile so if financial leverage increases this will increase the beta of the equity of the firm. The business risk in the market is indicated by asset beta while business and financial risk are indicated by equity beta. Finally the main result is that systematic risk of companies listed in Tehran Stock Exchange is affected by financial leverage.
Patro, Qi, & Sun, 2013	1988-2008 USA	Systematic risk and stock returns	The study found that stock return correlation is considered as an indicator of systematic risk this indicator can be easily estimated for non-bank and non-US financial institutions a better management of systemic risk calls for an ongoing monitoring of the movements of the risk measures. The study observed that there was a change from low systematic risk regime to high systematic risk regime since 1995 which leads to high -risk environment
Tzang, Wang, & Yu, 2016	2/1/2008-31/12/2009 USA	Systematic risk, unsystematic risk and stock option prices	The study concluded that there is no relation between option values and beta. Also there is negative relation between level of beta and level of volatility which means that beta can affect the volatility structure. The study found that skewness and kurtosis are directly proportional to systematic risk.
Mohohlo & Hall 2018	1994-2015 South Africa	Operating leverage, capital structure, asset tangibility, profitability	The study found that the financial leverage is inversely related to operating leverage in the industrial sector, and the asset and tangibility profitability are negatively related to long term debts and while they are positively related to short term debt. The study showed that almost there is no effect of operating leverage on capital structure due to the conservative nature of firms in south Africa excluding firms in industrial sector. Following to 2008 firms search for ways to reduce their overall risk by reducing their financial or operating leverage.

1.3 What is new with this study?

Within the financial leverage-operating leverage trade-off hypothesis states that as financial leverage increases, management of firms will seek to reduce the exposure to operating leverage in an attempt to balance the overall risk profile of a firm. according to the analytical framework introduced by (Rubinstein, 1973; Bowman,1979) and the tests of both (Hamada, 1972; Alaghi, 2011) the systematic risk is affected by financial leverage, in addition there the positive association of the firm size with the systematic risk according to (Lee & Jang, 2007); the study adds two variables are short-term financial risk and the efficiency of the stock exchange, So The Study is seeking for the impact of financial risk at long-term & short-term; in addition to the impact of corporate size & the efficiency of the stock exchange as control variables.

1.4 Study problem

Financial risk means the uncertainty of a return and the possibility for both loss and gain, Not only for corporates but also for investors (individuals or institutions), Long-term and short-term investors interact in stock exchange to determine the market value of Securities for an opportunity to Fair pricing processes under their risk.

Long-term and short-term investors are exposed to Financial risk typically evolves over time as the Stage of a business cycle and financial stability. As investors care about risk over different time horizons, they react differently against data, information and news of corporates listed in the stock exchange and the economy in general.

Investors view differing lengths of past data & information as being relevant to their investment decision-making process. The interaction of these memory lengths in determining market value creates a kind of market ecology, which occurs in a dynamically changing market (LeBaron, 2001). So, Investors has previous experience on securities returns are a reference to investment decision making especially when unsystematic risks (operation risks, financial risks and events risks) interact with market risk; such as default risk.

This study focused on the relationships between systematic and unsystematic risks through analyzing the impact of financial risk on systemic risk, the study examined the financial risks in the long and short term and their relationship to systematic risks (see Figure 1). So, the study has the following questions:

- Q 1 Is there an impact of short-term financial risk on systematic risks?
- Q 2 Is there an impact of Long-term financial risk on systematic risks?
- Q 3 Is there an impact of financial risk on systematic risks?
- Q 4 What are the determinants of the impact of financial risk on systematic risks?

1.5 State Hypotheses

According to the study problem & Literature Review, the Study Hypotheses can be shown as follows:

- (H₁) there is no significant impact of short-term financial risk on systematic risks.
- (H₂) there is no significant impact of long-term financial risk on systematic risks.
- (H₃) there is no significant impact of financial risk on systematic risks.

1.6 The study Objectives

This study aimed first to examine the impact of financial risk in short & long-term (as a type of unsystematic risks) on systematic risks of common stock listed in International and emerging stock exchange, the second aim is identifying the determinants of this impact according to two control variables "corporate value" and "efficiency of market".

2. Method

A corporate should have enough capital to meet its operational needs for objectives of profitability and growth. The common stock is considered to have the highest strength among all sources of capital to accommodate all forms of risk when the stock exchange market is efficiency.

Systematic risk of common stock through establishing linear relationship between the market portfolio returns as independent variables and common stock returns as the dependent variable is derived. So, the study used the quantitative methodology to describe and analyze the impact of the financial risks in the long and short term on systematic risks; Equation No.1 illustrates the overview of Function for method test.

$$\beta_i = F(\text{Short Term Financial Risk ; Long Term Financial Risk; Corporate Value; Efficiency of market}) \quad (1)$$

According to equation No.1, the study used "current ratio" & "quick ratio" as measurement for financial risks in short term, but "long-term debt to equity", "total debt to equity" and "interest coverage" as measurement for financial risks in the long term. Additionally to two control variables, those include "corporate value" and "efficiency of market". Equation no.2 & no.3 illustrates that

$$\beta_i = f(CR + QR + DTE + LTDTE + IC + CV+EM) \quad (2)$$

$$\beta_i = \alpha + \beta_{CR}CR + \beta_{QR}QR + \beta_{DTE}DTE + \beta_{LTDTE}LTDTE + \beta_{IC}IC + \beta_{CV}CV + \beta_{EM}EM + e_i \quad (3)$$

According to equation No.3, the study measured the financial risk through the five financial ratios, including "quick ratio", "current ratio", "long term debt to equity",

"total debt to equity" & "interest coverage", but measured systematic risks through beta coefficient (β) in addition to two control variables which are the efficiency of the stock exchange (the impact of rational valuation) & market capitalization (the impact of corporate size). Data analysis was performed using Gnu Regression, Econometrics and Time-series Library (GRET) through between-groups methodology according to panel data analysis, so the test hypotheses according to equation No.4.

$$\beta_i = \alpha + \beta_{CR} CR + \beta_{QR} QR + \beta_{DTE} DTE + \beta_{LTDTE} LTDTE + \beta_{IC} IC + \beta_{CV} CV + e_i \quad (4)$$

2.1 Study population and sampling technique

The population of this study includes all corporates listed in four countries United States (New York Stock Exchange & NASDAQ Stock Exchange Global), Germany (Frankfurt Stock Exchange & Deutsche Börse), South Korea (The Korea Exchange: KRX) and Egypt (The Egyptian Exchange: EGX) 30 from each country. However, the corporates did not have the required period information for systematic risks or financial risk. So, the corporates which were listed after 2013 in the succeeding fiscal year were not included in this study. Data of 120 corporates were gathered to examine the impact of financial risk as a type of unsystematic risks on systematic risks.

2.2 Data collection

This study was based on secondary data collection. The data for this study was collected from financial Reuters database, this data include the listed 120 corporates in four countries United States, Germany, South Korea and Egypt at end 2017.

2.3 Sampling Procedures

Describe the procedures for selecting participants, including (a) the sampling method, if a systematic sampling plan was used; (b) the percentage of the sample approached that participated; and (c) the number of participants who selected themselves into the sample. Describe the settings and locations in which the data were collected as well as any agreements and payments made to participants, agreements with the institutional review board, ethical standards met, and safety monitoring procedures.

2.3.1 Definition of variables

The variables were divided into three groups, which are independent, control and dependent variables, measurements of Systematic Risks were used as dependent variables; measurements of financial risk (as a type of unsystematic risks) are used as independent variables. The control variables were deployed in order to control the dependent variables; it included the Efficient of the stock exchange (the impact of rational valuation) & market capitalization (the impact of corporate size).

3. Test Hypotheses

3.1 Examining the impact of short-term financial risk on common stock's systematic risks

Equation No.5 illustrates tests the impact of short-term financial risk on common stock's systematic risks within control variables under between-groups methodology according to panel data analysis; The following model is used to examine factors which affect common stock's systematic risks, Where β_i is common stock's systematic risks, QR is quick ratio, CR is current Ratio, CV is corporate value and e_i is a random error.

$$\beta_i = 2.52264 + 0.858388QR - 0.619253CR - 0.396711CV + e_i \quad (5)$$

According to Table (2); the 60.56% of variability in common stock's systematic risks is explained by the selected explanatory variables: current ratio, quick ratio, efficient of the stock exchange and market capitalization, As $F = 15.84563$, $\text{sig} = 0.00$, which indicates that the explanatory variables jointly have significant impact on common stock's systematic risks. The pattern of relationship (positive) between Quick Ratio & systematic risks is illogical. The study can explain this relationship according to the high efficiency of the banking system in three host countries (United States, Germany & South Korea) out four stock exchange, which supports banking facilities short-term. In addition, the study found a negative influence of market capitalization of corporate in a systematic risks evaluation under short-term financial risk. So, there is an impact of short-term financial risk on systematic risks under market capitalization of corporate & efficient of the stock exchange.

Table (2): Output of panel data analysis which tests short-term financial risk within control variables

Model 1: Between-groups, using observations 1-30 Dependent variable: BETA

variables	coefficient	std. error	t-ratio	p-value
Const.	2.52264	0.375944	6.710	4.05e-07 ***
CV	-0.396711	0.0919303	-4.315	0.0002 ***
QR	0.858388	0.197265	4.351	0.0002 ***
CR	-0.619253	0.154768	-4.001	0.0005 ***
Mean dependent var	1.129750	S.D. dependent var		0.276421
Sum squared resid	0.783446	S.E. of regression		0.173587
R-squared	0.646436	Adjusted R-squared		0.605640
F(3, 26)	15.84563	P-value(F)		4.63e-06
Log-likelihood	12.11060	Akaike criterion		-16.22119
Schwarz criterion	-10.61640	Hannan-Quinn		-14.42817

Source: Gnu Regression, Econometrics and Time-series Library.

3.2 Examining the impact of long-term financial risk on common stock's systematic risks

Equation No.6 illustrates the main results of regression analysis which tests the impact of long-term financial risk on common stock's systematic risks within control variables Between-groups according to panel data analysis; The following model is used to examine factors that affect common stock's systematic risks, Where β_i is common stock's systematic risks, LTDTE is long-term debt to equity, DTE is total debt to equity, IC is interest coverage, CV is corporate value and e_i is a random error.

$$\beta_i = 3.70819 + 0.00323308 \text{DTE} - 0.00334938 \text{LTDTE} - 0.00966037 \text{IC} - 0.699269 \text{CV} + e_i \quad (6)$$

According to Table (3); The 75.70% of variability in common stock's systematic risks is explained according to the selected explanatory variables: long-term debt to equity, total debt to equity, interest coverage, efficient of the stock exchange and market capitalization, As $F= 23.59$, $\text{sig}=0.00$, it indicates that the explanatory variables jointly have significant impact on common stock's systematic risks. The pattern of relationship (negative) between interest coverage & systematic risks is illogical. The studies can explained this relationship according to the high efficiency of working capital management in support of long-term financing needs in accordance with riskiness management. In addition, the study found a negative influence of market capitalization of corporate in a systematic risks evaluation under long-term financial risk. So, there is an impact of Long-term financial risk on systematic risks under market capitalization of corporate & efficient of the stock exchange.

Table (3): Output of panel data analysis which tests long-term financial risk within control variables.

Model 2: Between-groups, using observations 1-30 Dependent variable: BETA

variables	coefficient	std. error	t-ratio	p-value	
Const.	3.70819	0.285610	12.98	1.30e-012	***
CV	-0.699269	0.0761825	-9.179	1.76e-09	***
LTDTE	-0.00334938	0.00156265	-2.143	0.0420	**
DTE	0.00323308	0.000766459	4.218	0.0003	***
IC	-0.00966037	0.00161183	-5.993	2.93e-06	***
Mean dependent var	1.129750	S.D. dependent var		0.276421	
Sum squared resid	0.464065	S.E. of regression		0.136245	
R-squared	0.790571	Adjusted R-squared		0.757062	
F(4, 25)	23.59300	P-value(F)		3.55e-08	
Log-likelihood	19.96577	Akaike criterion		-29.93153	
Schwarz criterion	-22.92555	Hannan-Quinn		-27.69026	

Source: Gnu Regression, Econometrics and Time-series Library.

3.3 Examining the impact of financial risk on common stock's systematic risks

Equation No.7 illustrates the main results of regression analysis which tested the impact of financial risk on common stock's systematic risks within control variables Between-groups according to panel data analysis; The following model is used to examine factors that affect common stock's systematic risks, Where β_i is common stock's systematic risks, QR is quick ratio, CR is current Ratio, LTDTE is long-term debt to equity, DTE is total debt to equity, IC is interest coverage , CV is corporate value and e_i is a random error.

$$\beta_i = 3.77101 + 1.26043QR + 0.00505777DTE - 1.2968CR - 0.00514LTDTE - 0.00133319IC - 0.645601CV + e_i \quad (7)$$

According to Table (4); The 93.58% of variability in common stock's systematic risks is explained by the selected explanatory variables: current ratio, quick ratio, long-term debt to equity, total debt to equity, interest coverage, efficient of the stock exchange and market capitalization, As F= 71.45, sig=0.00, it indicates that the explanatory variables jointly have significant impact on common stock's systematic risks, Finally, the study found a positive relationship between the quick ratio & total debt to equity on common stock's systematic risk

Table (4): Output of panel data analysis which tests financial risk within control variables
 Model 3: Between-groups, using observations 1-30. Dependent variable: BETA

variables	coefficient	std. error	t-ratio	p-value
Const.	3.77101	0.196331	19.21	1.17e-015 ***
CV	-0.645601	0.0477804	-13.51	2.00e-012 ***
LTDTE	-0.00514005	0.000865036	-5.942	4.66e-06 ***
DTE	0.00505777	0.000507750	9.961	8.23e-010 ***
IC	-0.00133319	0.00132120	-1.009	0.3234
QR	1.26043	0.157792	7.988	4.40e-08 ***
CR	-1.29680	0.153854	-8.429	1.73e-08 ***
Mean dependent var	1.129750	S.D. dependent var		0.276421
Sum squared resid	0.112821	S.E. of regression		0.070038
R-squared	0.949084	Adjusted R-squared		0.935802
F(6, 23)	71.45478	P-value(F)		1.03e-13
Log-likelihood	41.17905	Akaike criterion		-68.35809
Schwarz criterion	-58.54971	Hannan-Quinn		-65.22031

Source: Gnu Regression, Econometrics and Time-series Library.

4. Conclusions and Recommendations

The stock exchange is fraught with Interaction, under Risk-Return Trade-off; CML, CAPM & APT illustrates that (Wagdi, 2014). So, some stock exchange applied a system of mandatory business risk disclosure such as the United States and Japan (Kim & Yasuda, 2018) but the study did not find a similar system in most emerging markets, as in Egypt, here the efficiency of a stock exchange is important, On the other hand, the disclosure of financial risk is simpler, as it appears directly in the balance sheet and income statement, however, the aggregate corporate debt maturity has a clear pattern: the average debt maturity is longer in economic expansions than in recessions, makes the choice of debt relevant. Improvements in risk disclosure have been an important part of the corporate governance reforms (Madrigal et. al., 2015).

The financial risk is one of the determinants of common stock risk (Huffman, 1983) According to the analytic framework introduced by (Rubinstein, 1973; Bowman,1979) and the tests of both (Hamada,1972; Alaghi,2011) the systematic risk is affected by financial leverage, in addition there the positive association of the firm size with the systematic risk according to (Lee & Jang, 2007); the study adds a new variable it's the efficiency of the stock exchange, So The Study is

investigated the impact of financial risk at long-term & short-term; in addition to the impact of corporate size & the efficiency of the stock exchange as control variables.

According to Inferential Statistics for short-term financial risk, the 60.56% of variability in common stock's systematic risks is explained by the selected explanatory variables: current ratio, quick ratio, efficient of the stock exchange and market capitalization. On the other hand, the 75.70% of variability in common stock's systematic risks is explained according to the selected explanatory variables: long-term debt to equity, total debt to equity, interest coverage, efficient of the stock exchange and market capitalization. That agrees with Hamada, 1972; Lee & Jang, 2007 & Alaghi, 2011.

According to Inferential Statistics for short & long-term financial risk, the 93.58% of variability in common stock's systematic risks is explained by the selected explanatory variables: current ratio, quick ratio, long-term debt to equity, total debt to equity, interest coverage, efficient of the stock exchange and market capitalization. So, the effect of short-term financial risk increase at explained of common stock's systematic risks when compared with Hamada, 1972; Lee & Jang, 2007 and Alaghi, 2011 results.

Finally, The corporates should take into consideration the impact of both short term and long term financial risk as this will affect the systematic risk and this is achieved through the interaction between the working capital management in short-term and the capital structure in long-term; The determinates of this impact include (a) the banking system efficiency (b) the corporate size (c) the stock exchange efficiency in addition to operating leverage under the financial leverage-operating leverage trade-off hypothesis. That Assisted in the assessment of the effect of financial risk on systematic risk of a common stock, which supports maximizing the wealth of shareholder.

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