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Original Article

RISK MANAGEMENT AND IT MANAGEMENT IN VIET NAM ELECTRIC POWER INDUSTRY DURING AND AFTER THE GLOBAL CRISIS 2007-2009

NGO DUC TIEN[1], SYLWIA GWOŹDZIEWICZ[2], DINH TRAN NGOC HUY[3], DO PHUONG THAO[4], DINH VAN SON[5] & PHAM TUAN ANH[6]

[1]*Academy of Finance, Hanoi, Vietnam*

[2]*Research Scholar, Jacob of Paradies University in Gorzow Wielkopolski, Poland*

[3]*Banking University HCMC, Ho CHi Minh city Vietnam*

[4,5,6]*Thuongmai University Hanoi Vietnam*

ABSTRACT

Technological innovation and management in Vietnam electric power is a crucial issue to improve quality of electric power products, services and system. This paper estimates the impacts of external financing on market risk for the listed firms in the Viet nam electric power industry, esp. after the financial crisis 2007-2009.

First, by using quantitative and analytical methods to estimate asset and equity beta of total 20 listed companies in Viet Nam electric power industry with a proper traditional model, we found out that the beta values, in general, for many institutions are acceptable.

Second, under 3 different scenarios of changing leverage (in 2011 financial reports, 30% up and 20% down), we recognized that the risk level, measured by equity and asset beta mean, decreases (0,243) when leverage increases to 30% and vice versa.

Third, by changing leverage in 3 scenarios, we recognized the dispersion of risk level increases (measured by equity beta var) if the leverage increases to 30%.

Finally, this paper provides some outcomes that could provide companies and government more evidence in establishing their policies in governance.

KEYWORDS: Equity Beta, Financial Structure, Financial Crisis, Risk, External Financing, Electric Power Industry
JEL CLASSIFICATION: G010, G100, G390

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INTRODUCTION

Financial system development has positively related to the economic growth, throughout many recent years, and Viet Nam electric power industry is considered as one of active economic sectors.

This paper is organized as follow. The research issues and literature review will be covered in next sessions 2 and 3, for a short summary. Then, methodology and conceptual theories are introduced in session 4 and 5. Session 6 describes the data in empirical analysis. Session 7 presents empirical results and findings. Next, session 8 covers the analytical results. Then, session 9 presents analysis of risk. Lastly, session 10 and 11 will present discussion and conclude with some policy suggestions. This paper also supports readers with references, exhibits and relevant web sources.

RESEARCH ISSUES

We mention some issues on the estimating of impacts of external financing on beta for listed electric power companies in Viet Nam stock exchange as following:

- Issue 1: Whether the risk level of electric power firms under the different changing scenarios of leverage increase or decrease so much.
- Issue 2: Whether the dispersed distribution of beta values become large in the different changing scenarios of leverage estimated in the electric power industry.

Besides, we also propose some hypotheses for the above issues:

- Hypothesis 1: Because using leverage may strongly affect business returns, changing leverage scenarios could strongly affect firm risk.
- Hypothesis 2: As external financing is vital for the business development, there will be large disperse in beta or risk values estimated.

LITERATURE REVIEW

Scott (1976) indicated that the value of tax benefit is a major factor in capital structure. Black (1976) proposes the leverage effect to explain the negative correlation between equity returns and return volatilities. Mishkin (1983) analysis suggests that the negative relation between excess leverage and future returns can be explained by the market's failure to react promptly to the information in excess leverage about the firm's probability of distress and future asset growth. Levine (1991) said liquid markets can enable investment in long-term investment projects while at the same time allowing investors to have access to their savings at short-term notice. King and Levine (1993) stated financial institutions and markets allow cross-sectional diversification across projects, allowing risky innovative activity.

Next, Peter and Liuren (2007) mentions equity volatility increases proportionally with the level of financial leverage, the variation of which is dictated by managerial decisions on a company's capital structure based on economic conditions. And for a company with a fixed amount of debt, its financial leverage increases when the market price of its stock declines. Then, Chava and Purnanandam (2009) mentioned leverage is positively correlated with financial distress and distress intensity is negatively related to future returns.

Reinhart and Rogoff (2009) pointed the history of finance is full of boom-and-bust cycles, bank failures, and systemic bank and currency crises. Adrian and Shin (2010) stated a company can also proactively vary its financial leverage based on variations on market conditions.

Then, Harry and Rene (2013) pointed that because debt-equity neutrality assigns zero way to the social value of liquidity, it is an inappropriately equity-biased baseline for assessing whether the high leverage ratios of real-world banks are excessive or socially destructive.

Finally, financial leverage can be considered as one among many factors that affect business risk of electric power firms.

CONCEPTUAL THEORIES

The Impact of Financial Leverage on the Economy

A sound and effective financial system has positive effect on the development and growth of the economy. Financial institutions not only help businesses to reduce agency problems but also enable them to enhance liquidity capacity and long-term capital. And financial innovation also reduces the cost of diversification. So, finance and growth has interrelated.

In a specific industry such as electric power industry, on the one hand, using leverage with a decrease or increase in certain periods could affect tax obligations, revenues, profit after tax and technology innovation and compensation and jobs of the industry.

During and after financial crises such as the 2007-2009 crisis, there raises concerns about the role of financial leverage of many countries, in both developed and developing markets. On the one hand, lending programs and packages might support the business sectors. On the other hand, it might create more risks for the business and economy.

METHODOLOGY

In order to calculate systemic risk results and leverage impacts, in this study, we use the live data during the crisis period 2007-2011 from the stock exchange market in Viet Nam (HOSE and HNX and UPCOM).

In this research, analytical research method is used, philosophical method is used and specially, leverage scenario analysis method is used. Analytical data is from the situation of listed electric power firms in VN stock exchange and current tax rate is 25%.

Finally, we use the results to suggest policy for both these enterprises, relevant organizations and government.

GENERAL DATA ANALYSIS

The research sample has total 20 listed firms in the electric power market with the live data from the stock exchange.

Firstly, we estimate equity beta values of these firms and use financial leverage to estimate asset beta values of them. Secondly, we change the leverage from what reported in F.S 2011 to increasing 30% and reducing 20% to see the sensitivity of beta values. We found out that in 3 cases, asset beta mean values are estimated at 0,305, 0,243 and 0,354 which are negatively correlated with the leverage. Also in 3 scenarios, we find out equity beta mean values (0,489, 0,449 and 0,514) are also negatively correlated with the leverage. A leverage degree change definitely has certain effects on asset and equity beta values.

EMPIRICAL RESEARCH FINDINGS AND DISCUSSION

In the below section, data used are from total 20 listed electric power companies on VN stock exchange (HOSE and HNX mainly). In the scenario 1, current financial leverage degree is kept as in the 2011 financial statements which is used to calculate market risk (beta). Then, two (2) FL scenarios are changed up to 30% and down to 20%, compared to the current FL degree.

Market risk (beta) under the impact of tax rate, includes: 1) equity beta; and 2) asset beta.

Scenario 1: Current Financial Leverage (FL) as in financial reports 2011

In this case, all beta values of 20 listed firms on VN electric power market as following:

Table 1: Market Risk of Listed Companies on VN Electric Power Market

Sl. No.	Company Stock Code	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Note	Financial Leverage
1	BTP	0,720	0,306		46,0%
2	CHP	0,349	0,144	BTP as comparable	46,9%
3	DNC	-0,052	-0,016		55,0%
4	DRL	0,458	0,376	NLC as comparable	14,3%
5	DTV	0,511	0,483	NLC as comparable	4,3%
6	GHC	0,496	0,162	NBP as comparable	53,9%
7	HJS	0,407	0,117		57,1%
8	KHP	0,967	0,484		40,0%
9	NBP	1,262	0,835		27,1%
10	ND2	0,165	0,039	TBC as comparable	61,0%
11	NLC	0,532	0,494		5,8%
12	NT2	-0,138	-0,029		62,9%
13	PPC	0,792	0,227		57,1%
14	RHC	0,270	0,149		35,7%
15	SBA	0,146	0,052	SJD as comparable	51,8%
16	SEB	0,331	0,151		43,6%
17	SHP	0,415	0,210	BTP as comparable	39,5%
18	SJD	0,348	0,183		37,9%
19	TBC	0,563	0,522		5,8%
20	TIC	1,247	1,220		1,8%
				Average	37,37%

Scenario 2: Financial Leverage Increases up to 30%

If leverage increases up to 30%, all beta values of total 20 listed firms on VN non-banking investment and financial service market as below:

Table 2: Market Risks of Listed Electric Power Firms (Case 2)

Sl. No.	Company Stock Code	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Note	Financial Leverage (30% up)
1	BTP	0,720	0,182		74,8%
2	CHP	0,211	0,050	BTP as comparable	76,2%
3	DNC	-0,052	-0,006		89,4%
4	DRL	0,434	0,333	NLC as comparable	23,2%
5	DTV	0,504	0,469	NLC as comparable	7,0%
6	GHC	0,201	0,025	NBP as comparable	87,5%
7	HJS	0,407	0,030		92,7%
8	KHP	0,967	0,339		65,0%
9	NBP	1,262	0,707		44,0%
10	ND2	0,007	0,000	TBC as comparable	99,1%
11	NLC	0,532	0,483		9,4%

12	NT2	-0,138	0,003		102,2%

Table 2: Contd.,

13	PPC	0,792	0,057		92,7%
14	RHC	0,270	0,113		58,1%
15	SBA	0,070	0,011	SJD as comparable	84,2%
16	SEB	0,331	0,096		70,9%
17	SHP	0,307	0,110	BTP as comparable	64,2%
18	SJD	0,348	0,134		61,6%
19	TBC	0,563	0,510		9,5%
20	TIC	1,247	1,211		2,9%
				Average	60,73%

Scenario 3: Leverage Decreases Down to 20%

If leverage decreases down to 20%, all beta values of total 20 listed firms on the electric power market in VN as following:

Table 3: Market Risk of Listed Electric Power Firms (Case 3)

Sl. No.	Company Stock Code	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Note	Financial Leverage (20% Down)
1	BTP	0,720	0,389		46,0%
2	CHP	0,433	0,230	BTP as comparable	46,9%
3	DNC	-0,052	-0,023		55,0%
4	DRL	0,473	0,406	NLC as comparable	14,3%
5	DTV	0,515	0,493	NLC as comparable	4,3%
6	GHC	0,673	0,310	NBP as comparable	53,9%
7	HJS	0,407	0,175		57,1%
8	KHP	0,967	0,580		40,0%
9	NBP	1,262	0,920		27,1%
10	ND2	0,259	0,101	TBC as comparable	61,0%
11	NLC	0,532	0,502		5,8%
12	NT2	-0,138	-0,051		62,9%
13	PPC	0,792	0,340		57,1%
14	RHC	0,270	0,173		35,7%
15	SBA	0,193	0,093	SJD as comparable	51,8%
16	SEB	0,331	0,187		43,6%
17	SHP	0,483	0,292	BTP as comparable	39,5%
18	SJD	0,348	0,216		37,9%
19	TBC	0,563	0,530		5,8%
20	TIC	1,247	1,225		1,8%
				Average	37,37%

All three above tables and data show that values of equity and asset beta in the case of increasing leverage up to 30% or decreasing leverage degree down to 20% have certain fluctuation.

COMPARING STATISTICAL RESULTS IN 3 SCENARIOS OF CHANGING LEVERAGE

Table 4: Statistical Results (FL in Case 1)

Statistic Results	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Difference
MAX	1,262	1,220	0,0425
MIN	-0,138	-0,029	-0,1084
MEAN	0,489	0,305	0,1841
VAR	0,1362	0,0936	0,0426
Note: Sample Size: 20			

Table 5: Statistical Results (FL in Case 2)

Statistic Results	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Difference
MAX	1,262	1,211	0,0507
MIN	-0,138	-0,006	-0,1324
MEAN	0,449	0,243	0,2064
VAR	0,1533	0,0957	0,0576
Note: Sample Size: 20			

Table 6: Statistical Results (FL in Case 3)

Statistic Results	Equity Beta	Asset Beta (Assume Debt Beta = 0)	Difference
MAX	1,262	1,225	0,0370
MIN	-0,138	-0,051	-0,0867
MEAN	0,514	0,354	0,1596
VAR	0,1319	0,0936	0,0382
Note: Sample Size: 20			

Based on the above Results, We Find Out

Equity beta mean values in all 3 scenarios are low (< 0,6) and asset beta mean values are also small (< 0,4) although max equity beta values in some cases might be higher than (>) 1. In the case of reported leverage in 2011, equity beta value fluctuates in an acceptable range from 0,281 (min) up to 2,111 (max) and asset beta fluctuates from -0,029 (min) up to 1,22 (max). If leverage increases to 30%, equity beta moves in an unchanged range and asset beta moves from -0,006 (min) up to 1,211 (max). Hence, we note that there is an increase in asset beta min value if leverage increases. When leverage decreases down to 20%, equity beta value still fluctuates in an unchanged range and asset beta changes from -0,051 (min) up to 1,225 (max). So, there is a small decrease in asset beta min value when leverage decreases in scenario 3.

Beside, Exhibit 5 informs us that in the case 30% leverage up, average equity beta value of 20 listed firms decreases down to -0, 04 while average asset beta value of these 20 firms decreases little more up to -0,063. Then, when leverage reduces to 20%, average equity beta value of 20 listed firms goes up to 0,024 and average asset beta value of 20 firms increases more to 0,049.

The below chart 1 shows us : when leverage degree decreases down to 20%, average equity and asset beta values decrease slightly (0,514 and 0,354) compared to those at the initial rate of 25% (0,489 and 0,305). Then, when leverage degree increases up to 30%, average equity beta decreases little more and average asset beta value also decreases more (to 0,243 and 0,449). However, the fluctuation of equity beta value (0,153) in the case of 30% leverage up is higher than (>) the results in the rest 2 leverage cases.

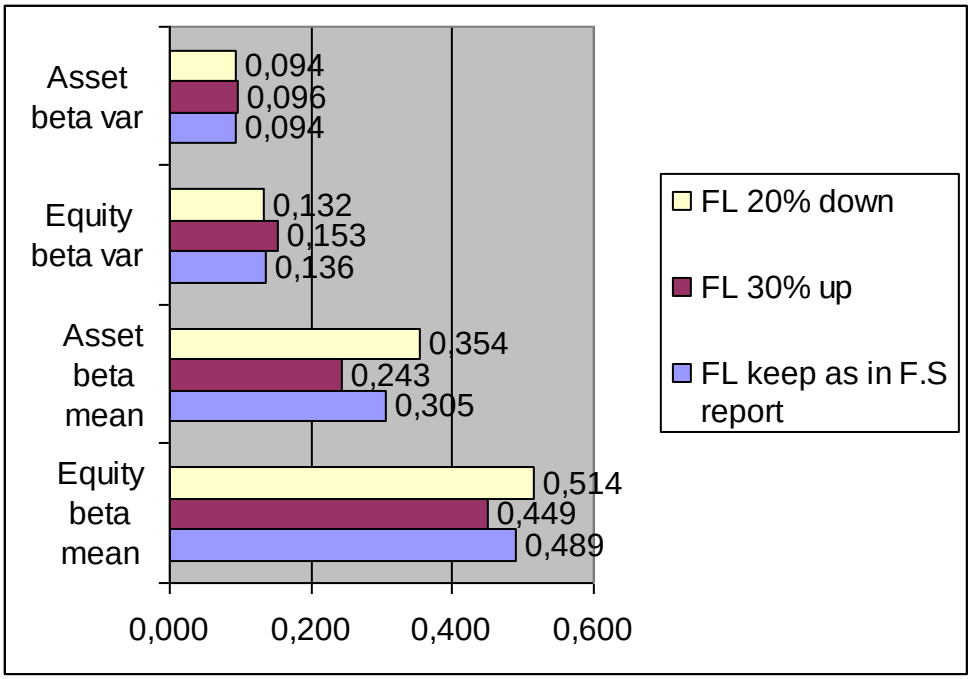

Chart 1: Comparing Statistical Results of Three (3) Scenarios of Changing FL (2007-2009).

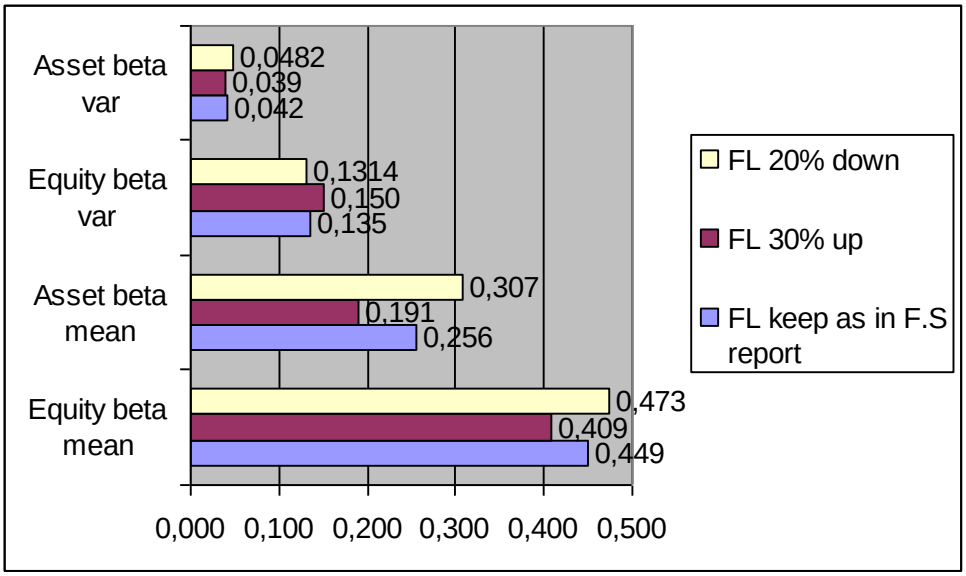

Chart 2: Comparing Statistical Results of Three (3) Scenarios of Changing FL (2007-2011).

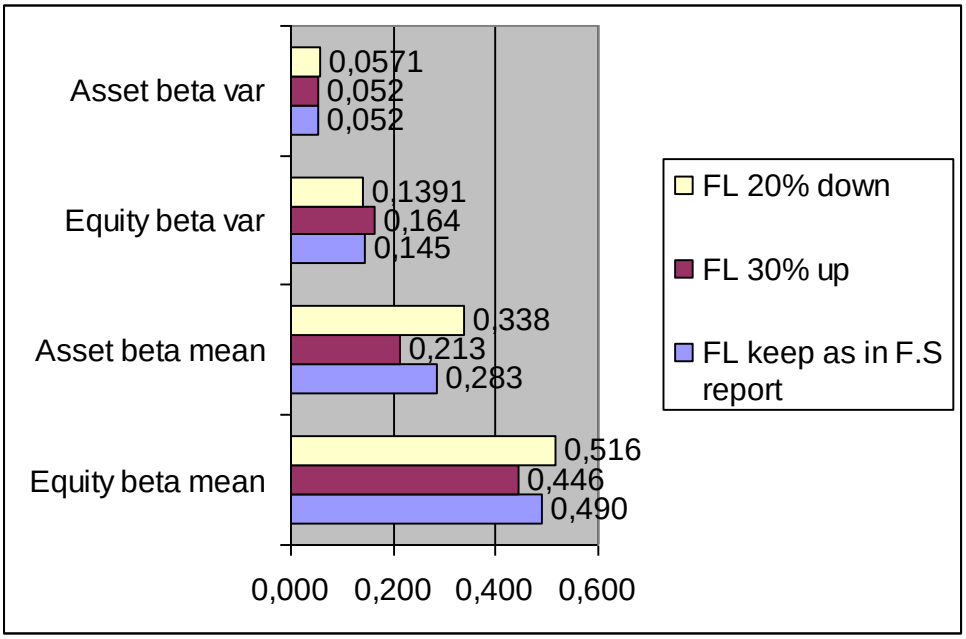

Chart 3: Comparing Statistical Results of Three (3) Scenarios of Changing FL (2009-2011).

RISK ANALYSIS

In short, the using of financial leverage could have both negatively or positively impacts on the financial results or return on equity of a company. The more debt the firm uses the more risk it takes. And FL is a factor that causes financial crises in many economies and firms. Using leverage too much indicates the firm met financial distress.

On the other hand, in the case of increasing leverage, the company will expect to get more returns. The financial leverage becomes worthwhile if the cost of additional financial leverage is lower than the additional earnings before taxes and interests (EBIT). FL has become a positive factor linking finance and growth in many companies. Beside, leverage choice could also become a determinant of firms' capital structure and financial risk.

DISCUSSIONS

Looking at chart 2, it is noted that in case leverage up 30%, during 2007-2009 period, asset and equity beta mean (0,243 and 0,449) of electric power industry are higher than those in the period 2007-2011 (0,213 and 0,446). Looking at exhibit 7, we can see asset beta mean is higher while equity beta mean is lower than those of consumer goods industry (0,222 and 0,630). This relatively shows us that financial leverage does affect asset beta values.

Development of IT and Technology in Electric Power Sector

There are some positive aspects of IT applications:

Software applications have focused on the goal of creating many communication channels with customers, making it easy for customers to participate - easy to use - easy to monitor electricity services. As a result, electricity business activities become more convenient and transparent for people.

However, there are still some limitations relating to IT: IT infrastructure and IT application system are not uniform, some systems have not been upgraded to keep up with actual requirements. At the same time, security issues and availability of most systems are not high. Another difficulty is that when building and deploying data aggregation systems,

because some component systems do not yet ensure connectivity and integration, it must be done through many intermediary transformation steps, leading to information not online. In addition, information systems in the field of control and automation are inadequate, and not yet developed synchronously, there is no product of the industry, and there is no mechanism to concentrate human resources for development though.

CONCLUSION AND POLICY SUGGESTION

Looking at exhibit 3, we could see GDP of Viet Nam during the period 2007-2011 in the range of 5%-6.5% (< 7%). And inflation goes down in 2009 then goes up in later years. And comparing to the results of consumer goods industry in exhibit 4, we find out the risk dispersion of telecom. Industry is higher (shown by asset beta var).

We might note that var of asset beta may increases (looking at the above charts and analysis) so we need risk management solutions then. Besides, companies might consider some innovative solutions going together with risk strategies, and one example shown in the below 12 section.

Implementing Security Solution in the Electric Power Sector

Currently, cyber-attacks are prone to growing quickly, both in terms of quantity as well as the sophisticated in each attack. The safety of the systems of enterprises requiring early detection and warning of abnormal changes, hazards are threatening the system. It is therefore necessary to have several solutions that improve cyber security issues.

A. The Principle of Security System Design

Cyber security must be set up based on the following guidelines:

- Defense in Depth: The system must be protected in-depth, divided into several floors, and separated into different layers. Each floor and class will be implemented with different security or containment policies. On the other hand, it is also a precaution to prevent when a layer or a class is compromised, and it cannot be affected by other floors or classes.
- Using various technologies: do not rely on only one technology or technology product that guarantees the security of a company's network. Because of the company's products are found by hackers to find vulnerabilities, the same products in the network will be easily passed and the stratigraphy, layered in defense policy is meaningful. Therefore, when conducting stratigraphy, separating the layer, it is recommended to use many technological products of various carriers to limit the downside. At the same time using a variety of technology and security solutions combined to strengthen the power of the defense system as a coordinated Firewall as the Direct prevention tool, IDS does the tool "sniffing", proactive defense reactions, Anti-virus to filter viruses... Etc
- Meet standards: The security products must meet several standard certifications such as Common Criteria, ISO/IEC 15408:2005, and ISO/IEC 18405:2005 EAL4, ICSA Firewall and VPN, FIPS-140.

Based on the following criteria and guidelines, there are several groups of solutions needed:

B. Group Solution System for Preventing and Detecting Attacks

Planning and Design Solutions Team

Designing, planning a large network system is not merely developing additional devices supporting users that must be based on the standard model has been applied to advanced network systems in the world, development enterprises, which is the model of Network oriented service architecture (Service-Oriented architecture – SOA).

- Designing infrastructure according to the SOA model
- Classification Design Method – Hierarchical
- Service deployment models and user management
- Partitioning VLAN (virtual LAN)

C. System Solutions for Preventing and Detecting Attacks

Multi-Story Firewall System

To solve these problems, we offer a split-network solution into multiple virtual LAN networks. VLAN is defined as a logical group of network devices and is set up based on the functional elements, parts, and applications of the Organization. Dividing VLAN into different systems helps to achieve the highest results, security, management, and performance.1 Multi-storey firewall system

The firewall system is an access control system between the Internet and the local network. The firewall has 2 types: hardware and software. Each category has different advantages. The hardware has a stable performance, does not depend on the operating system, virus, malicious code, blocking good protocols at the network layer in the TCP/IP Reference Model. The software is very versatile in those configurations at the application layer protocol in the TCP/IP model.

Blockchain System

It is necessary to adopt legal provisions to the specific conditions of IoT communication. In the case of blockchain technology, often occurring problems are so-called smart contracts.

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EXHIBIT

Exhibit 1: Interest Rates in Banking Industry During Crisis

Year	Borrowing Interest Rates	Deposit Rates	Note
2011	18%-22%	13%-14%	
2010	19%-20%	13%-14%	Approximately (2007: required reserves ratio at SBV is changed from 5% to 10%) (2009: special supporting interest rate is 4%)
2009	9%-12%	9%-10%	
2008	19%-21%	15%-16,5%	
2007	12%-15%	9%-11%	

(Source: Viet Nam Commercial Banks)

Exhibit 2: Basic Interest Rate Changes in Viet Nam

Year	Basic Rate	Note
2011	9%	
2010	8%	
2009	7%	
2008	8,75%-14%	Approximately, Fluctuated
2007	8,25%	
2006	8,25%	
2005	7,8%	
2004	7,5%	
2003	7,5%	
2002	7,44%	
2001	7,2%-8,7%	Approximately, Fluctuated
2000	9%	

(Source: State Bank of Viet Nam and Viet Nam economy)

Exhibit 3: Inflation, GDP Growth and Macroeconomics Factors

Year	Inflation	GDP	USD/VND Rate
2011	18%	5,89%	20.670
2010	11,75% (Estimated at Dec 2010)	6,5% (expected)	19.495
2009	6,88%	5,2%	17.000
2008	22%	6,23%	17.700
2007	12,63%	8,44%	16.132
2006	6,6%	8,17%	
2005	8,4%		
Note	Approximately		

(Source: Viet Nam Commercial Banks and Economic Statistical Bureau)

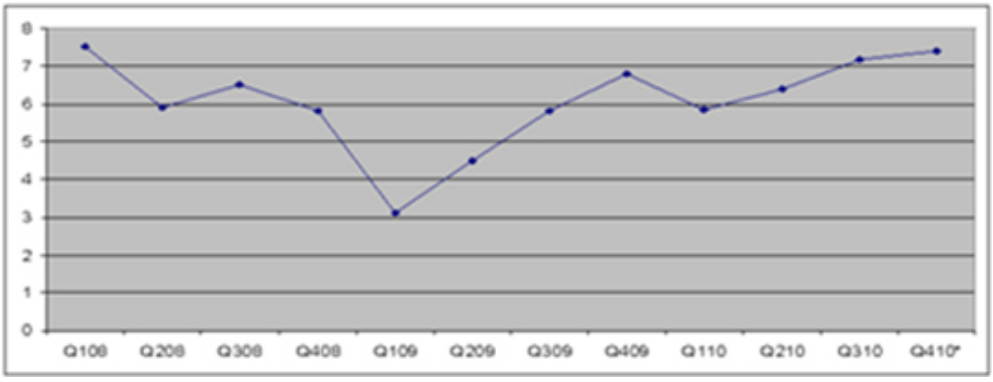

Exhibit 4: GDP Growth Việt Nam 2006-2010 (Source: Bureau Statistic).

Exhibit 5: Increase/Decrease Risk Level of Listed Electric Power Firms Under Changing Scenarios of Leverage: In 2011 F.S Reports, 30% Up, 20% Down in the Period 2007 - 2009

Order No.	Company Stock Code	FL keep as in F.S Report		FL 30% Up		FL 20% Down	
		Equity Beta	Asset Beta	Increase /Decrease (Equity Beta)	Increase /Decrease (Asset Beta)	Increase /Decrease (Equity Beta)	Increase /Decrease (Asset Beta)
1	BTP	0,720	0,306	0,000	-0,124	0,000	0,083
2	CHP	0,349	0,144	-0,138	-0,094	0,084	0,086
3	DNC	-0,052	-0,016	0,000	0,011	0,000	-0,007
4	DRL	0,458	0,376	-0,024	-0,043	0,016	0,030
5	DTV	0,511	0,483	-0,007	-0,014	0,004	0,010
6	GHC	0,496	0,162	-0,294	-0,137	0,177	0,148
7	HJS	0,407	0,117	0,000	-0,087	0,000	0,058
8	KHP	0,967	0,484	0,000	-0,145	0,000	0,097
9	NBP	1,262	0,835	0,000	-0,128	0,000	0,085
10	ND2	0,165	0,039	-0,159	-0,039	0,094	0,062
11	NLC	0,532	0,494	0,000	-0,012	0,000	0,008
12	NT2	-0,138	-0,029	0,000	0,033	0,000	-0,022
13	PPC	0,792	0,227	0,000	-0,170	0,000	0,113
14	RHC	0,270	0,149	0,000	-0,036	0,000	0,024
15	SBA	0,146	0,052	-0,077	-0,041	0,046	0,041
16	SEB	0,331	0,151	0,000	-0,054	0,000	0,036
17	SHP	0,415	0,210	-0,109	-0,100	0,068	0,082
18	SJD	0,348	0,183	0,000	-0,049	0,000	0,033
19	TBC	0,563	0,522	0,000	-0,012	0,000	0,008
20	TIC	1,247	1,220	0,000	-0,008	0,000	0,005
			Average	-0,040	-0,063	0,024	0,049

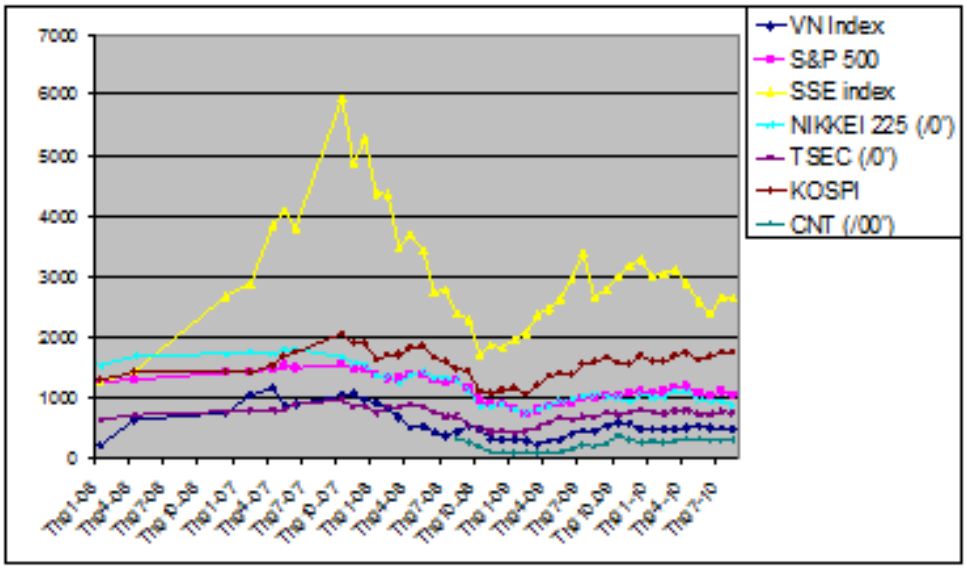

Exhibit 6: VNI Index and Other Stock Market Index During Crisis 2006-2010.

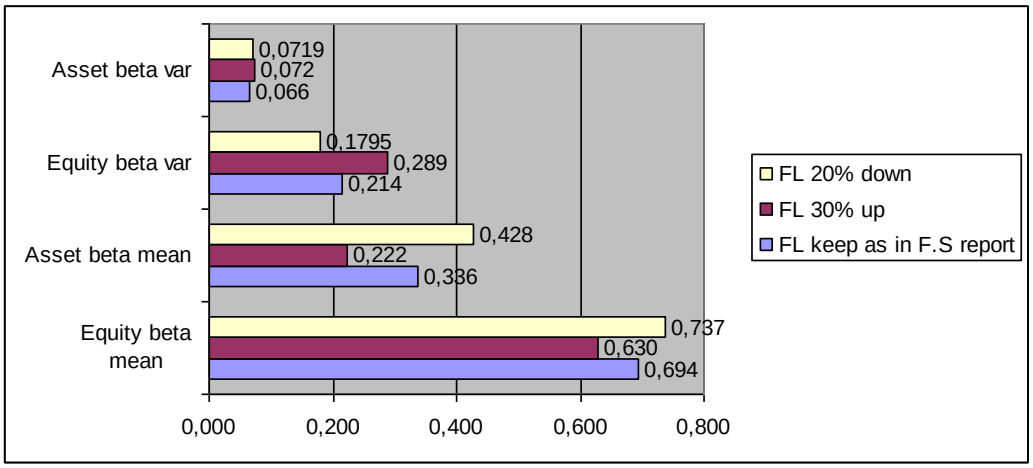

Exhibit 7: Comparing Statistical Results of Three (3) Scenarios of Changing FL of 121 Listed Firms in the Consumer Good Industry.

Author Note: My sincere thanks are for the editorial office and Lecturers/Doctors at Banking University and International University of Japan. Through the qualitative analysis, please kindly email me if any error found.