The Risk Level of Viet Nam Electric Power Industry Under Financial Leverage During and After the Global Crisis 2009-2011

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Abstract
This paperwork evaluates the impacts of external financing on market risk for the listed firms in the Viet nam electric power industry, esp. during and after the financial crisis 2009-2011.
First of all, by using quantitative and analytical methods to estimate asset and equity beta of total 6 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 when leverage increases to 30% but increases more if leverage decreases down to 20%.
Third, by changing leverage in 3 scenarios, we recognized the dispersion of risk level, measured by equity beta var, increases from 0,145 to 0,164 if the leverage increases to 30% whereas decreases to 0,139 if leverage decreases to 20%. But the dispersion measured by asste beta var decreases to 0,057 (leverage down 20%), showing leverage impact.
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

I. Introduction

Financial leverage has certain effects on the risk level of listed companies on stock exchange. Flifel (2012) stated today, the assumption of efficient capital markets is very controversial, especially in these times of crisis, and is challenged by research showing that the pricing was distorted by detection of long memory. Gabrijelcic et all (2013) find a significant negative effect of leverage on firm performance. And firms that had some foreign debt financing performed better than their counterparts.
Measuring beta is a popular method used in many models such as the famous CAPM model. The Viet Nam electric power industry is selected for the research because until now there is no research published with the same scope and because Viet Nam electric power industry is considered as one of active economic sectors in local financial markets, which has some positive effects for the economy. The purpose of this study, therefore, to find out how much market risk for this industry in changing contexts of financial leverage.
We mention some issues on the estimating of impacts of external financing on beta for listed electric power industry companies in Viet Nam stock exchange as following:

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

Beside, 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.

This paper is organized as follow. The research issues and literature review and methodology will be covered in next sessions 2 and 3, for a short summary. Next session presents empirical results and findings. The last session shows discussion and will conclude with some policy suggestions. This paper also supports readers with references, exhibits and relevant web sources.

II. Theoretical Background

A. Conceptual Theories

The impact of Financial Leverage on the Economy

Financial development and economic growth are positively interrelated. The interaction between these two (2) fields can be considered as a circle, in which good financial development causes economic growth and vice versa. A sound and effective financial system has positive effect on the development and growth of the economy. Financial institutions and markets can enable corporations to solve liquidity needs and enhance long-term investments. This system include many channels for a firm who wants to use financial leverage or FL, which refers to debt or to the borrowing of funds to finance a company's assets.
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.

B. Methodology

For calculating systemic risk results and leverage impacts, in this study, we use the live data during the crisis period 2009-2011 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 industry firms in VN stock exchange and curent tax rate is 25%.

Generally speaking, quantitative method is mainly used in this study whith a note that risk measure asset beta is mainly derive from equity beta and financial leverage.
Finally, we use the results to suggest policy for both these enterprises, relevant organizations and government.

C. Previous Studies

Fama, Eugene F., and French, Kenneth R., (2004) also indicated in the three factor model that "value" and "size" are significant components which can affect stock returns. They also mentioned that a stock's return not only depends on a market beta, but also on market capitalization beta. The market beta is used in the three factor model, developed by Fama and French, which is the successor to the CAPM model by Sharpe, Treynor and Lintner.
Dimitrov (2006) documented a significantly negative association between changes in financial leverage and contemporaneous risk-adjusted stock returns. Aydemir et all (2006) identified in an economy with more realistic variation in interest rates and the price of risk, there is significant variation in stock return volatility at the market and firm level. In such an economy, financial leverage has little effect on the dynamics of stock return volatility at the market level. Financial leverage contributes more to the dynamics of stock return volatility for a small firm. Then, Maia (2010) stated the main determinants of firms' capital structures are related to firms' sensitivities to these systematic sources of risk and they affect asymmetrically low and high leverage firms. And temporary shocks are relatively more important for low leverage firms, and that financial distress risk seems to be captured by the sensitivity of firms' cash flow innovations to market discount rate news.
Umar (2011) found that firms which maintain good governance structures have leverage ratios that are higher (forty-seven percent) than those of firms with poor governance mechanisms per unit of profit. Chen et all (2013) supported regulators' suspicions that over-reliance on short-term funding and insufficient collateral compounded the effects of dangerously high leverage and resulted in undercapitalization and excessive risk exposure for Lehman Brothers. The model reinforces the importance of the relationship between capital structure and risk management. Then, Alcock et all (2013) found evidence that leverage cannot be viewed as a long-term strategy to enhance performance, but in the short term, managers do seem to add significantly to fund excess returns by effectively timing leverage choices to the expected future market environment. And Gunaratha (2013) revealed that in different industries in Sri Lanka, the degree of financial leverage has a significant positive correlation with financial risk.
Finally, financial leverage can be considered as one among many factors that affect business risk of electric power firms.

III. Empirical Analysis

A. General Data Analysis

The research sample has total 20 listed firms in the electric power industry 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 0,283, 0,213 and 0,338 which are sensitive and negatively correlated with the leverage. Also in 3 scenarios, we find out equity beta mean values (0,490, 0,446 and 0,516) are negatively correlated with the leverage. Leverage degree changes definitely has certain effects on asset and equity beta values.

B. Empirical Research Findings and Discussion

In the below section, data used are from total 6 listed electric power industry 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.

B.1 Scenario 1: current financial leverage (FL) as in financial reports 2011

In this case, all beta values of 6 listed firms on VN electric power industry market as following:

Table 1: Market risk of listed companies on VN electric power industry market

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (F.S reports)
1	BTP	0,840	0,357		57,5%
2	CHP	0,407	0,168	BTP as comparable	58,7%
3	DNC	-0,865	-0,270		68,8%
4	DRL	0,542	0,445	NLC as comparable	17,9%
5	DTV	0,605	0,572	NLC as comparable	5,4%
6	GHC	0,359	0,117	NBP as comparable	67,3%
7	HJS	0,983	0,282		71,3%
8	KHP	0,615	0,308		50,0%
9	NBP	0,914	0,604		33,9%
10	ND2	0,230	0,055	TBC as comparable	76,2%
11	NLC	0,631	0,585		7,2%
12	NT2	0,639	0,137		78,6%
13	PPC	0,651	0,186		71,3%
14	RHC	0,444	0,245		44,7%
15	SBA	0,223	0,079	SJD as comparable	64,8%
16	SEB	0,427	0,194		54,5%
17	SHP	0,485	0,245	BTP as comparable	49,4%
18	SJD	0,531	0,279		47,4%
19	TBC	0,784	0,726		7,3%
20	TIC	0,351	0,343		2,2%
				Average	46,72%

(source: Viet Nam stock exchange 2012)

B.2. Scenario 2: financial leverage increases up to 30%

If leverage increases up to 30%, all beta values of total 6 listed firms on VN electric power industry market as below:

Table 2 – Market risks of listed electric power industry firms (case 2)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (30% up)
1	BTP	0,840	0,212		74,8%
2	CHP	0,246	0,059	BTP as comparable	76,2%
3	DNC	-0,865	-0,092		89,4%
4	DRL	0,514	0,395	NLC as comparable	23,2%
5	DTV	0,597	0,555	NLC as comparable	7,0%
6	GHC	0,146	0,018	NBP as comparable	87,5%
7	HJS	0,983	0,071		92,7%
8	KHP	0,615	0,215		65,0%
9	NBP	0,914	0,511		44,0%
10	ND2	0,009	0,000	TBC as comparable	99,1%
11	NLC	0,631	0,572		9,4%
12	NT2	0,639	-0,014		102,2%
13	PPC	0,651	0,047		92,7%
14	RHC	0,444	0,186		58,1%
15	SBA	0,106	0,017	SJD as comparable	84,2%
16	SEB	0,427	0,124		70,9%
17	SHP	0,358	0,128	BTP as comparable	64,2%
18	SJD	0,531	0,204		61,6%
19	TBC	0,784	0,709		9,5%
20	TIC	0,351	0,341		2,9%
				Average	60,73%

(source: Viet Nam stock exchange 2012)

B.3. 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 industry market in VN as following:

Table 3: Market risk of listed electric power industry firms (case 3)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (20% down)
1	BTP	0,840	0,453		46,0%
2	CHP	0,505	0,268	BTP as comparable	46,9%
3	DNC	-0,865	-0,389		55,0%
4	DRL	0,561	0,480	NLC as comparable	14,3%
5	DTV	0,610	0,584	NLC as comparable	4,3%
6	GHC	0,487	0,225	NBP as comparable	53,9%
7	HJS	0,983	0,422		57,1%
8	KHP	0,615	0,369		40,0%
9	NBP	0,914	0,666		27,1%
10	ND2	0,361	0,141	TBC as comparable	61,0%
11	NLC	0,631	0,594		5,8%
12	NT2	0,639	0,237		62,9%
13	PPC	0,651	0,279		57,1%
14	RHC	0,444	0,285		35,7%
15	SBA	0,294	0,142	SJD as comparable	51,8%
16	SEB	0,427	0,241		43,6%
17	SHP	0,563	0,341	BTP as comparable	39,5%
18	SJD	0,531	0,330		37,9%
19	TBC	0,784	0,738		5,8%
20	TIC	0,351	0,345		1,8%
				Average	37,37%

(source: Viet Nam stock exchange 2012)

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.

C. 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	0,983	0,726	0,2566
MIN	-0,865	-0,270	-0,5946
MEAN	0,490	0,283	0,2067
VAR	0,1450	0,0523	0,0928
Note: Sample size : 20			

(source: Viet Nam stock exchange 2012)

Table 5: Statistical results (FL in case 2)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	0,983	0,709	0,2737
MIN	-0,865	-0,092	-0,7730
MEAN	0,446	0,213	0,2330
VAR	0,1644	0,0518	0,1126
Note: Sample size : 20			

(source: Viet Nam stock exchange 2012)

Table 6: Statistical results (FL in case 3)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	0,983	0,738	0,2451
MIN	-0,865	-0,389	-0,4757
MEAN	0,516	0,338	0,1787
VAR	0,1391	0,0571	0,0820
Note: Sample size : 20			

(source: Viet Nam stock exchange 2012)

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). In the case of reported leverage in 2011, equity beta value fluctuates in an acceptable range from -0,865 (min) up to 0,983 (max) and asset beta fluctuates from -0,27 (min) up to 0,726 (max). If leverage increases to 30%, equity beta moves in an unchanged range and asset beta moves from -0,092 (min) up to 0,709 (max). Hence, we note that there is a decrease in asset beta min value if leverage increases. When leverage decreases down to 20%, equity beta value moves in an unchanged range and asset beta changes from -0,389 (min) up to 0,738 (max). So, there is an increase in asset beta min when leverage decreases in scenario 3.
Beside, Exhibit 4 informs us that in the case 30% leverage up, average equity beta value of 20 listed firms decreases down to -0,044 while average asset beta value of these 20 firms decreases little more to -0,07. Then, when leverage reduces to 20%, average equity beta value of 20 listed firms goes up little to 0,026 and average asset beta value of 20 firms up to 0,055.

The below chart 1 shows us : when leverage degree decreases down to 20%, average equity and asset beta values increase to 0,516 and 0,338 compared to those at the initial reported leverage (0,490 and 0,283). Then, when leverage degree increases up to 30%, average equity beta decreases little less and average asset beta value also decreases less (to 0,446 and 0,213). However, the fluctuation of equity beta value (0,164) in the case of 30% leverage up is higher than (>) the results in the rest 2 leverage cases. And we could note that the decrease of leverage in the case of 20% leverage down causes an increase in asset beta var up to 0,057 (compared to 0,048).

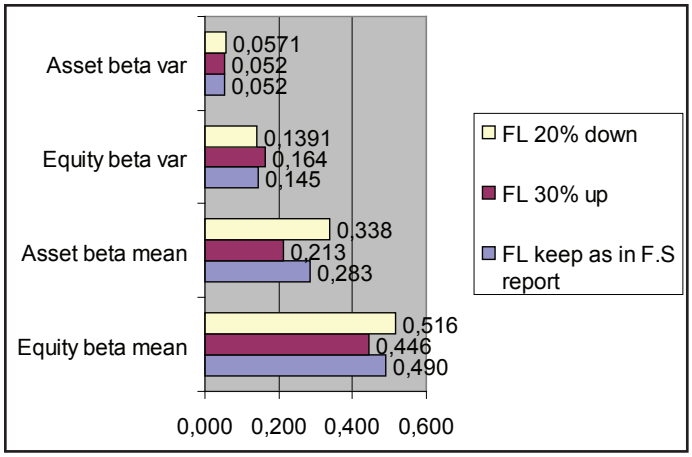
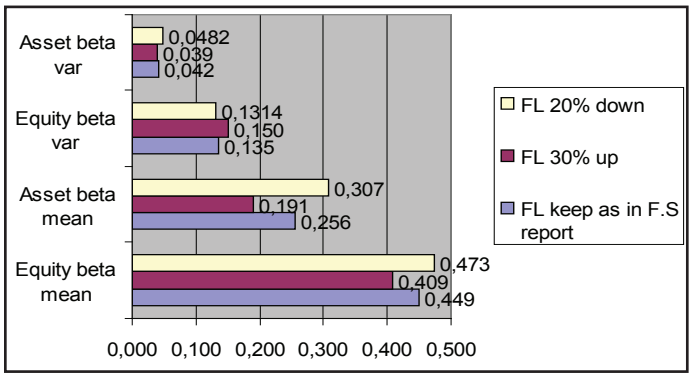


Fig. 1: Comparing Statistical Results of three (3) Scenarios of Changing FL (period 2009-2011)



(source: Viet Nam stock exchange 2012)
Fig. 2: Comparing statistical results of three (3) scenarios of changing FL (period 2007-2011)

D. Empirical results

In scenario 1 (current FL), asset and equity beta mean reach the medium values (0,283 and 0,490) whereas asset beta var also reaches minimum (0,052), compared to the rest 2 cases.
In scenario 2 (FL 30%), asset and equity beta mean reach minimum values (0,213 and 0,446) whereas equity beta var reaches maximum (0,164), compared to the rest 2 cases.
And finally, in scenario 3 (FL down 20%), asset and equity beta mean reach maximum values while asset beta var reaches maximum value (0,057), compared to the rest 2 cases.

E. 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. Beside, the increasing interest on loans might drive the earning per share (EPS) lower.
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). Considering risk vs. return, FL becomes a decisional variable for managers. And the maximum risk that a firm accepts will ask for the maximum financial leverage.

F. Discussion

Looking at figure 2, it is noted that in case leverage up 30%, during 2009-2011 period, asset and equity beta mean (0,213 and 0,446) of electric power industry are higher than those in the period 2007-2011 (0,191 and 0,409). Looking at exhibit 6, we can see asset beta mean is higher while equity beta mean is lower than those of consumer good industry (0,336 and 0,694). This relatively shows us that financial leverage does affect asset beta values.

IV. Conclusion

In general, the government has to consider the impacts on the mobility of capital in the markets when it changes the macro policies. Beside, it continues to increase the effectiveness of building the legal system and regulation supporting the plan of developing electric power market. The Ministry of Finance continues to increase the effectiveness of fiscal policies and tax policies which are needed to combine with other macro policies at the same time. The State Bank of Viet Nam continues to increase the effectiveness of capital providing channels for electric power companies as we could note that in this study when leverage is going to increase up to 30%, the risk level decreases as well as the asset beta var, compared to the case it is going to decrease down to 20%. And for the corporations, figure 2 tells us that increasing leverage can reduce risk both in the period 2009-2011 and in the 2007-2011 period.

Furthermore, the entire efforts among many different government bodies need to be coordinated.

Finally, this paper suggests implications for further research and policy suggestion for the Viet Nam government and relevant organizations, economists and investors from current market conditions.

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Appendix 1. Interest rates in banking industry during crisis
(source: Viet Nam commercial banks)

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%	

Appendix 2. Basic interest rate changes in Viet Nam
(source: State Bank of Viet Nam and Viet Nam economy)

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%	

Appendix 3. Inflation, GDP growth and macroeconomics factors
(source: Viet Nam commercial banks and economic statistical bureau)

Year	Inflation	GDP	USD/VND rate
2011	18%	5,89%	20.670
2010	11,75% (Estimated at Dec 2010)	6,5% (expected)	19.495

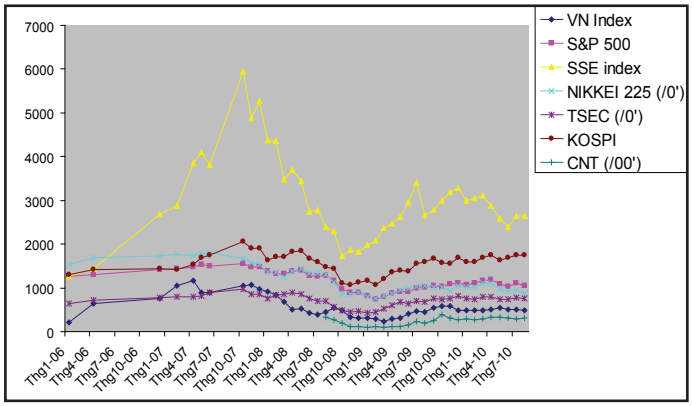
2009	6,88%	5,2%	17.000
2008	22%	6,23%	17.700
2007	12,63%	8,44%	16.132
2006	6,6%	8,17%	
2005	8,4%		
Note	approximately		

Appendix 4. Increase/decrease risk level of listed electric power industry firms under changing scenarios of leverage : in 2011 F.S reports, 30% up, 20% down in the period 2009 - 2011

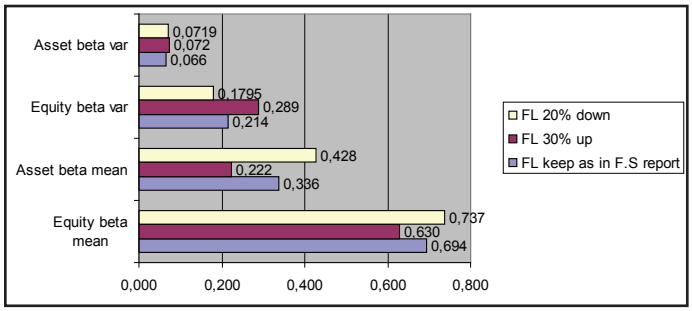
Order No.	Company stock code	FL keep as in F.S report		FL 30% up		FL 20% down	
		Equity beta	Asset beta	Increase/ Decrease (equity beta)	Increase / Decrease (asset beta)	Increase / Decrease (equity beta)	Increase / Decrease (asset beta)
1	BTP	0,840	0,357	0,000	-0,145	0,000	0,097
2	CHP	0,407	0,168	-0,160	-0,110	0,098	0,100
3	DNC	-0,865	-0,270	0,000	0,178	0,000	-0,119
4	DRL	0,542	0,445	-0,028	-0,051	0,018	0,035
5	DTV	0,605	0,572	-0,008	-0,017	0,005	0,012
6	GHC	0,359	0,117	-0,213	-0,099	0,128	0,107
7	HJS	0,983	0,282	0,000	-0,210	0,000	0,140
8	KHP	0,615	0,308	0,000	-0,092	0,000	0,062
9	NBP	0,914	0,604	0,000	-0,093	0,000	0,062
10	ND2	0,230	0,055	-0,221	-0,055	0,131	0,086
11	NLC	0,631	0,585	0,000	-0,014	0,000	0,009
12	NT2	0,639	0,137	0,000	-0,151	0,000	0,100
13	PPC	0,651	0,186	0,000	-0,139	0,000	0,093
14	RHC	0,444	0,245	0,000	-0,059	0,000	0,040
15	SBA	0,223	0,079	-0,117	-0,062	0,071	0,063
16	SEB	0,427	0,194	0,000	-0,070	0,000	0,047
17	SHP	0,485	0,245	-0,127	-0,117	0,079	0,096
18	SJD	0,531	0,279	0,000	-0,075	0,000	0,050
19	TBC	0,784	0,726	0,000	-0,017	0,000	0,011
20	TIC	0,351	0,343	0,000	-0,002	0,000	0,002
			Average	-0,044	-0,070	0,026	0,055

(source: Viet Nam stock exchange 2012)

Appendix 5. VNI Index and other stock market index during crisis 2006-10



Appendix 6. Comparing statistical results of three (3) scenarios of changing FL of 121 listed firms in the consumer good industry



(source: Viet Nam stock exchange 2012)

"***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."*