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First of all, using quantitative and analytical methods to estimate asset and equity beta values of three (3) groups of sub-medical listed companies in Viet Nam Medicine, Medical equipment and Human resource industries with a suitable traditional model, we found out that the beta values, in general, for most companies are acceptable, excluding a few cases. There are 57% and 71% of listed firms with lower risk, among total 14 firms, whose beta values lower than (<) 1, which is measured by equity and asset beta, accordingly.

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GJMBR-C Classification : *JEL Code: G010, G100, G390*



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Second, through comparison of beta values among three (3) above industries, we recognized there are still 21% and 7% of total listed firms in the above group companies with beta values higher than (>) 1 and have stock returns fluctuating more than the market index, indicated by equity and asset beta, accordingly.

Ultimately, this paper generates some outcomes that could provides both internal and external investors, financial institutions, companies and government more evidence in establishing their policies in investments and in governance.

Keywords : equity beta, financial structure, financial crisis, risk, asset beta, medical industry.

I. Introduction

After the previous published article on estimated beta for listed construction company groups, here we will compare the estimated beta results of listed Viet Nam medical equipment companies to those in its supply chain activities such as medicine and human resource companies to make a comparative analysis and risk evaluation after financial crisis impacts.

Although risk estimation can be done by using various research methods. Here, we perform a market risk analysis based on asset and equity beta of total 14 listed companies in the category of medical equipment, medicine and human resource firms. This paper emphasizes on analyzing un-diversifiable risk in the above industry in one of emerging markets: Vietnam stock market during the financial crisis 2007-2011. No research, so far, has been done on the same topic.

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. Next, 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. Then, session 8 gives analysis of risk. Lastly, session 9 will conclude with some policy suggestions. This paper also provides readers with references, exhibits and relevant web sources.

II. Research Issues

We mention a couple of issues on the estimating of beta for listed medical equipment, medicine and human resource companies in Viet Nam stock exchange as following:

Hypothesis/Issue 1: Among the three (3) companies groups, under the financial crisis impact and high inflation, the beta or risk level of listed companies in human resource industries will relatively higher than those in the rest two (2) industries.

Hypothesis/Issue 2: Because Viet Nam is an emerging and immature financial market and the stock market still in the recovering stage, there will be a large disperse distribution in beta values estimated in the medical equipment, medicine and human resource industries.

Hypothesis/Issue 3: With the above reasons, the mean of equity and asset beta values of these listed medical equipment companies tend to impose a high risk level, i.e., beta should higher than (>) 1.

III. Literature Review

Fame, Eugene F., and French, Kenneth R., (2004) 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 Fame and French, which is the successor to the CAPM model by Sharpe, Trey nor

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and Linter. As Luis E. Pierre (2010) pointed, the task of estimating cost of equity in emerging markets is more difficult because of problems such as collecting data in short periods. Mo Chaudhury (2011) found out over 2007/08 crisis period, unconditional daily returns fell to negative level, unconditional volatility surged more than 200 percent, correlation between stocks weakened and the risk reduction benefit of portfolio diversification rose. Marcin, Mariusz, Marek, and Karol (2012) mentioned that the reliability and fitness of calculated betas are relevant to the valuation and investment of investors in emerging markets. And Xiaowei Kang (2012) found that combining weighted or alternative beta strategies can gain significant traction in investment community and reduce risk. Next, Wolfgang, Lukas and Ranko (2013) discovered during the financial crisis, the relation between stock returns and implied volatility exhibits differences consistent with European institutional and cultural clusters; for example, German stock market tends to be more responsive to changes in implied volatility compared to UK stock market.

IV. Conceptual Theories

a) Determinants of Equity and Asset Beta

There are several kinds of business risks including systematic and unsystematic risk. In financial markets, systematic risk relates to the overall risk of the whole market, is affected by some factors such as: the volatility of expected return of a single stock, interest rate fluctuations or economic crisis, cannot be avoided by diversification, and is measured by a financial metric, beta which is also called systemic risk. Market risk, indicated by beta β, can be known by the decreasing value of an investment because of movement of market factors.

Market risk coming from market factors can be contrasted with internal risk coming from internal factors of a company.

Firms with beta > 1 will have the movement of stock price higher than the market benchmark. Companies whose beta values < 1 have the risk lower than the entire market risk. For example, if beta of a company is 1, 25, it means that the volatility of stock price is 25% more than that of the entire market.

V. Methodology

During the period 2007-2011, the time highlighting impacts from financial crisis, we use the data from the stock exchange market in Viet Nam (HOSE and HNX and UPCOM) to estimate systemic risk results.

First of all, we use the market stock price of total 14 listed companies in the medical equipment, medicine and human resource industries in Viet Nam stock exchange market to calculate the variability in monthly stock price in the same period; second, we estimate the equity beta for these three (3) listed groups of companies and make a comparison. Third, from the equity beta values of these listed companies, we perform a comparative analysis between equity and asset beta values of these 3 companies groups in Viet Nam. Finally, we use the results to suggest policy for both these enterprises, financial services institutions and relevant organizations.

The below table gives us the number of medical equipment, medicine and human resource firms used in the research of estimating beta:

Market	Listed Medical equipment companies (1)	Listed Medicine companies (2)	Listed Human Resource companies (3)	Note (4)
Viet Nam	0	4	2	Estimating by traditional method
	2	4	2	Estimating by comparative method
Total	**2**	**8**	**4**	**Total firms in groups: 14**

(Note: The above data is at the December 12th, 2012, from Viet Nam stock exchange).

VI. General Data Analysis

This is a study sample of 14 firms in 3 categories of industries: medical equipment, medicine and human resource companies groups, and here are the results: the mean of equity beta is valued at 0,538 while that of asset beta is about 0,320. These data are quite acceptable values during the crisis. Additionally, the sample variance of asset beta is low (0, 1449) which is a good number, while that of equity beta is somewhat higher (0,570) showing the gap of 0,425. This shows us that the effectiveness of using financial leverage has decreased the systemic risk for the entire group.

However, the max and min values of beta are still somewhat large. Max equity beta value is up to 2,091 that are a little bit high, compared to max asset beta value is just 1,075 that is acceptable. Looking at

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the table 2 (below), we can see there is 21%, or 3 listed firms still have beta values larger than (>) 1, whereas there is 57% or 8 firms whose beta values lower than (<) 1 and higher than (>) 0.

Value of equity beta varies in a range from 2,091 (max) to -0,946 (min) and that of asset beta varies in a range from 1,075 (max) to -0,163 (min). Some companies still has larger risk exposure than most of the others. There are 3 listed companies whose both equity and asset betas are lower than (<) 0, which means the stock return moves in a opposite direction to the market benchmark.

Next, Asset beta max value is 1,075 and min value is -0,163 which show us that if beta of debt is assumed to be zero (0), the company's financial leverage contributes to a decrease in the market risk level.

Lastly, we can see the relatively high difference between max equity and max asset beta values, which is about 1, 0153, whereas there is a smaller difference between equity and asset beta variance values which is just 0,425; so, there is certain impact on systemic risk of certain firms in term of using leverage while it indicates for most of firms that financial leverage can enable them to reduce market risk. And there is not quite big effect from financial leverage on the gap between company's beta variance values.

Table 1 : Estimating beta results for Three (3) Viet Nam Listed Medical equipment, Medicine and Human resource Companies Groups (as of Dec 2012)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	2,091	1,075	1,0153
MIN	-0,946	-0,163	-0,7831
MEAN	0,538	0,320	0,2177
VAR	0,5700	0,1449	0,4250
Note: Sample size : 14			

(Source : Viet Nam stock exchange data).

Table 2 : The number of companies in research sample with different beta values and financial leverage

Equity Beta	No. of firms	Financial leverage (average)	Ratio
<0	3	76,09%	21%
0<beta<1	8	55,07%	57%
Beta > 1	3	36,44%	21%
total	14	47,1%	100%

Asset Beta	No. of firms	Financial leverage (average)	Ratio
<0	3	76,09%	21%
0<beta<1	10	54,02%	71%
Beta > 1	1	9,72%	7%
total	14	43,0%	100%

VII. Empirical Research Findings and Discussion

a) Medical Equipment Listed Companies Group

During the crisis 2007-2011, the market for these companies still exists, but has certain difficulties because of increasing input prices.

This group has the smallest size with only 2 firms. The table 3 below shows us the results of the mean of equity beta and asset beta are 0,096 and 0,029, accordingly. These values are good numbers in term of indicating a low and acceptable un-diversifiable risk because of the smallest study size.

Besides, the variance of equity and asset beta of the sample group equals to 0,0102 and 0,0014 accordingly which are much lower than the variance of the entire sample equity and asset beta of 0,57 and 0,14. The effect from financial leverage makes these beta values fluctuate a little bit less from the sample beta mean.

We might note that equity beta values of 2 firms in this material category are the lowest compared to those of firms in the rest two (2) groups. Among three (3) industries, the systemic risk of medical equipment group companies is a bit lower than those of the rest two groups.

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Besides, the estimated equity beta mean is 0,096 and sample variance is 0,0102, which is not supporting our 2nd research hypothesis or issue that there would be a large disperse distribution in beta values estimated in this industry as well as our 3rd research hypothesis or issue that the mean of equity and asset beta values of these listed companies tend to impose a high risk level or beta should higher than (>) 1.

Table 3 : Estimating beta results for Viet Nam Listed Medical Equipment Companies (as of Dec 2012)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	DNM	0,168	0,056	APC as comparable	66,6%
2	JVC	0,025	0,003	DNM as comparable	88,5%
Note : Raw data, not adjusted.					

(Source : Viet Nam stock exchange data)

Table 4 : Statistical results for Vietnam listed Material companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	0,168	0,056	0,1118
MIN	0,025	0,003	0,0220
MEAN	0,096	0,029	0,0669
VAR	0,0102	0,0014	0,0088
Note: Sample size : 2			

b) Medicine Listed Companies Group

Because of the necessity in a developing economy, the market for medicine firms is definitely established and potential although it may be affected by impacts from the financial crisis.

The Table 5 below shows us the equity and asset beta mean of 8 listed medicine companies, with values of 0,682 and 0,414, accordingly. This result means the risk is low and acceptable although the equity/asset beta values are the highest among 3 groups. This partly, maintains the public confidence of business operation of the whole industry and partly, indicates the good effect from using financial leverage.

Besides, the variance of beta values among these 8 firms is normal, from 0,7144 to 0,1389 for equity and asset beta, accordingly, whereas there are only one special case with beta higher than (>) 2.

Please refer to table 5 and 6 for more information.

Table 5 : Estimating beta results for Viet Nam Listed Medicine Companies (as of Dec 2012)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	AMV	1,191	1,075		9,7%
2	APC	0,419	0,383	DLV as comparable	8,6%
3	DBM	2,091	0,765	PGT as comparable	63,4%
4	DBT	0,661	0,192	PGT as comparable	70,9%
5	DCL	0,840	0,374	PGT as comparable	55,4%
6	DDN	-0,946	-0,163		82,8%
7	DHG	0,592	0,432		27,2%
8	DHT	0,610	0,251		58,8%

(Source : Viet Nam stock exchange data).

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Table 6 : Statistical results for Vietnam listed Medicine companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	2,091	1,075	1,0153
MIN	-0,946	-0,163	-0,7831
MEAN	0,682	0,414	0,2685
VAR	0,7144	0,1389	0,5756
Note: Sample size : 8			

c) Human Resource Listed Companies Group

Among 3 groups, this is the group with the 2nd smallest number of listed firms (sample size = 4) and with the 2nd lowest values of equity and asset beta mean and equity beta var of about 0, 47, 0, 28 and 0, 61 accordingly. However, the asset beta var of about 0, 2214 is the highest among 3 industries. The using of leverage has influenced these firms' risk exposure a bit less than the medicine industry.

Different from firms in the medicine industries, 4 listed human resource firms has lower equity and asset beta mean and equity beta var values, estimated at 0,469 and 0,278 and 0,6075, which implies there is a more concentration in market risks among firms in this industry. The equity and asset beta values are distributed in a smaller range, from -0,199 to 1,502, and from -0,058 to 0,958 which are acceptable, esp., asset beta values are quite low, indicating the effectiveness of using financial leverage.

Please refer to Exhibit 2 for more information.

Table 7 : Statistical results for Vietnam listed Human Resource companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,502	0,958	0,5436
MIN	-0,199	-0,058	-0,1412
MEAN	0,469	0,278	0,1914
VAR	0,6075	0,2214	0,3861
Note: Sample size : 4			

d) Comparison Among 3 Groups of Medical Equipment, Medicine and Human Resource Companies

The below chart 1 shows us among the 3 groups, equity beta and asset beta values of the medical group are the lowest (0,1 and 0,3 accordingly) while those of the medicine group are the highest (0,68 and 0,71 accordingly). Assuming debt beta is 0, financial leverage has helped many listed firms in these industries lower the un-diversifiable risk.

Furthermore, we see the equity and asset beta mean values of all 3 groups have gaps but acceptable. Therefore, it also rejects our 3rd hypothesis that the mean values of equity/asset beta of all 3 groups impose higher risks.

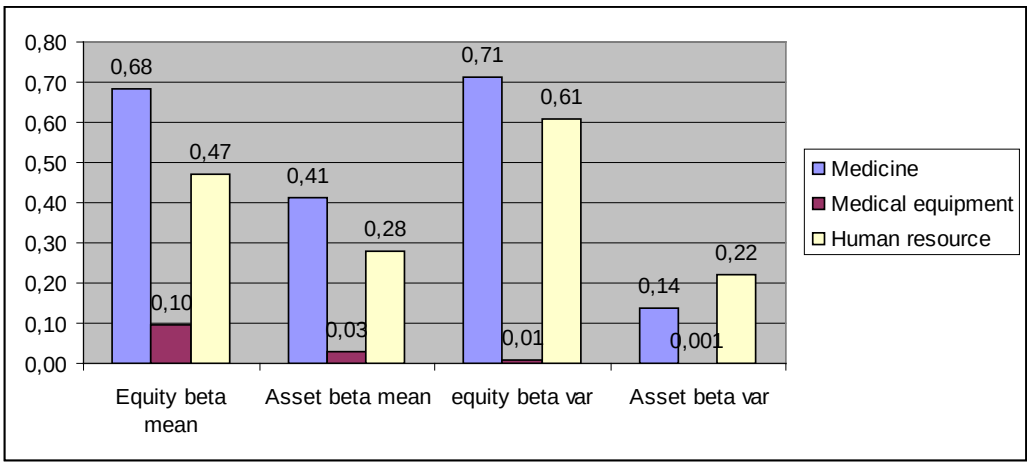
Next, we can recognize from the chart that, the risk in the medicine industries higher than those in the other 2 industries. So, it rejects our 1st hypothesis.

Last but not least, from the calculated results, variance values of asset /equity beta in the medical equipment group are lowest. In number, equity beta var is from 0,01 - 0,71 and asset beta var is from 0,001-0,22 which is not big. This also rejects our 2nd hypothesis.

Finally, if we compare beta values of three (3) above industries to those of computer and electrical group companies, we see the asset beta mean values in the medical equipment, medicine and human resource industries are a little bit lower (see exhibit 4).

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Chart 1 : Statistical results of three (3) groups of 14 listed VN medical equipment, medicine and human resource firms during/after the crisis period 2007-2011



VIII. Risk Analysis

The crisis seems having no effects on medical industry because of population growth. Firms in the industry have to face risks from competition as there are more and more similar provided services and products for consumers and patients. These risks can affect the performance and net cash flow of these companies. And prices of medical material and public utilities could increase over years. However, the medical services are vital for most of people despite of increasing medical service prices. And the medical policies are also good in term of building more hospitals and providing more high quality medical services.

IX. Conclusion and Policy Suggestion

a) Medical Equipment Industry

Even though beta mean values are fine, this is the industry which has both the lowest equity/asset beta mean values and the lowest asset /equity beta var (see chart 1). During the crisis, this industry has lower market risk and beta values of firms in the group are less fluctuated.

After difficulties in the crisis (see exhibit 1), financial services industries, the government and central banks have certain efforts and policies to support businesses and internal investors, and stabilize inflation.

b) Medicine Industry

Generally speaking, this is the industry which has the highest values of equity/asset beta mean and equity beta varies, among 3 groups (0, 68, 0, 41 and 0, 71). The using of financial leverage can be a reason to reduce market risk. The market is well established.

c) Human Resource Industry

Through our comparative analysis on asset beta values, this is the industry which has the lower market risk exposure than that of the medicine industry when we consider values of asset beta var. Also the beta variance shows a small dispersion and smaller than, esp., medicine firms, under leverage impacts.

In general, our empirical findings state that they are not in favor of our 1st and 2nd and 3rd hypotheses or research issues.

In short, although Viet Nam is an emerging market with imperfect financial system, the beta values estimated are at acceptable level with 57% firms in the research sample while just a few companies' beta values are risky (about 21% firms).

Additionally, it indicates the higher the using of financial leverage, the lower the beta values. In reality, there are 57% of VN medical equipment, medicine and human resource firms (8 among 14 firms) which has 0< equity beta<1 and 71% of total firms (10 among 14 firms) with 0<asset beta < 1 in this research sample. If used effectively, using leverage can be good for risk management.

Moreover, comparing these data and values to those of construction and real estate firms, and to those of computer and electrical companies in our previous research (see exhibit 3 and 4), the research results show that in here, the asset beta mean can be a little bit lower while the impacts from the crisis happens on the overall market. So, the leverage becomes more meaningful and the crisis might have less influence on the firms in the above research.

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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Exhibit

Exhibit 1 : Interest rates, Inflation, GDP growth and macroeconomics factors

Year	Basic rates	Lending rates	Deposit rates	Inflation	GDP	USD/VND rate
2012	n/a	12% - 15%	9%	6,81%	5,03%	20.828
2011	9%	18%-22%	13%-14%	18%	5,89%	20.670
2010	8%-9%	19%-20%	13%-14%	11,75% (Estimated at Dec 2010)	6,5% (expected)	19.495
2009	7%	9%-12%	9%-10%	6,88%	5,2%	17.000
2008	8,75%-14%	19%-21%	15%-16,5%	22%	6,23%	17.700
2007	8,25%	12%-15%	9%-11%	12,63%	8,44%	16.132
2006	8,25%			6,6%	8,17%	
2005	7,8%			8,4%		
Note	Approximately (2007: required reserves ratio at SBV is changed from 5% to 10%) (2009: special supporting interest rate is 4%)					

Exhibit 2 : Estimating beta results for Viet Nam Listed Human Resource Companies (as of Dec 2012)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	CMS	-0,063	-0,016	VCM as comparable	74,4%
2	ILC	0,635	0,226	SDA as comparable	64,5%
3	SDA	1,502	0,958		36,2%
4	VCM	-0,199	-0,058		71,1%

(Source: Viet Nam stock exchange data).

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Exhibit 3 : Statistical results of four (4) groups of 64 listed VN computer and electrical firms during/after the crisis period 2007-2011

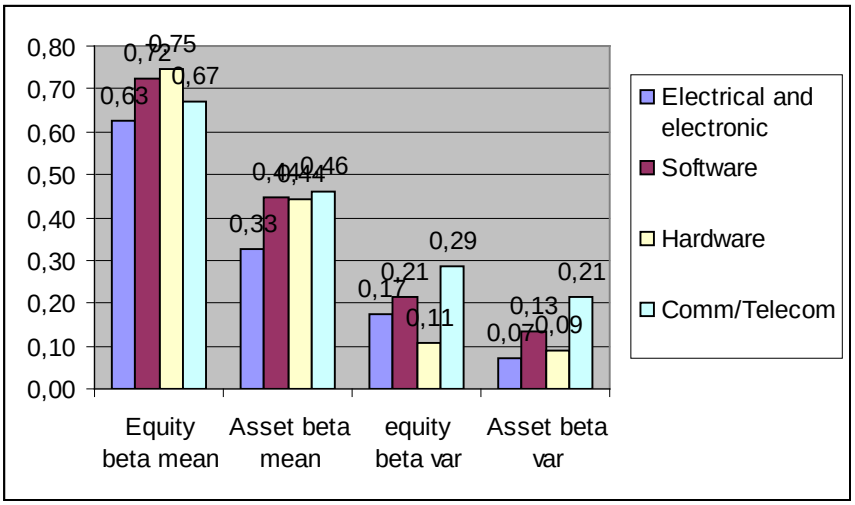


Exhibit 4 : Statistical results of three (3) groups of 103 listed construction firms during crisis period

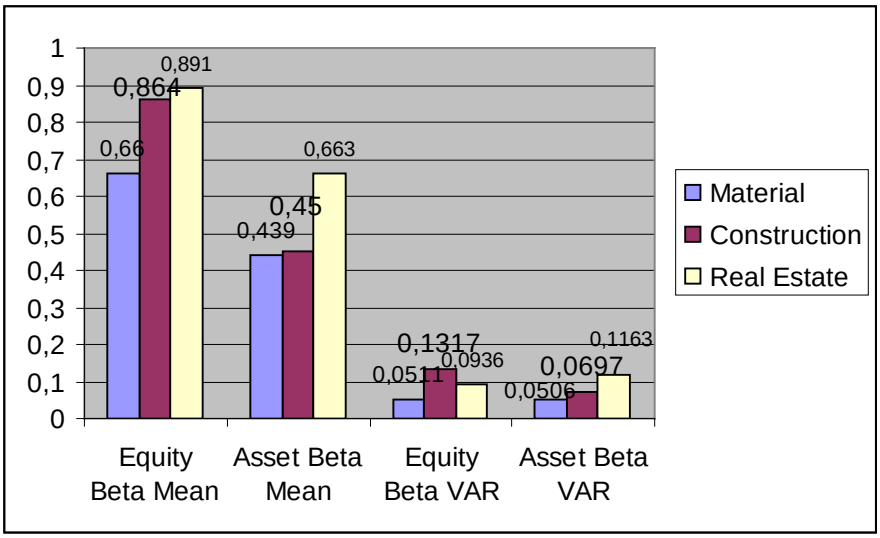
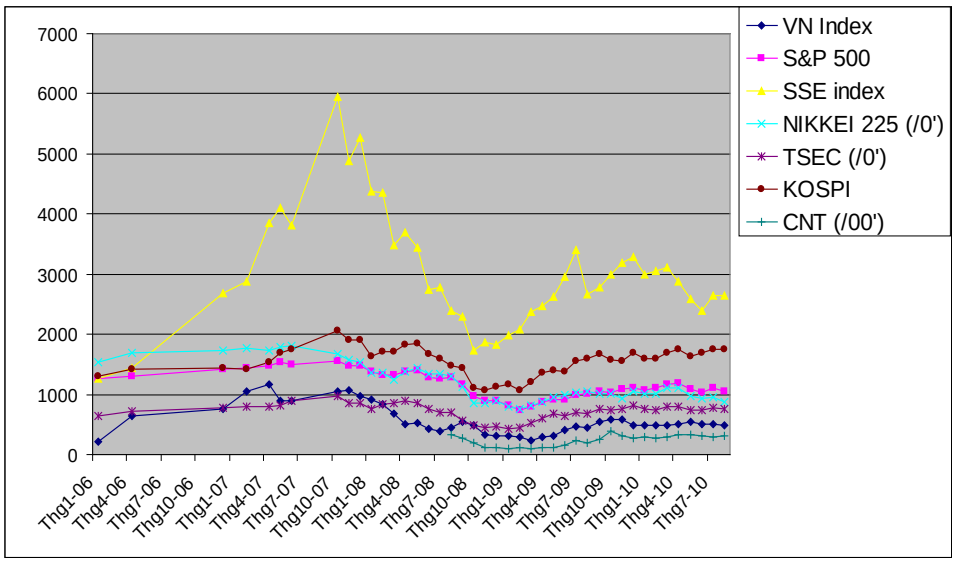


Exhibit 5 : VNI Index and other stock market index during crisis 2006-2010



Author note: My sincere thanks are for the editorial office and Lecturers/Doctors at Banking University.

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