

# The Volatility of Market Risk In Groups of Viet Nam Listed Computer and Electrical Company Groups during the Financial Crisis 2007-2009

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## Summary

During the financial crisis 2007-2009 with certain impacts on the Viet Nam economy and especially, the stock exchange, there is un-diversifiable risk that influences the whole computer and electrical industries. Hence, the risk re-estimation for the listed firms in these industries becomes necessary. First of all, by using quantitative and analytical methods to estimate asset and equity beta of four (4) groups of listed companies in Viet Nam electrical, software, hardware and telecommunication industries with a proper traditional estimating model, we found out that the beta values, in general, for most companies are acceptable, excluding just a few cases. There are 88% of listed firms with lower risk, among total 64 firms, whose beta values lower than ( $<$ ) 1. Secondly, through comparison of beta values among three (3) above industries, we recognized there are still 13% of total listed firms in the above group companies with beta values higher than ( $>$ ) 1 and have stock returns moving more than the market benchmark. Ultimately, this paper generates some results 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, computer industry

## 1. Introduction

Market risk is a fundamental financial terminology that could be estimated by using various research methods. In this research sample, we perform a market risk analysis based on asset and equity beta of 64 listed companies in the category of electrical, software, hardware and telecommunication firms. This paper, hence, emphasizes on analyzing un-diversifiable risk in the above industry in one of emerging economies, and esp.: Vietnam stock market during the financial crisis 2007-2009. After the previous published research article on estimated beta for listed construction company groups, we will compare the estimated beta results of listed Viet Nam electrical companies to those in its supply chain activities such as computer and telecommunication companies to make a comparative analysis and risk re-evaluation after global crisis. No research, so far, has been done on the same topic.

This paper is structured as follow. The research issues and literature review will be covered in next sessions 2 and 3, for a summary. Next, methodology and conceptual theories are introduced in session 4 and 5. Then, session 6 describes the data in empirical analysis. Session 7 presents empirical re-

sults 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.

## 2. Research Issues

We mention a couple of issues on the estimating of beta for listed computer and electrical companies in Viet Nam stock exchange as following:

Hypothesis/Issue 1: Among the four (4) companies groups, under the financial crisis impact and high inflation, the beta or risk level of listed companies in electrical and electronic industries will relatively higher than those in the rest three (3) industries.

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

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

### 3. Literature review

Beta, a financial and risk measure, is used widely in the financial world even though there are a lot of arguments. As Sharpe, Lintner (1964), and Black. (1972) with CAPM model identified the expected stock return is linearly proportional to its market beta. Fama, and French (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. As Peirero (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. 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 merging markets. And Xiaowei Kang (2012) found that combining weighted or alternative beta strategies can gain significant traction in investment community and reduce risk.

### 4. Conceptual theories

#### Determinants of Equity and Asset Beta

Risk-taking or risk-adverse is different risk attitude of various investors on the stock exchange. Based on their risk preference or acceptance, investors including individuals or groups, can create an investment portfolio that could use market risk or beta as one of determinant components.

The European Central Bank (2010) mentioned it, beta or systematic risk, as a risk of financial instability with so widespread.

Several factors affecting beta include, but not limit to, the volatility of expected return of a single stock, or the volatility of the expected return of the entire stock market index, or general factors such as interest rates or consumer price index (CPI). In fact, similar to inflation, to some extent, beta implies volatility of price of a kind of financial asset, or security price.

In theory, market risk can not be eliminated through diversification. However, to some extent, our researches on various groups of industries of listed companies in the Viet Nam stock exchange could generate the viewpoint that different industries have different impacts from the crisis on the business and hence, beta measure, which include equity and asset beta.

### 5. Methodology

The period 2007-2009 is the time with impacts from financial crisis. Therefore, we use the data from the stock exchange market in Viet Nam (HOSE and HNX) during the 2 years period to estimate systemic risk results.

First, we use the market stock price of 64 listed companies in the electrical, software, hardware and telecommunication 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 4 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 4 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 computer and electrical firms used in the research of estimating beta:

Market	Listed Electrical and Electronic equipments companies (1)	Listed Software companies (2)	Listed Comm. And Telecom- munication com- panies (4)	Note (4)
Viet Nam	7	3	7	Estimating by traditional method
	11	3	15	Estimating by comparative method
<b>Total</b>	<b>18</b>	<b>6</b>	<b>22</b>	<b>Total firms in groups:64</b>

(Note: The above data is at the December 12<sup>th</sup>, 2009, from Viet Nam stock exchange)

### 6. General Data Analysis

The research sample uses data of 64 firms in 4 categories of industries: electrical, software, hardware and telecommunication companies groups, and the mean of equity beta is valued at 0,572 while that of asset beta is about 0,339. These data are acceptable values during the crisis. Moreover, the sample variance of asset beta is quite low (0,059) which is a good number, while that of equity beta is a little bit higher (0,10). This shows us that the systemic risk for the whole industry has declined due to the effectiveness of using financial leverage.

In addition to, the max and min values of beta

are still somewhat fine. Max equity beta value is up to 1,180, compared to max asset beta value is just 1,022 that is acceptable. Looking at the table 2 (below), we can see there is 13%, or 8 listed firms still have beta values larger than ( $>$ ) 1, whereas there is 88% or 56 firms whose beta values lower than ( $<$ ) 1 and higher than ( $>$ ) 0.

Value of equity beta varies in a range from 1,180 (max) to 0,084 (min) and that of asset beta varies in a range from 1,022 (max) to 0,007 (min). Only a few companies still has larger risk exposure than most of the others. There are no listed companies whose betas are lower than ( $<$ ) 0.

Next, Asset beta max value is 1,022 and min value is 0,007 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. Only 2% of total firms has asset beta value  $>$  1 whereas 98% of total firms has beta  $<$  1.

Lastly, we can see the relatively small difference between max equity and max asset beta values, which is about 0,1573, whereas there is a smaller difference between equity and asset beta variance values which is just 0,0427; 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 Four (4) Viet Nam Listed Computer and Electrical Companies Groups (as of Dec 2009)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,180	1,022	0,1573
MIN	0,084	0,007	0,0765
MEAN	0,572	0,339	0,2331
VAR	0,1017	0,0590	0,0427
Note: Sample size : 64			

(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	0	0,00%	0%
$0 < \text{beta} < 1$	56	45,12%	88%
Beta $>$ 1	8	44,16%	13%
total	64	44,4%	100%

Asset Beta	No. of firms	Financial leverage (average)	Ratio
$<$ 0	0	0,00%	0%
$0 < \text{beta} < 1$	63	44,99%	98%
Beta $>$ 1	1	6,14%	2%
total	64	42,1%	100%

## 7. Empirical Research Findings and Discussion

### A- Electrical and Electronic listed companies group

Despite of difficulties during the crisis 2007-2009, the market for these companies is still potential. The market for these firms has been affected because selling prices increase.

The table 3 below shows us the research of 18 listed firms in this category during the above period. In general, the mean of equity beta and asset beta are 0,473 and 0,254, accordingly. These values are good numbers in term of showing a low un-diversifiable risk. The market demand for electronic/electrical products is still high.

Next, the variance of equity and asset beta of the sample group equals to **0,09** and **0,05** accordingly which are lower than the variance of the entire sample equity and asset beta of **0,10** and **0,059**. The effect from financial leverage makes these beta values fluctuate a little bit less than the sample beta mean.

We might note that equity and asset beta mean values of 18 firms in this material category are the lowest among those of firms in the rest three groups. This might be considered as one characteristic of these industries. Among four industries, the systemic risk of material group companies is a bit lower than those of the rest groups.

Besides, the estimated equity beta mean is **0,473** and sample variance is **0,09**, which is not supporting our 2<sup>nd</sup> research hypothesis or issue that there would be a large disperse distribution in beta values estimated in this industry as well as our 3<sup>rd</sup> 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 Electrical and Electronic Equipment Companies (as of December 2009)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	ISB	0,186	0,050	CJC as comparable	76,9%
2	BTH	0,789	0,524		37,8%
3	DZM	0,265	0,107	CJC as comparable	58,6%
4	DVH	0,204	0,061	CJC as comparable	73,2%
5	LGC	0,723	0,293		61,2%
6	CJC	0,561	0,087		90,1%
7	TYA	0,999	0,313		69,5%
8	PPS	0,098	0,007	ELC as comparable	72,2%
9	GLT	0,425	0,298	CJC as comparable	49,8%
10	NAG	0,488	0,189	VHG as comparable	40,0%
11	NHW	0,488	0,189	VHG as comparable	51,9%
12	FBA	0,611	0,439	BTH as comparable	96,1%
13	SMA	0,084	0,011	NHW as comparable	71,2%
14	IIE	0,169	0,133	DVH as comparable	20,2%
15	TGP	0,232	0,080	CJC as comparable	60,4%
16	VHG	1,067	0,843		13,6%
17	VBH	0,356	0,306		27,0%
18	CSG	0,765	0,636		8,3%

(Source: Viet Nam stock exchange data)

**Table 4.** Statistical results for Viet Nam listed Electrical and Electronic Equipment companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,067	0,843	0,224
MIN	0,084	0,007	0,076
MEAN	0,473	0,254	0,219
VAR	0,0919	0,0536	0,038

Note: Sample size : 18

### B- Software listed companies group

In an emerging developing economy such as Viet Nam, the market for software firms is definitely established and potential because of the public need for computer and products although it may be affected by impacts from the financial crisis and demand from hardware industry. However, the number of listed firms is still limited.

The Table 5 shows us the equity and asset beta mean of 6 listed software companies, with values of 0,596 and 0,369, accordingly. This result, which means the risk, is low and acceptable although the equity/asset beta values are higher than those of the electrical/hardware firms.

Besides, the variance of beta values among these 6 listed firms is normal, from 0,1889 to 0,1004 for equity and asset beta, accordingly.

Please refer to Exhibit 2 for more information.

**Table 5.** Statistical results for Viet Nam listed Software Companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,156	0,886	0,269
MIN	0,115	0,081	0,034
MEAN	0,596	0,369	0,228
VAR	0,1889	0,1004	0,088

Note: Sample size : 6

### C- Hardware listed companies group

Among 4 groups, this is the group with the largest number of listed firms (sample size = 22) and with the average equity/asset beta values of about 0,554 and 0,327. Besides, the asset and equity beta var of about 0,068 and 0,109 are average values in 4 groups. The values of market risk generally are lower than those of software and electrical industries. The using of leverage has influenced these firms' risk, relatively, a bit less than the other groups.

Although max asset beta value is 1,022 that is higher than those of electrical, telecommunication and software industries, the equity and asset beta values are distributed in an acceptable range, from 0,098 to 1,138, and from 0,026 to 1,022, indicating the effectiveness of using financial leverage.

Please refer to Exhibit 3 for more information.

**Table 6.** Statistical results for Viet Nam listed Hardware companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,138	1,022	0,116
MIN	0,098	0,026	0,072
MEAN	0,554	0,327	0,227
VAR	0,1092	0,0679	0,041

Note: Sample size : 22

### D- Comm. & Telecommunication listed companies group

Different from firms in the other three (3) industries, 18 listed comm./telecom firms has the highest equity and asset beta mean values, 0,687 and 0,431 accordingly. Max beta value of 1,180 and min beta value of 0,315 are the highest among 4 groups. This indicates a relatively high level of market risks among firms in this industry. However, the asset beta and equity beta var value are 0,03 and 0,07 accordingly, are the lowest in 4 groups, showing the more concentration impacts of market risk exposure during the crisis period.

Please refer to Exhibit 4 for more information.

**Table 7.** Statistical results for Viet Nam listed Comm. and Telecommunication companies

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	1,180	0,802	0,377
MIN	0,315	0,147	0,168
MEAN	0,687	0,431	0,256
VAR	0,0697	0,0345	0,035

Note: Sample size : 18

### Comparison among 4 groups of computer and electrical companies

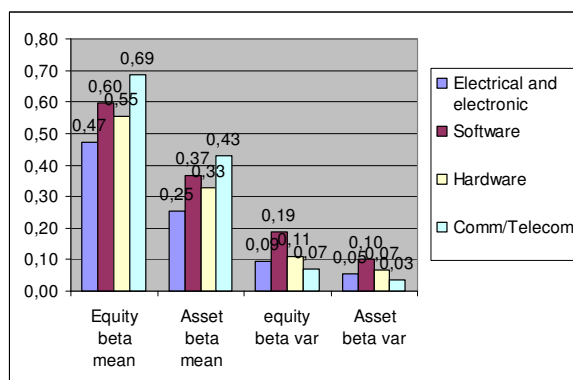
In the below chart, we can compare among the 4 groups, equity and asset beta values of the electrical group are the lowest (0,47 and 0,25 accordingly). Assuming debt beta is 0, financial leverage has helped many listed firms in these industries lower the un-diversifiable risk.

Additionally, we see the asset beta mean values of all 4 groups have not big difference and acceptable. Therefore, it also rejects our 3<sup>rd</sup> hypothesis that the mean values of equity/asset beta of all 4 groups impose higher risks.

Then, we recognize that during the crisis period, the telecommunication industry has the highest values of equity and asset beta (0,69 and 0,43 accordingly).

Next, we can recognize from the chart that, the risk in the electrical industries higher than those in the other 3 industries. So, it supports our 1<sup>st</sup> hypothesis.

Finally, if we compare beta values of 4 above industries to those of construction group companies, we see the asset beta mean values in the electrical and computer industries are a little bit lower (see exhibit 5).



**Chart 1** Statistical results of four (4) groups of 64 listed VN computer and electrical firms during/after the crisis period 2007-2011

## 8. Risk analysis

The electrical and computer industries still have the market demand established together with the economic growth in Viet Nam. During the crisis, there is negative influence from the whole decreasing demand in the local market. Additionally, the slow-down on the real estate market has also made the development of these industries slow. Besides, many small IT firms have to compete with each other to offer various IT services to their customers.

However, the computer industry, software and hardware, could create a good barrier for competitors who want to enter the industry. And also the speed and the need of using information technology in many companies, both governmental and non-governmental, become more widely. Last but not least, the market for the ERP system is still potential because just a small proportion of Vietnamese companies use it while many more firms use basic IT solutions.

## 9. Conclusion and Policy suggestion

### Electrical and electronic industry

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

After increasing rates period (see exhibit 1), financial services industries, the government and central banks have certain efforts and proper policies to support businesses and internal investors, and stabilize inflation.

### Software industry

Generally speaking, this is the industry which has middle values of equity beta mean and var, among 3 groups. The using of financial leverage can be a reason to reduce market risk, from 0,69 (equity beta mean) to 0,34 (asset beta mean). The market is established.

### Hardware industry

Through our comparative analysis on asset beta values, this is the industry which has the lower market risk exposure than that of the other two (2) above industries when we consider values of equity beta mean, or asset/equity beta var. Also the beta variance shows a small dispersion and smaller than, esp., material and consumer good firms.

**Comm. & Telecommunication listed companies group**

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

In summary, though Viet Nam is an emerging market with imperfect financial system, the beta values estimated are at acceptable level with 72% firms in the research sample while just a few companies' beta values are risky (about 26% firms).

Additionally, it indicates the higher the using of financial leverage, the lower the beta values. In reality, there are 72% of computer and electrical firms (166 among 229 firms) which has  $0 < \beta < 1$  in this research sample. If used effectively, using leverage can be good for risk management.

Furthermore, if we compare 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 4 and 5), we might see 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.

**Exhibit**

**Exhibit 1** Interest rates, Inflation, GDP growth and macro-economics 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%)					

(Source: Viet Nam commercial banks and economic statistical bureau)

**Exhibit 2** Estimating beta results for Viet Nam Listed Software Companies (as of December 2009)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	<a href="#">FPT</a>	1,156	0,431		63,9%
2	<a href="#">CMG</a>	0,440	0,161	ELC as comparable	50,0%
3	<a href="#">SRB</a>	0,914	0,886		7,3%
4	<a href="#">VLA</a>	0,115	0,102	SRA as comparable	3,2%
5	<a href="#">HIG</a>	0,827	0,550	SAM as comparable	42,8%
6	<a href="#">SRA</a>	0,126	0,081		48,0%

(Source: Viet Nam stock exchange data)

**Exhibit 3** Estimating beta results for Viet Nam Listed Hardware Companies (as of December 2009)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	<a href="#">CMT</a>	0,442	0,216	LTC as comparable	54,1%
2	<a href="#">SVT</a>	0,740	0,560	TLC as comparable	44,0%
3	<a href="#">VIE</a>	0,241	0,046	UNI as comparable	84,8%
4	<a href="#">HPT</a>	0,098	0,026	TST as comparable	81,1%
5	<a href="#">NIS</a>	0,289	0,137	VTC as comparable	58,4%
6	<a href="#">TST</a>	0,303	0,097	LTC as comparable	50,0%
7	<a href="#">ST8</a>	0,875	0,670		29,7%
8	<a href="#">TAG</a>	0,561	0,365	LTC as comparable	31,2%
9	<a href="#">POT</a>	0,927	0,472		37,8%
10	<a href="#">CKV</a>	0,105	0,038	VIE as comparable	73,5%
11	<a href="#">ONE</a>	0,629	0,248	UNI as comparable	60,2%
12	<a href="#">PMT</a>	0,256	0,219	NIS as comparable	25,7%
13	<a href="#">SMT</a>	0,194	0,136	PMT as comparable	20,5%
14	<a href="#">UNI</a>	1,011	0,624		20,7%
15	<a href="#">TLC</a>	0,917	0,662		23,2%
16	<a href="#">KST</a>	0,584	0,332	TLC as comparable	43,6%
17	<a href="#">VAT</a>	0,139	0,066	PMT as comparable	53,8%
18	<a href="#">VTC</a>	0,528	0,358		45,5%
19	<a href="#">ELC</a>	1,011	0,505	ITD as comparable	71,9%
20	<a href="#">SAM</a>	1,138	1,022		6,1%
21	<a href="#">LTC</a>	0,788	0,235		69,8%
22	<a href="#">ITD</a>	0,412	0,155	POT as comparable	59,4%

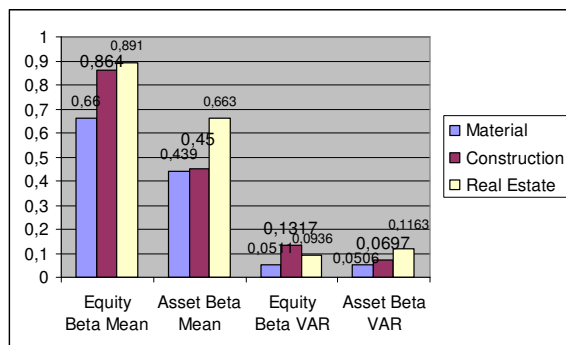
(Source: Viet Nam stock exchange data)

**Exhibit 4** Estimating beta results for Viet Nam Listed Comm. and Telecommunication Companies (as of December 2009)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage
1	<a href="#">ECI</a>	0,471	0,351	IHK as comparable	16,3%
2	<a href="#">INN</a>	0,467	0,250	ALT as comparable	35,8%
3	<a href="#">PTP</a>	0,425	0,203	ALT as comparable	51,3%
4	<a href="#">DHI</a>	0,894	0,660		43,5%
5	<a href="#">IHK</a>	0,593	0,340	TPH as comparable	40,4%
6	<a href="#">HTP</a>	1,035	0,802		22,3%
7	<a href="#">TPH</a>	0,924	0,411		56,1%
8	<a href="#">IN4</a>	0,315	0,189	ECI as comparable	18,3%
9	<a href="#">ADC</a>	0,513	0,258	DHI as comparable	21,1%
10	<a href="#">HST</a>	0,654	0,455	HEV as comparable	19,0%
11	<a href="#">SGD</a>	1,180	0,630		55,9%
12	<a href="#">DAE</a>	1,013	0,399		59,6%
13	<a href="#">HEV</a>	0,869	0,596		29,9%
14	<a href="#">ALT</a>	0,772	0,617		22,5%
15	<a href="#">EFI</a>	0,447	0,422	INN as comparable	5,2%
16	<a href="#">EID</a>	0,599	0,433	ALT as comparable	37,5%
17	<a href="#">DAD</a>	0,868	0,588	SGD as comparable	19,2%
18	<a href="#">SED</a>	0,319	0,147	EID as comparable	48,4%

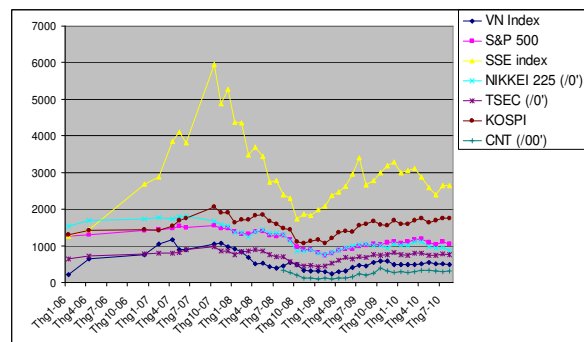
(Source: Viet Nam stock exchange data)

**Exhibit 5** Statistical results of three (3) groups of 103 listed construction firms during crisis period



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**Exhibit 6** VNI Index and other stock market index during crisis 2006-2010



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