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Building Better Risk Management Information System (RMIS) for Sustainable Bank Management in Vietnam

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Abstract
Recently the roles of building a risk management information system in commercial banks in Vietnam has been becoming necessary during Covid 19 effects.
This study mainly use combination of quantitative methods and qualitative methods including synthesis, inductive and explanatory methods.
We analyze rism management and risk evaluation in case of one big listed bank in Vietnam, Navibank (NVB) who became National Citizen Bank later (NCB).
We figure out that CPI, lending rate and VNIndex have negative correlation with both beta CAPM and stock price of NVB. And these risk results and models can be delivered to suitable users in a management information system (MIS).

Key-words: Sustainable Bank Management, Management Information System, Risk Management, Economic Development, Vietnam.

JEL: M21, G30, G32, G38.

1. Introduction

First, we recognize the importance of MIS in banking also increase to a new level in recent years where we realize the need of incorporate risk information and risk model to deliver information to stakeholders.

In our paper we mainly focus on using reliable internet data in comparing and evaluating 2 key factors: stock price and beta CAPM under macro variables impacts, for one big listed bank in Vietnam: Navibank (NVB).

It is organized with introduction, literature review, method and data, main results, discussion and conclusion.

We recognize from below charts with all data from reliable internet sources (mentioned above) that:

For external factors, both exchange rate and SP500 have negative correlation with both beta CAPM and stock price of NVB.

For internal factors, both industrial production and Rf have positive relationship with beta and stock price of NVB.

Chart 1 - Stock Price NVB vs. Internal and External Macro Factors

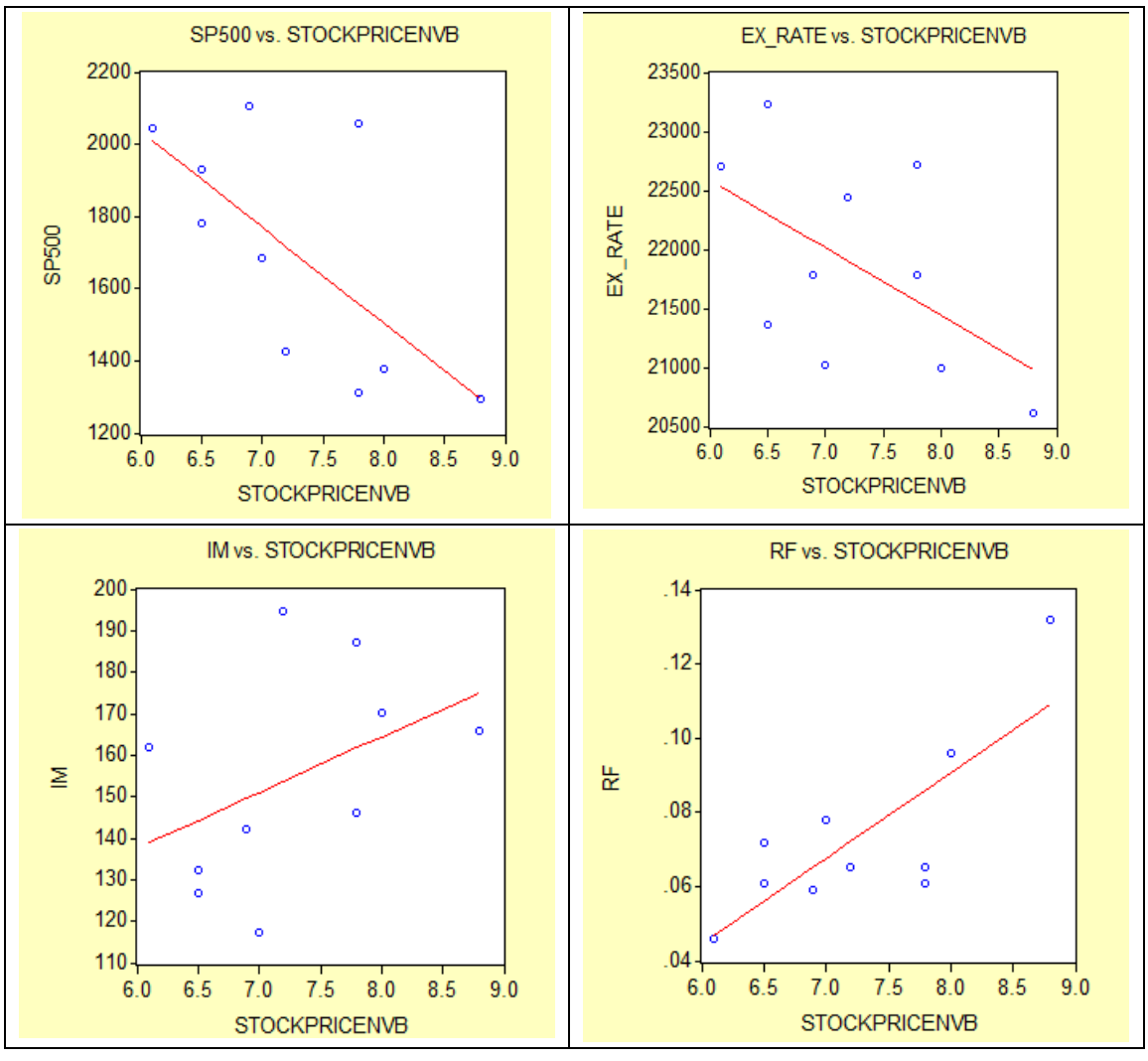

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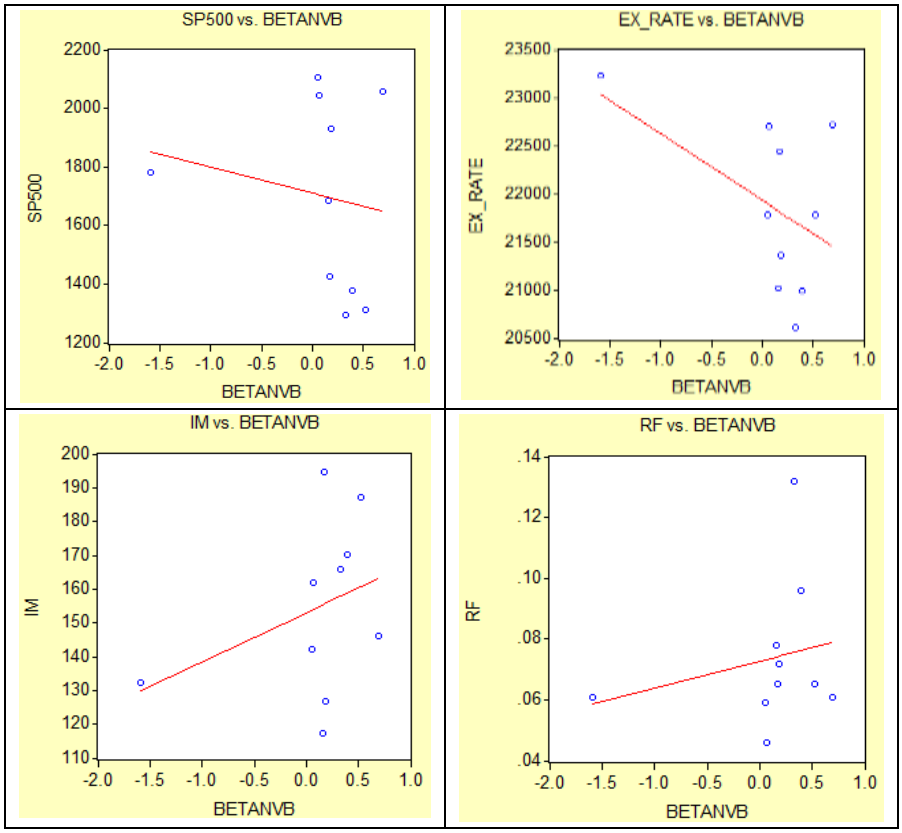
Chart 2 - Beta CAPM NVB vs. Internal and External Macro Factors



2. Literature Review

First of all, Pylarczyk (2016) stated that MIS is good for banks and first stage is building continuous data collection with software. Next step is that gathering data, figuring out resources and how they work.

Then, We summarize previous studies as follows:

Table 1 – Summary of Previous Studies

Authors	Year	Contents, results
Karim, A.J	2011	Management Information Systems (MIS) is the key factor to facilitate and attain efficient decision making in an organization.
Gunaratha	2016	whereas firm size negatively impacts on the financial risk, financial leverage and financial risk has positive relationship.
Hami	2017	financial depth has been affected negatively by inflation in Iran during the observation period.
Kantos and Batolomeo	2020	when the probabilities of rare extreme events are considered, strategies that focus on “alpha” (risk adjusted return) as defined in Jensen (J Finance 23(2):389–416, 1967) are structurally superior to “smart beta” strategies that seek to outperform a market index benchmark.
Feitosa et al	2019	Disruptive technologies are triggers that transform the nature of work, leading to profound changes in organizational structure, labor relations, employee skills, customer relationship and communications.

3. Methodology

Method and Data

This study mainly use combination of quantitative methods and qualitative methods including synthesis, inductive and explanatory methods.

For quantitative analysis, the study is supported with OLS regression.

Looking at descriptive statistics in below figures, we see that:standard deviation of exchange rate and SP500 are highest values.

Figure 3.1 – NVB Stock Price and other Macro Factors Statistics

	STOCKPRI...	CPI	G	IM	R	RF	VNINDEX	EX_RATE	SP500	TRADEBA...
Mean	7.260000	0.068270	0.056730	154.4800	0.132500	0.073505	490.1750	21864.80	1701.587	-232.2000
Median	7.100000	0.063850	0.056500	153.9500	0.125000	0.065275	492.8800	21780.00	1734.160	-162.5000
Maximum	8.800000	0.181300	0.066800	194.8000	0.190000	0.132000	593.0500	23230.00	2103.840	498.0000
Minimum	6.100000	0.006300	0.043800	117.4000	0.100000	0.046000	351.5500	20618.00	1292.280	-1162.000
Std. Dev.	0.830261	0.059925	0.007141	25.76659	0.031380	0.024419	83.37681	876.1553	327.3917	465.6620
Skewness	0.382498	0.921046	-0.361761	0.145331	0.844274	1.469319	-0.196155	0.108851	-0.061715	-0.405459
Kurtosis	2.232726	2.637092	2.181881	1.849123	2.335049	4.388549	1.735476	1.708458	1.360020	2.975371
Jarque-Bera	0.489137	1.468753	0.497001	0.587084	1.372230	4.401524	0.730387	0.714782	1.126987	0.274248
Probability	0.783042	0.479805	0.779970	0.745618	0.503528	0.110719	0.694062	0.699499	0.569217	0.871862
Sum	72.60000	0.682700	0.567300	1544.800	1.325000	0.735050	4901.750	218648.0	17015.87	-2322.000
Sum Sq. Dev.	6.204000	0.032319	0.000459	5975.256	0.008862	0.005367	62565.23	6908834.	964668.1	1951570.

Figure 3.2 – NVB Beta and other Macro Factors Statistics

	BETANVB	CPI	G	IM	R	RF	VNINDEX	EX_RATE	SP500	TRADEBA...
Mean	0.099000	0.068270	0.056730	154.4800	0.132500	0.073505	490.1750	21864.80	1701.587	-232.2000
Median	0.180000	0.063850	0.056500	153.9500	0.125000	0.065275	492.8800	21780.00	1734.160	-162.5000
Maximum	0.690000	0.181300	0.066800	194.8000	0.190000	0.132000	593.0500	23230.00	2103.840	498.0000
Minimum	-1.590000	0.006300	0.043800	117.4000	0.100000	0.046000	351.5500	20618.00	1292.280	-1162.000
Std. Dev.	0.627702	0.059925	0.007141	25.76659	0.031380	0.024419	83.37681	876.1553	327.3917	465.6620
Skewness	-2.127988	0.921046	-0.361761	0.145331	0.844274	1.469319	-0.196155	0.108851	-0.061715	-0.405459
Kurtosis	6.604228	2.637092	2.181881	1.849123	2.335049	4.388549	1.735476	1.708458	1.360020	2.975371
Jarque-Bera	12.95991	1.468753	0.497001	0.587084	1.372230	4.401524	0.730387	0.714782	1.126987	0.274248
Probability	0.001534	0.479805	0.779970	0.745618	0.503528	0.110719	0.694062	0.699499	0.569217	0.871862
Sum	0.990000	0.682700	0.567300	1544.800	1.325000	0.735050	4901.750	218648.0	17015.87	-2322.000
Sum Sq. Dev.	3.546090	0.032319	0.000459	5975.256	0.008862	0.005367	62565.23	6908834.	964668.1	1951570.

4. Main Results

4.1. Overall Results

Shown in below figures, We can see:

GDP growth has negative correlation with stock price while positive correlation with beta CAPM.

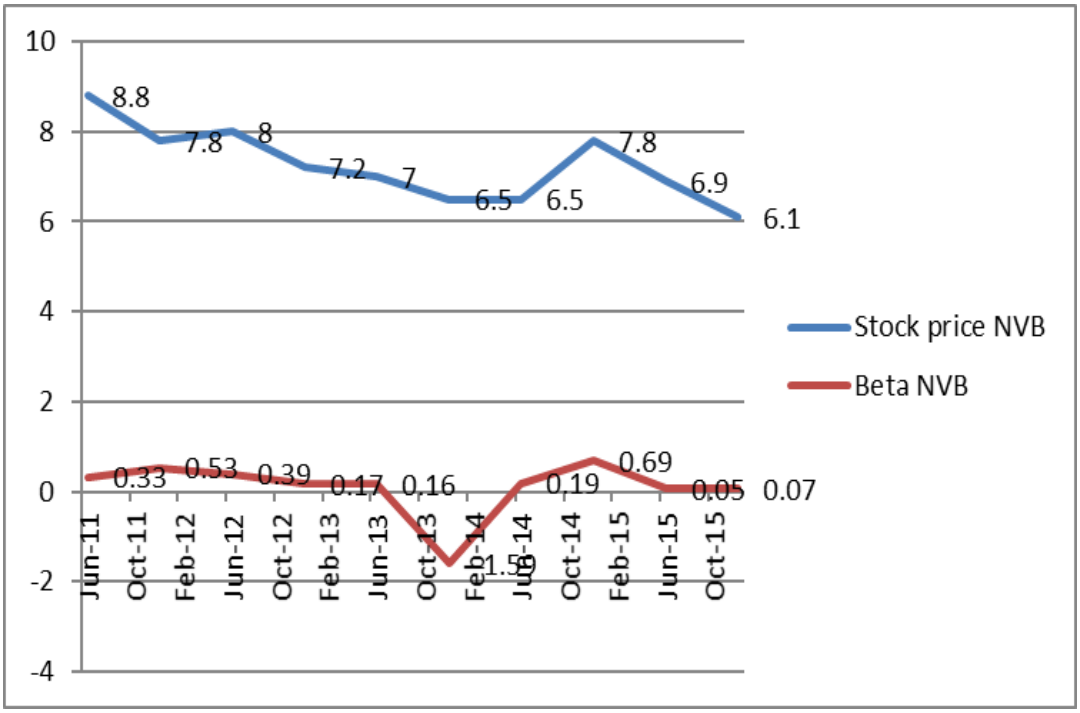
Figure 4.1 – Relation between Stock Price of NVB and Macro Indicators

Correlation Matrix										
	STOCKPRI...	CPI	G	IM	R	RF	VNINDEX	EX_RATE	SP500	TRADEBA...
STOCKPRI...	1.000000	0.739872	-0.028262	0.431512	0.127940	0.782746	-0.633859	-0.542403	-0.671593	-0.006604
CPI	0.739872	1.000000	0.090566	0.500206	0.428665	0.580486	-0.861426	-0.382440	-0.844053	0.156409
G	-0.028262	0.090566	1.000000	0.440105	0.223263	-0.421402	-0.016434	0.519076	0.136776	-0.107369
IM	0.431512	0.500206	0.440105	1.000000	0.663798	0.117679	-0.664368	0.038528	-0.613771	0.161388
R	0.127940	0.428665	0.223263	0.663798	1.000000	-0.045403	-0.746263	0.006143	-0.664122	0.553061
RF	0.782746	0.580486	-0.421402	0.117679	-0.045403	1.000000	-0.444136	-0.772931	-0.652624	0.264192
VNINDEX	-0.633859	-0.861426	-0.016434	-0.664368	-0.746263	-0.444136	1.000000	0.295409	0.950618	-0.375438
EX_RATE	-0.542403	-0.382440	0.519076	0.038528	0.006143	-0.772931	0.295409	1.000000	0.476195	-0.491811
SP500	-0.671593	-0.844053	0.136776	-0.613771	-0.664122	-0.652624	0.950618	0.476195	1.000000	-0.485719
TRADEBA...	-0.006604	0.156409	-0.107369	0.161388	0.553061	0.264192	-0.375438	-0.491811	-0.485719	1.000000

Figure 4.2 - Relation between Beta of NVB and Macro Indicators

Correlation Matrix										
	BETANVB	CPI	G	IM	R	RF	VNINDEX	EX_RATE	SP500	TRADEBA...
BETANVB	1.000000	0.198754	0.095546	0.356647	0.058524	0.226459	-0.191149	-0.495650	-0.168160	0.044034
CPI	0.198754	1.000000	0.090566	0.500206	0.428665	0.580486	-0.861426	-0.382440	-0.844053	0.156409
G	0.095546	0.090566	1.000000	0.440105	0.223263	-0.421402	-0.016434	0.519076	0.136776	-0.107369
IM	0.356647	0.500206	0.440105	1.000000	0.663798	0.117679	-0.664368	0.038528	-0.613771	0.161388
R	0.058524	0.428665	0.223263	0.663798	1.000000	-0.045403	-0.746263	0.006143	-0.664122	0.553061
RF	0.226459	0.580486	-0.421402	0.117679	-0.045403	1.000000	-0.444136	-0.772931	-0.652624	0.264192
VNINDEX	-0.191149	-0.861426	-0.016434	-0.664368	-0.746263	-0.444136	1.000000	0.295409	0.950618	-0.375438
EX_RATE	-0.495650	-0.382440	0.519076	0.038528	0.006143	-0.772931	0.295409	1.000000	0.476195	-0.491811
SP500	-0.168160	-0.844053	0.136776	-0.613771	-0.664122	-0.652624	0.950618	0.476195	1.000000	-0.485719
TRADEBA...	0.044034	0.156409	-0.107369	0.161388	0.553061	0.264192	-0.375438	-0.491811	-0.485719	1.000000

Chart 1 – Movements of Beta and Stock Price NVB 2011-2015



Above chat shows us that in 2013-14 beta goes down lowest while stock price reduce slightly. Stock price declines gradually while beta CAPM goes down and up till 2015.

4.2. OLS Regression Results

Run OLS regression with Eviews gives below results:

Figure 4.2.1- Regression Results for Comparison of Internal Effects on NVB Stock Price during Pre-L Inflation Time

Dependent Variable: STOCKPRICENVB
Method: Least Squares
Date: 03/08/21 Time: 21:20
Sample: 1 10
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-3.653206	10.19865	-0.358205	0.7439
G	37.24059	45.34634	0.821248	0.4717
IM	0.003447	0.013221	0.260696	0.8112
R	-15.30238	14.36536	-1.065227	0.3649
RF	20.82745	13.02290	1.599294	0.2081
VNINDEX	-0.009402	0.010212	-0.920710	0.4251
C	9.969754	7.019376	1.420319	0.2506

R-squared	0.846007	Mean dependent var	7.260000
Adjusted R-squared	0.538022	S.D. dependent var	0.830261
S.E. of regression	0.564320	Akaike info criterion	1.889636
Sum squared resid	0.955370	Schwarz criterion	2.101445
Log likelihood	-2.448178	F-statistic	2.746909
Durbin-Watson stat	1.499730	Prob(F-statistic)	0.218211

Figure 4.2.2- Regresion Results for Comparison of External Effects on NVB Stock Price during pre-L Inflation Time

Dependent Variable: STOCKPRICENVB
Method: Least Squares
Date: 03/08/21 Time: 21:18
Sample: 1 10
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX_RATE	-0.000465	0.000229	-2.035438	0.0880
TRADEBALANCE	-0.001075	0.000433	-2.484698	0.0475
SP500	-0.001853	0.000609	-3.040623	0.0228
C	20.33709	4.738404	4.291970	0.0051

R-squared	0.761018	Mean dependent var	7.260000
Adjusted R-squared	0.641527	S.D. dependent var	0.830261
S.E. of regression	0.497099	Akaike info criterion	1.729120
Sum squared resid	1.482645	Schwarz criterion	1.850154
Log likelihood	-4.645598	F-statistic	6.368828
Durbin-Watson stat	2.041048	Prob(F-statistic)	0.027039

Figure 4.2.3 – Regresion Results for Comparison of Internal Effects on NVB Beta CAPM during Pre-L Inflation Time

Dependent Variable: BETANVB
Method: Least Squares
Date: 03/08/21 Time: 21:28
Sample: 1 10
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-1.203462	17.48148	-0.068842	0.9494
G	1.594840	77.72805	0.020518	0.9849
IM	0.012947	0.022663	0.571308	0.6078
R	-5.772063	24.62363	-0.234412	0.8298
RF	5.047093	22.32253	0.226099	0.8357
VNINDEX	-0.000488	0.017505	-0.027895	0.9795
C	-1.276274	12.03190	-0.106074	0.9222

R-squared	0.208423	Mean dependent var	0.099000
Adjusted R-squared	-1.374731	S.D. dependent var	0.627702
S.E. of regression	0.967299	Akaike info criterion	2.967409
Sum squared resid	2.807003	Schwarz criterion	3.179219
Log likelihood	-7.837047	F-statistic	0.131651
Durbin-Watson stat	2.737909	Prob(F-statistic)	0.981813

Figure 4.2.4 – Regression Results for Comparison of External Effects on NVB beta CAPM during Pre-L Inflation Time

Dependent Variable: BETANVB
Method: Least Squares
Date: 03/08/21 Time: 21:27
Sample: 1 10
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX_RATE	-0.000448	0.000296	-1.514245	0.1807
SP500	4.45E-06	0.000789	0.005635	0.9957
TRADEBALANCE	-0.000354	0.000561	-0.631697	0.5509
C	9.814401	6.138553	1.598814	0.1610

R-squared	0.298294	Mean dependent var	0.099000
Adjusted R-squared	-0.052559	S.D. dependent var	0.627702
S.E. of regression	0.643987	Akaike info criterion	2.246897
Sum squared resid	2.488312	Schwarz criterion	2.367931
Log likelihood	-7.234483	F-statistic	0.850197
Durbin-Watson stat	2.037453	Prob(F-statistic)	0.515192

Analysis

We can infer from the above table that Rf and lending rate have highest coefficients in case of beta CAPM (NVB). Whereas GDP growth, Rf and R have highest coefficients in case of stock price of NVB.

5. Discussion

During Post – L Inflation

In case of external macro factors effects: exchange rate and trade balance have negative relationship with beta CAPM of NVB, and the same phenomenon happens for stock price NVB.

In case of internal macro factors effects: CPI, lending rate and VNIndex have negative correlation with both beta CAPM and stock price of NVB.

We might note that economic meanings to some extent more important than statistical meanings.

6. Conclusion

Because Rf (positive relation) and lending rate (negative correlation) have highest coefficients in case of beta CAPM (NVB) and also on stock price, Ministry of Finance, State bank of Vietnam and relevant agencies need to control R as well as rates of Treasury bonds toward benefits for managing risk.

Mukhamadeev et al (2019) stated that the role of information systems for entrepreneurship education in developing countries on the example of the Azerbaijan education system and Internet banking.

Management Information System (MIS) Implications

Management information system is computer-based infrastructure and built with continuous data gathering.

When data combined and collected in a proper process and they are organized well with reliability and relevance, then they can support for process of decision making of the banks.

The better MIS system banks have, the better the quality of decision banks make to improve profit ratios and productivity.

Limitation of Research

We can expand our research model for other industries and other markets.

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