

Using Internet Data for Evaluating Market Risk During Period 2011-2020 - A Case of Eximbank in Vietnam in the Concept of Sustainable Development

Dinh Tran Ngoc Huy*

MBA, PhD Candidate, Banking University HCMC, Ho Chi Minh City, Vietnam.

E-mail: dtnhuy2010@gmail.com

Nguyen Ngoc Thach

PhD, Banking University HCMC, Ho Chi Minh City, Vietnam.

E-mail: thachnn@buh.edu.vn

Nguyen Thi Hoa

PhD, Thu Dau Mot University, Binh Duong Vietnam.

E-mail: Hoant.khql@tdmu.edu.vn

Nguyen Tien Dung

PhD, Hanoi University of Science and Technology, Vietnam.

E-mail: dung.nguyentien3@hust.edu.vn

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Abstract

In recent years, there is high demand for research and development of policies serving for sustainable development of economy in emerging markets such as Vietnam. Reason is that quality of economic growth of the country still not so high as expected.

Because banks in Vietnam played major role in promoting economic development, we will analyze which factors that influence sustainable development of banks, from a risk management approach.

Authors use, in this paper, a mixed methods of qualitative with synthesis and inductive methods, with quantitative methods such as OLS. We will choose a big listed bank, Eximbank - EIB as a typical case study.

The research findings tell us that because SP500 have higher impacts on beta CAPM, for external factors and positive effects whereas exchange rate has negative impact on beta. We suggest government agencies need to increase exchange rate little bit to reduce risk.

Keywords

Bank Sustainability, Vietnam Banks, Eximbank, Beta CAPM, Risk Management, Digital Transformation, Internet Data, Industry 4.0.

JEL: M21, G30, G32, G38.

Introduction

First, we recognize the importance of sustainable development in banking also increase to a new level in recent years esp. During digital transformation in industry 4.0.

Next, We figure out that : according to WCED-United Nation, sustainable development defined as development that meet current demand and not be obstacles for needs of future generation.

And in reality, many nation sin the world consider 3 main elements of sustainable development including: quality of economic growth in relation to social issues and environmental issues.

So only focusing on economic growth countries can go on the way of sustainable development.

In Vietnam economy, there are situation that shows competitiveness of economy still low, and also low quality and effectiveness, and the nation resources are not used effectively, and capitals of state still be wasteful, etc.

In order to promote economic growth, we need to emphasize roles of commercial banks in financing for economic development.

And it is better to analyze what are factors that affect sustainable development of atypical commercial big listed bank in Vietnam under macro effects, from the approach of risk management.

We organize our study with introduction, previous studies, methodology, main results, discussion and conclusion.

Literature Review

First, Document at Party Conference X has continue to confirm: fast development need to go parallel with sustainable development, in terms of macro and micro views, and both in short and long term.

Second, quantity growth need to go with quality growth, and enhancing quality and competitiveness of the economy.

Third, Researches found out that in Greece job productivity has been affected negatively by effectiveness of MIS-Internal process model, and creativity and innovation reflected by effectiveness of Management Information System (MIS) externally (Trivelas and Satouridis, 2013).

Next, Study found better customer/client satisfaction in banking sector with flow of information n service quality changing. (Arasu et al, 2014).

Huy, D.T.N (2015) mentioned that it would be better to improve corporate governance and risk management standards at corporations with standards.

Moreover, Studies specified that activities involving cash management and risk mgt can be enhanced by IS - Information system (IS) and in most areas in banking functions (Gupta, 2019).

Last but not least, Huy, D.T.N, Loan, B.T.T, & Anh, P.T (2020) stated risk management activities are necessary in a case of Vietcombank in Vietnam.

Methodology

Method and Data

Because of reliability of OLS regression, our paper will use a mix of OLS regression and qualitative methods such as synthesis, inductive methods.

We also ensure reliability of data from good websites of banks and Bureau statistics.

Here we can analyze from below charts that:

- Value of standard dev. of VNIndex higher than that of IM (figure 3).
- Value of standard dev. of exchange rate higher than that of SP500 with beta (figure 1).

- Correlation between trade balance and beta higher than that between SP500 and beta (figure 2).
- Correlation between IM and beta higher than that between G and beta (figure 4).

	BETA_EIB	EX_RATE	SP500	TRADEBA...
Mean	1.215000	22394.20	2245.493	-75.16000
Median	1.130000	22700.00	2138.720	-125.0000
Maximum	4.790000	23230.00	3703.060	498.0000
Minimum	-0.450000	20618.00	1292.280	-1162.000
Std. Dev.	1.109023	837.4044	685.2655	402.1636
Skewness	1.538229	-0.853154	0.363508	-0.667135
Kurtosis	6.575441	2.379814	2.307065	3.848882
Jarque-Bera	18.54031	2.746765	0.840594	2.084063
Probability	0.000094	0.253249	0.656852	0.352737
Sum	24.30000	447884.0	44909.86	-1503.200
Sum Sq. Dev.	23.36870	13323677	8922186.	3072975.

Figure 1 Beta EIB and external descriptive stat
(source: author calculations and stock exchange)

Correlation Matrix				
	BETA_EIB	EX_RATE	SP500	TRADEBA...
BETA_EIB	1.000000	-0.253945	0.029595	0.215416
EX_RATE	-0.253945	1.000000	0.720764	0.048661
SP500	0.029595	0.720764	1.000000	0.375157
TRADEBA...	0.215416	0.048661	0.375157	1.000000

Figure 2 Beta EIB and external correlation
(source: author calculations and stock exchange)

	BETA_EIB	CPI	G	IM	R	RF	VNIINDEX
Mean	1.215000	0.049970	0.057150	162.0550	0.112630	0.055213	680.2135
Median	1.130000	0.035350	0.059700	150.4000	0.102500	0.059850	606.6300
Maximum	4.790000	0.181300	0.070800	267.2000	0.190000	0.132000	1067.500
Minimum	-0.450000	0.006300	0.018100	117.4000	0.080000	0.012200	351.5500
Std. Dev.	1.109023	0.045765	0.013917	36.96982	0.030423	0.027599	226.7034
Skewness	1.538229	1.928654	-1.442505	1.394427	1.349477	0.911109	0.267939
Kurtosis	6.575441	5.913603	4.632589	4.628737	4.016835	4.234518	1.664441
Jarque-Bera	18.54031	19.47325	9.157194	8.692074	6.931922	4.037095	1.725736
Probability	0.000094	0.000059	0.010269	0.012958	0.031243	0.132848	0.421950
Sum	24.30000	0.999400	1.143000	3241.100	2.252600	1.104250	13604.27
Sum Sq. Dev.	23.36870	0.039794	0.003680	25968.59	0.017586	0.014472	976494.2

Figure 3 Beta EIB and internal descriptive stat
(source: author calculations and stock exchange)

Correlation Matrix							
	BETA_EIB	CPI	G	IM	R	RF	VNIINDEX
BETA_EIB	1.000000	0.256170	0.130485	0.316224	-0.296540	0.299374	0.181876
CPI	0.256170	1.000000	0.038007	0.184050	0.547153	0.603133	-0.554246
G	0.130485	0.038007	1.000000	0.244021	-0.040216	0.068575	0.012915
IM	0.316224	0.184050	0.244021	1.000000	0.128743	-0.019349	0.052526
R	-0.296540	0.547153	-0.040216	0.128743	1.000000	0.484905	-0.790059
RF	0.299374	0.603133	0.068575	-0.019349	0.484905	1.000000	-0.804579
VNIINDEX	0.181876	-0.554246	0.012915	0.052526	-0.790059	-0.804579	1.000000

Figure 4 Beta EIB and internal correlation
(source: author calculations and stock exchange)

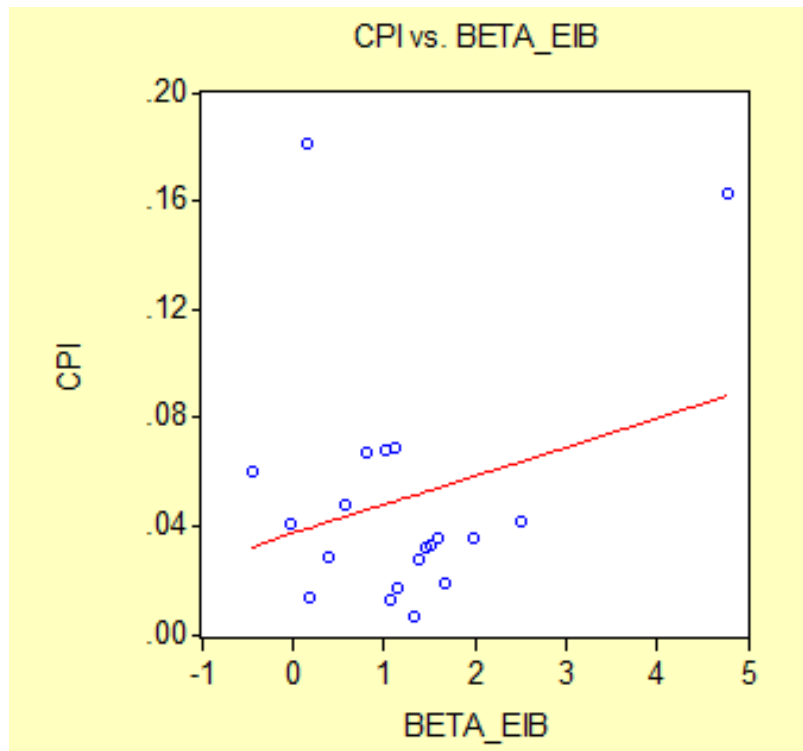
Main Results

Overall Results

Here we can analyze from below charts that:

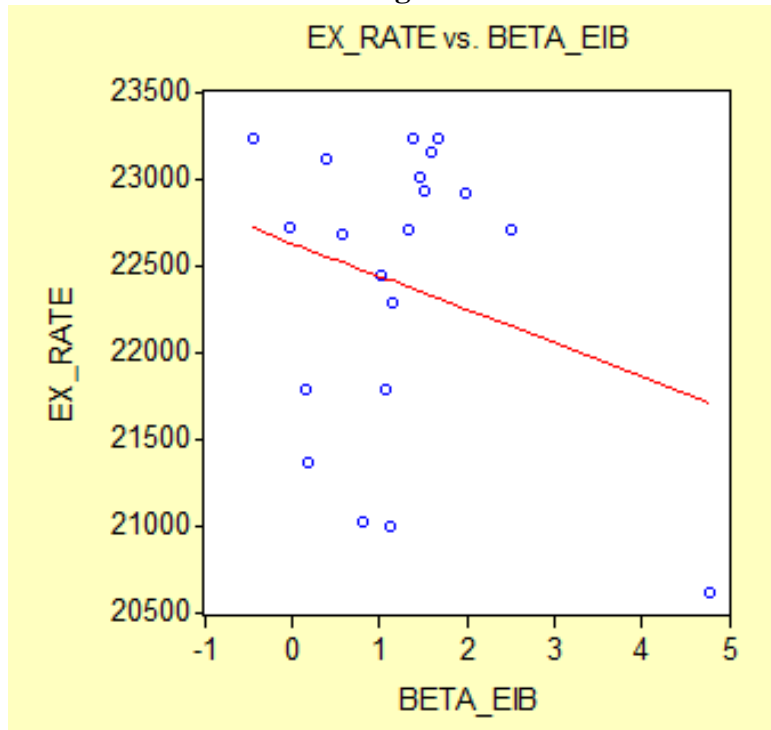
- In scatter chart, CPI has positive relation with beta (chart 1).
- In scatter chart, exchange rate has negative relation with beta (chart 2).
- In scatter chart, G has positive relation with beta (chart 3).
- In scatter chart, IM has positive relation with beta (chart 4).

Chart 1 CPI and beta



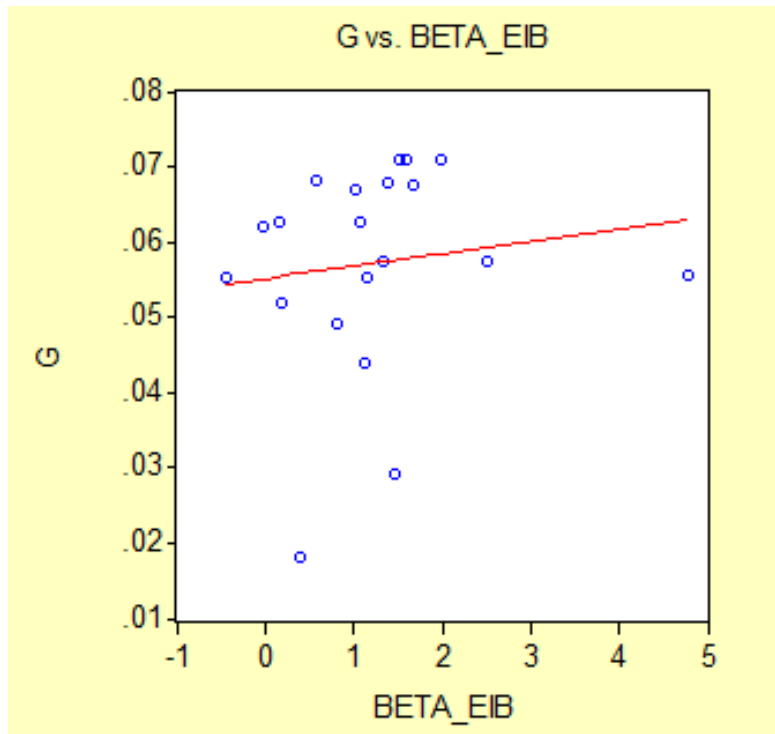
(source: author calculations and stock exchange)

Chart 2 Exchange rate and beta



(source: author calculations and stock exchange)

Chart 3 G and beta



(source: author calculations and stock exchange)

Chart 4 IM and beta

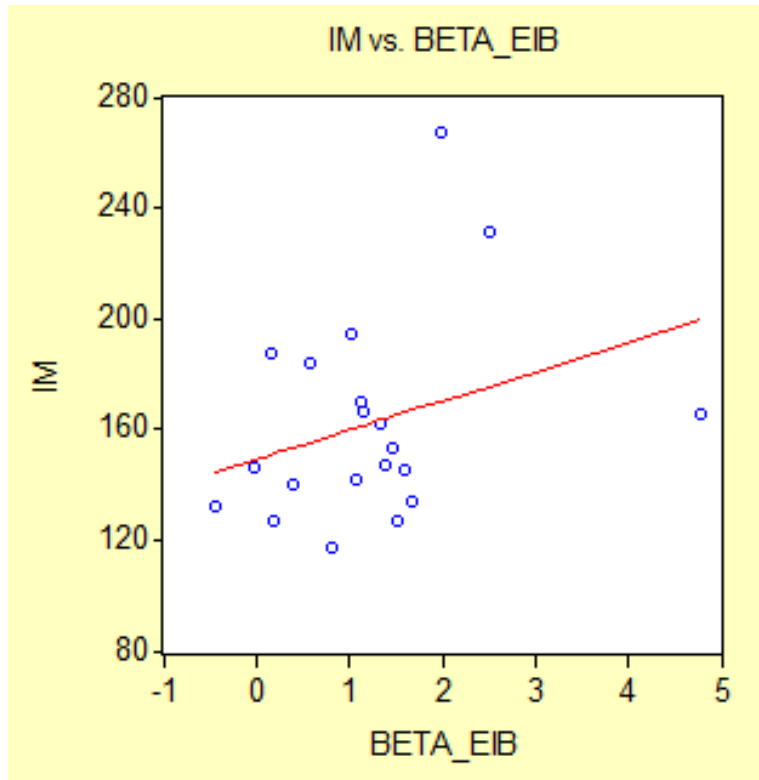


Chart 5 R and beta

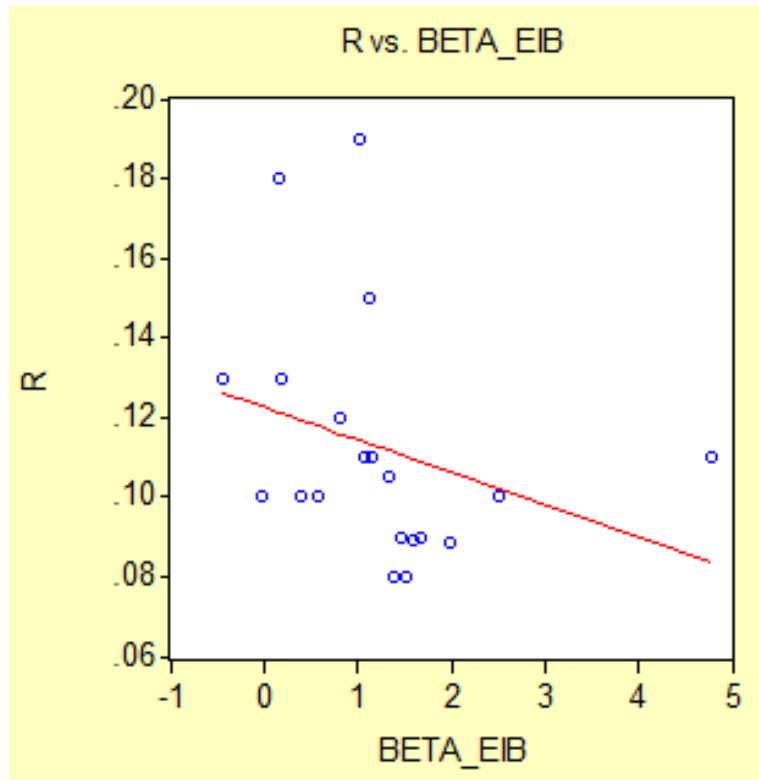
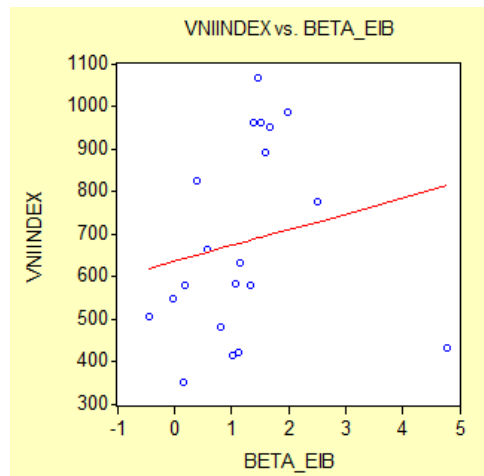


Chart 6 VNIndex and beta



(source: author calculations and stock exchange)

OLS Regression Results

Here we can analyze from below figures that:

- In single factor model, CPI has positive relation with beta (figure 5).
- In single factor model, exchange rate has negative relation with beta (figure 6).
- In single factor model, G has positive relation with beta (figure 7).
- In single factor model, IM has positive relation with beta (figure 8).
- CPI and G have positive relation while R has negative relation with beta (figure 11).
- Rf and VNIndex have positive relation with beta (figure 10).

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:51
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	6.207789	5.521194	1.124356	0.2756
C	0.904797	0.369825	2.446552	0.0249
R-squared	0.065623	Mean dependent var		1.215000
Adjusted R-squared	0.013713	S.D. dependent var		1.109023
S.E. of regression	1.101392	Akaike info criterion		3.125667
Sum squared resid	21.83517	Schwarz criterion		3.225240
Log likelihood	-29.25667	F-statistic		1.264177
Durbin-Watson stat	1.688305	Prob(F-statistic)		0.275633

Figure 5 OLS result for CPI

(source: author calculations and stock exchange)

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:52
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX_RATE	-0.000336	0.000302	-1.113911	0.2800
C	8.746468	6.765774	1.292752	0.2124
R-squared	0.064488	Mean dependent var		1.215000
Adjusted R-squared	0.012515	S.D. dependent var		1.109023
S.E. of regression	1.102061	Akaike info criterion		3.126881
Sum squared resid	21.86170	Schwarz criterion		3.226454
Log likelihood	-29.26881	F-statistic		1.240797
Durbin-Watson stat	1.243243	Prob(F-statistic)		0.279971

Figure 6 OLS result for exchange rate

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:52
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
G	10.39831	18.62251	0.558373	0.5835
C	0.620737	1.093843	0.567483	0.5774
R-squared	0.017026	Mean dependent var		1.215000
Adjusted R-squared	-0.037583	S.D. dependent var		1.109023
S.E. of regression	1.129671	Akaike info criterion		3.176369
Sum squared resid	22.97082	Schwarz criterion		3.275943
Log likelihood	-29.76369	F-statistic		0.311781
Durbin-Watson stat	1.476106	Prob(F-statistic)		0.583469

Figure 7 OLS result for GDP growth
 (source: author calculations and stock exchange)

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:53
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IM	0.009486	0.006708	1.414193	0.1744
C	-0.322269	1.113577	-0.289400	0.7756
R-squared	0.099997	Mean dependent var		1.215000
Adjusted R-squared	0.049997	S.D. dependent var		1.109023
S.E. of regression	1.080943	Akaike info criterion		3.088185
Sum squared resid	21.03189	Schwarz criterion		3.187758
Log likelihood	-28.88185	F-statistic		1.999942
Durbin-Watson stat	1.674037	Prob(F-statistic)		0.174369

Figure 8 OLS result for IM

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:53
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R	-10.80991	8.205684	-1.317369	0.2042
C	2.432520	0.955700	2.545277	0.0203
R-squared	0.087936	Mean dependent var		1.215000
Adjusted R-squared	0.037266	S.D. dependent var		1.109023
S.E. of regression	1.088162	Akaike info criterion		3.101497
Sum squared resid	21.31375	Schwarz criterion		3.201070
Log likelihood	-29.01497	F-statistic		1.735460
Durbin-Watson stat	1.255211	Prob(F-statistic)		0.204239

Figure 9 OLS result for lending rate
 (source: author calculations and stock exchange)

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:54
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RF	50.78706	10.42630	4.871052	0.0001
VNIINDEX	0.005864	0.001269	4.620109	0.0002
C	-5.578038	1.379984	-4.042104	0.0008
R-squared	0.596396	Mean dependent var		1.215000
Adjusted R-squared	0.548913	S.D. dependent var		1.109023
S.E. of regression	0.744853	Akaike info criterion		2.386222
Sum squared resid	9.431710	Schwarz criterion		2.535582
Log likelihood	-20.86222	F-statistic		12.56023
Durbin-Watson stat	1.606026	Prob(F-statistic)		0.000447

Figure 10 OLS result for Rf and VNindex
 (source: author calculations and stock exchange)

Dependent Variable: BETA_EIB
 Method: Least Squares
 Date: 07/26/21 Time: 13:54
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R	-22.45734	8.837103	-2.541256	0.0218
CPI	14.29947	5.874111	2.434321	0.0270
G	6.636778	16.18197	0.410134	0.6871
C	2.650533	1.324451	2.001232	0.0626
R-squared	0.344714	Mean dependent var		1.215000
Adjusted R-squared	0.221847	S.D. dependent var		1.109023
S.E. of regression	0.978302	Akaike info criterion		2.970859
Sum squared resid	15.31319	Schwarz criterion		3.170006
Log likelihood	-25.70859	F-statistic		2.805602
Durbin-Watson stat	2.260328	Prob(F-statistic)		0.073134

Figure 11 OLS result for CPI, R and G
 (source: author calculations and stock exchange)

Next, we Run OLS regression giving us:

Table 1 OLS for external factors

	Coefficient
Exchange rate	-0.0006
SP500	0.0005
Trade balance	0.0002
C	15.4
SER	1.1
Akaike info criteria	3.2

(source: author calculations and stock exchange)

Table 2 OLS for internal factors

	Coefficient
CPI	5.08
G	-3.1
IM	0.008
R	-5.6
Rf	43.9
VNIndex	0.005
C	-5.4
R-squared	0.55
SER	0.7
Akaike info criteria	2.4

(source: author calculations and stock exchange)

Discussion

During Period 2011-2020

In case of Eximbank from above table 2 we find out: CPI and Risk free rate (Rf) have higher impacts on beta CAPM, with positive effects. Thats for internal factors.

From above table 1 we figure out: SP500 have higher impacts on beta CAPM, for external factors and positive effects whereas exchange rate has negative impact on beta.

Improve Better Management Information System (MIS) Fir Banks

IS or information system in banks need to be improved with support of software and risk quantitative model as we suggested and analyzed which can contribute to the learning process of the whole bank system.

Conclusion

We can have a summary of analysis and recommend policies as below:

Firstly, we see that CPI and Risk free rate (Rf) have higher impacts on beta CAPM, with positive effects : relevant agencies need to reduce CPI ad Rf -Treasury bonds for better managing risk.

Next, we find out that SP500 have higher impacts on beta CAPM, for external factors and positive effects whereas exchange rate has negative impact on beta. We suggest government agencies need to increase exchange rate little bit to reduce risk.

From that base, we can try to solve issues of sustainable development of Vietnam economy such as: small size of economy, slow economic structure transfer, low productivity and effectiveness, social and economic infrastructure still not meet demand, low quality of education, etc.

Comments on Using Internet Data and Cybersecurity Risk in Digital Transformation Era

We can take advantage of reliable internet data from stock exchange and bank system in order to make risk model analysis.

However we need solutions to prevent cybersucurity risks, in specific:

With the development of Industry 4.0, cyber attacks on innovative ICT technologies can be a fundamental problem, which is why networks and information systems of the combined economy, society or critical infrastructure in the era of digitization require ever stronger and efficient security.

Determining the basic safety recommendations for Industry 4.0 components, services, and processes based on risk analysis is the first step to resolve difficult technical constraints in this field. Therefore, several basic recommendations should be made regarding the improvement of cyber security risk management standards in the development of new ICT technologies. These recommendations are only the basis for undertaking further analyzes of the subject taken with experience from US and Europe.

Recommendation. Cross-border Implementation of Common Legal Solutions on the Example of the EU and the USA

Ensuring a uniform and stable legal environment for cybersecurity of ICT Industry 4.0 will enable companies to plan long-term, sustainable business strategies, including improving various legal, organizational and technological aspects related to cyber security. Developing certification systems for ICT Industry 4.0 security technologies will make the market harmonization process more effective, increase consumer confidence and open

new business opportunities. Promoting international public-private partnerships (PPP) focused on cyber security of ICT Industry 4.0 technologies, effective dialogue, and synergies with many stakeholders.

These are just examples of recommendations, the implementation of which for effective ways to guarantee cyber security of networks and information systems, can improve the process of building international cooperation in building transparent rules of jurisdiction in counteracting cyber crime. From a procedural point of view, recent jurisdictional cases in the US and EU have shown the difficulties faced by victims of cyber crime due to the different criminal law provisions on cyber attacks. According to J. Siegel (*When The Internet of Things Flounders: Looking Into Gdpr-Esque Security Standards for IoT Devices in The United States From The Consumers' Perspective*) in the US, the lack of a definition of "data breach" through cyber incidents leads to high uncertainty about this how consumers can protect themselves effectively when using new ICT. Federal legislation in the United States revolving around cybersecurity (whether it will be guidelines for companies, specific industries, the government, or whether it concerns, for example, how to notify consumers if they are victims of a data breach) is extremely dispersed and unclear. Because federal legislation in the United States is ad hoc, and different industries and areas of activity are supported by different pieces of legislation rather than one general branch or statute, consumers affected by a data breach have difficulty determining what pieces of legislation to rely on. Compared to federal regulations, each of the fifty states has its way of dealing with data breaches. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons concerning the processing of personal data and the free movement of such data, and repealing Directive 95/46 / The EC (General Data Protection Regulation) in force since May 2018 in the Member States of the European Union allows consumers to demand the deletion of their data from the hands of businesses, requires companies to notify consumers of a violation of their data and clearly defines the consequences for companies who do not comply with the rules about personal data protection. The GDPR already has an impact on international corporations because they must ensure that their activities comply with the requirements of the GDPR to be able to do business in the European Union and legally process clients' data. Theoretically, this legal protection of personal data applies to the data of EU citizens, but the global nature of the Internet means that this legal obligation will apply to all online services, and the regulation has already caused significant changes for US users as companies try to adapt to them.

Therefore, due to the adoption in the United States of legislation similar to European Union's GDPR, combined with the legal definition of cyber security standards and certification for devices and networks used by users, e.g. in IoT, will improve the actual cross-border protection of data and information and network and IT systems.

Limitation of Research

We can, then, expand our research model for other industries.

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