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Sectoral Risks in Vietnam and Malaysia: A Comparative Analysis**

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Abstract

This paper measures and ranks market risk for 10 industries/sectors in Vietnam and Malaysia, two countries in the Asia-Pacific region. Two periods are considered, namely: (i) Global Financial Crisis (GFC) (2007-2009); and (ii) post-GFC (2010-2017). Market risk is measured using Value-at-Risk (VaR), that is, the potential losses in the future over a given time period (day or month) at a given confidence level; and Conditional Value-at-Risk (CVaR), that is, the risk of extreme loss. Both parametric and historical approaches are used. Empirical findings confirm that Vietnam sectors are relatively riskier than their counterparts in Malaysia, and that the market risk across sectors in both countries has been reduced substantially in the post-GFC period. The Financials sector, which includes Banks, Diversified Financials, and Insurance, has been largely ignored in the Vietnam Government's focus. This particular industry is considered relatively risky in Vietnam, whereas it is ranked as a very safe sector in Malaysia. With the ambition to be a financial hub in the Asia-Pacific regional integration, a shift in attention to this important sector in Vietnam is the near future is strongly recommended.

Keywords: Market risk, sectors, VaR, CVaR, Vietnam, Malaysia.

JEL: G01, G21, G22, G32.

1. Introduction

In recent years, the global financial market has undergone a huge change. At the early stage of the 2000s, the European Union indicated an important inclination of the European financial markets. Moreover, the international crisis of 2008/2009, which was originated from the US, caused the negative effect on the global financial system. Vietnam has emerged as a new economic engine for the Southeast Asian region with many important industries. The three pillars contributing the most value to the Vietnam economy over the last decade or so are agriculture, manufacturing, and food & beverage. Among these key pillars, for example, agriculture is a key industry, which has consistently contributed 20 percent to the national GDP in 2015 (GSO, 2015). In order to maximize the potential benefits from the partnership with any country around the world, it is time to recognize the important role of sectoral risk, in particular, for key sectors (industries) relatively to similar sectors from other country members in the Asia Pacific region, Vietnam's key competitors and market.

Risks may subsist in every movement of life and risk estimation is the essential activity, in particular for business environment. In business activities, risk may arise from various sources: the volatility of the business environment; business cycle, changes in government policies and especially in the financial markets. A number of companies passively accept the risk whereas others attempt to manage risk by utilizing the proactive methods. Either of these two circumstances, risk should be carefully monitored because of its potentially harmful effects.

This paper focuses on market risk, which has attracted great attention from academia, investment bankers, and policymakers in recent years. Numerous studies such as Allen and Powell (2010), Powell, Vo and Pham (2017), and Powell et al. (2017) have investigated the market risk for various share markets over the world. However, the extensive literature review indicates that there has been no attempt to estimate and compare market risks, using

Value at Risk (VaR) and Conditional Value at Risk (CVaR), at the sectoral levels for Vietnam and Malaysia, the most comparable (and competing) country from the Asia-Pacific region. As a result, this study is conducted to fill the gap.

2. Theoretical Review

2.1 Value-at-Risk

Following the introduction of RiskMetrics Technical paper by J.P. Morgan in 1994 and updated information by Morgan and Reuters (1996), Value at Risk (VaR) approach is a well-known and widely employed metric for estimating market risk in recent years. VaR is different to other approaches of measuring risks. Harper (2004) demonstrated that VaR based on the historical information can be used to calculate the potential losses in the future over the given time period (day or month) at a given confidential level (typically 95 per cent or 99 per cent). For instance, the expectation of a portfolio that may lose no more than $1 million, with 95 per cent confidence level of the time (30 days) has a Value at Risk of $1 million. The negative aspect is that 5 per cent of the period time or 1 day out of 30, the portfolio could lose at least $1 million. VaR is also utilized for estimating the capital investment. Moreover, one of the most considerable advantages of VaR is that the approach may compile several related and unrelated risks into general method that is expressed in currency terms of an enterprise or portfolio.

2.2 Conditional Value-at-Risk

Conditional Value at Risk (CVaR) is highly relevant to VaR. CVaR was designed to estimate the risk of extreme loss and was considered as an enhanced approach of VaR that can provide the total amount of expected loss. The user of VaR would ask this question with VaR: “How often may the portfolio lose at least $1 million?”, while with CVaR, the users could have a question “When the portfolio loses higher than $1 million, how much it would lose?”. As such, the value estimation of CVaR is equal or higher than the estimates from VaR. In addition, the relationship between VaR and CVaR is explained in the Figure 1 below.

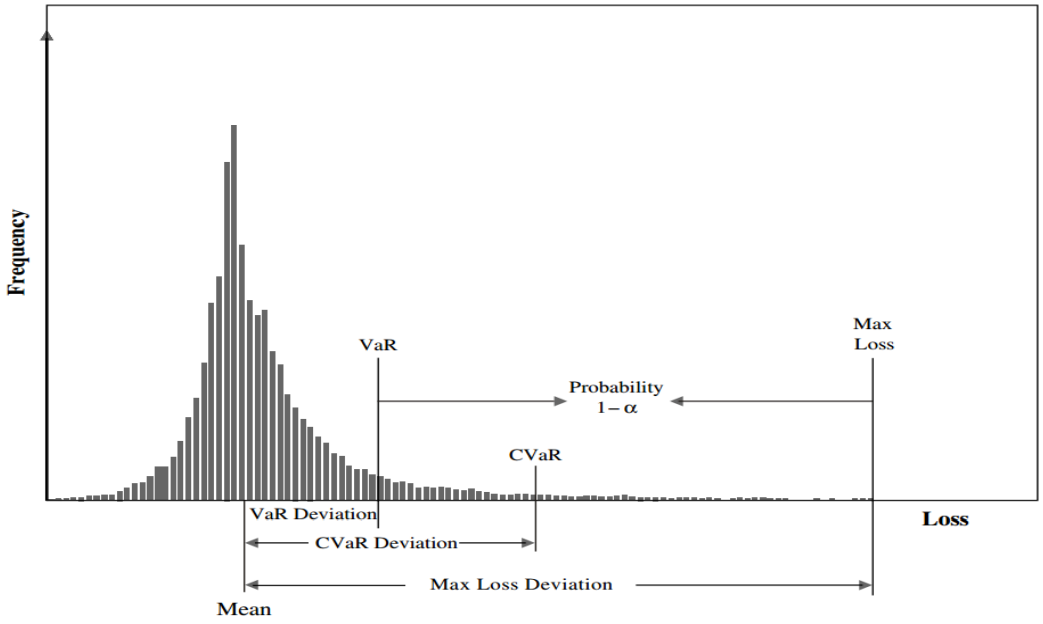

Figure 1

VaR versus CVaR

Source: Sarykalin, Serraino and Uryasev (2008)

CVaR measures the expected loss in the event that it is worse than the VaR. CVaR measure focuses on the tail of the distribution of returns and thus concentrates on extremely unfavorable market conditions and only those returns that are smaller than the VaR are appropriate for calculating the CVaR. In a simple language, CVaR is estimated as the average over the α-quartile of the return distribution, where (1-α) is the so-called confidence level.

The mean excess loss or tail of VaR is the specified name of CVaR. α-VaR is a probability value of the loss and (1-α)*100 is the mean value of the worst losses for CVaR. Uryasev (2000) considered that when estimating for VaR at 95 per cent level of confidence (α = 0.95), the average of the 5 per cent of the worst loss is the value of CVaR.

The limitation of VaR is that it does not satisfy the requirements of "coherent" risk measures and it was not simple to optimize VaR. By contrast, CVaR measures the losses that are occurrence at the end of the tail distribution. Pflug (2000) demonstrated that CVaR is a coherent risk approach and satisfies the desirable characteristics that VaR cannot. Moreover, VaR cannot estimate on the excess or extreme losses value, but CVaR can deal with this estimation. Rockafellar and Uryasev (2000) indicated that CVaR will be more efficient than VaR by utilizing the nonparametric method to estimate the portfolio losses.

However, CVaR also has its disadvantages. Yamai and Yoshiba (2002) demonstrated that CVaR requires a huge number of observations to produce a trustworthy estimation value, and VaR tends to provide the stable results than CVaR. Moreover, the consistency of CVaR mainly bases on the precision of the tail model; hence, CVaR users should fully comprehend these problems.

There are two approaches which are widely used for the estimates of the market risk using VaR and CVaR, namely: (i) the parametric approach; and (ii) the historical approach. Each of these two approaches is briefly discussed in turn below.

2.3 Parametric approach

For the parametric approach, it is essentially assumed that returns of asset/portfolio follow a normal distribution. Based on this assumption, the parametric approach requires two important factors to calculate the VaR and CVaR for an asset, which are the mean and standard deviation that allow sketching the distribution curve. The return is calculated as the logarithmic relative change of price (i.e. the logarithm of the ratio between current price and previous price) complies with the normal distribution assumption to deal with the financial time series observations.

2.4 Historical approach

For the historical approach, actual historical losses in asset/portfolio are collected and sorted from top (best) to bottom (worst). Based on the assumption that the future return could repeat the historical movement, VaR and CVaR are estimated from the actual return information.

3. Empirical Literature

Few studies have concentrated on examining VaR or CVaR approaches. For example, Mausser and Rosen (1999) demonstrated instruments containing the computation of VaR contribution, marginal VaR and risks for portfolio of European options. Authors examined tools by utilizing parametric, delta-normal versions and upgrade these tools to the non-parametric and simulation approach. Gourieroux et al. (2000) examined the ability of VaR by allocating two companies listed on the Paris Bourse (546 observations). The results provided the explanation to employ statistical inference and perform a particular analysis of VaR and the expected loss revealing the loss is greater than a given loss quantile.

Powell, Vo, and Pham (2016) focused on the particular agricultural product that has illustrated consistent supremacy mastery over others. This study generates the competition of various economic circumstances over a twelve years period (divide into four stages: pre-crisis, crisis, post-crisis and post-post crisis) to find out a winner, which contains three elements as returns, resilience (ability to overcome the risk), and teamwork (significant

contribution to portfolio optimization). To achieve this objective, the authors utilized the CVaR to estimate the extreme risk to determine the overall winner. However, in this study, there was no consistency in return rankings from one period to another, with individual commodities shifting from having among the best returns in one period to having among the worst in others. There was found to be a much higher level of consistency in relative risk, with commodities displaying similar risk rankings from one period to another.

Several studies have been investigated the association between VaR and CVaR. For instance, Powell (2007) inspected VaR and CVaR by utilizing a group of Australian industries. In addition, VaR and CVaR values were compared among these industries over time. Moreover, diversified and undiversified VaR, as well as parametric and nonparametric CVaR approaches, are also employed. The study has also established an important link between credit and market risk, which can provide a springboard for the development of further models integrating these aspects.

Gaivoronski and Pflug (2000) computed the optimization for the portfolio by utilizing VaR approach and compared these results with CVaR approach. Moreover, the authors indicated that it is more feasible to calculate for portfolio based on historical data than CVaR or variance optimization. Furthermore, Allen and Powell (2012) employed CVaR to calculate, compare the extremes risk value in mining share portfolios among seven leading mining areas and to demonstrate CVaR ability in optimizing the portfolios and minimize the extreme risk. The authors also observed considerable differences between countries utilizing VaR and CVaR via comparing risk rankings. Furthermore, the result indicated that investors using traditional VaR will not minimize the risk of portfolios.

Rockafellar and Uryasev (2000) developed the model based on CVaR to calculate the credit risk optimization for portfolio of bonds. The findings presented that CVaR results are quite similar to the results acquired with VaR, the expected loss and especially with the minimum expected regret approach. In addition, this model was adopted in the emerging market

bonds.

Recently, VaR and CVaR is applied in measuring the extreme risk in the commodity market. Using the data from S&P Goldman Sachs Commodity Index and its sub-indices including energy, agriculture, livestock, industrial metals, and precious metals, Powell, Vo and Pham (2017) derived a modified measurement of CVaR, economic CVaR, to examine the extreme risk linked to different economic periods. The results suggested that among various commodities, energy experienced the highest risk while livestock displayed the lowest ones during the whole research period. However, when different economic periods were considered, a great variability in the commodities' ranking in terms of relative risk was found.

Tail risk of 24 commodities and the association between commodity tail risk and equity market were investigated by Powell et al. (2017). CVaR at 95% was used to measure the tail risk. The results showed that the relative tail risk rankings changed over time, as well as across different economic periods (i.e. pre GFC, GFC, post GFC, and recent years). The Granger causality estimation results revealed that the causal relationships between commodities market and share market were inconsistent over time in either direction or strength.

The review has shown that there are very few VaR (and even fewer CVaR) studies in the Vietnam context, particularly in relation to industry risk. The few notable studies that have been undertaken in Vietnam have either been on international portfolios, or focusing on different aspects to this study.

4. Methods and Data

4.1 Value-at-Risk

This research intends to utilize the functions of VaR to calculate the market risk of various

industries for each country in the research sample. In relation to the estimate of the Value-at-Risk (VaR), let X be a random variable representing loss. Given a parameter $0 < \alpha < 1$, the α-VaR of X is:

$$VaR_{\alpha}(X) = \min\{c: P(X \leq c) \geq \alpha\}.$$

4.2 Conditional Value at Risk

In this paper, Acerbi's Integral Formula for CVaR is utilized. This widely used formulae measures a conditional expectation of losses beyond VaR which can fail to yield a coherent risk measure. Acebi (2002)'s integral CVaR formulae demonstrated the relationship between various components of the CVaR. This formula is arguably more relevant for practical purposes whereas the traditional CVaR estimates have been widely studied in academia.

Acerbi"s Integral Formula for CVaR can be briefly explained as follows. The CVaR of a random variable X, which represents loss, at the confidence level α can be expressed as follows:

$$CVaR_{\alpha}(X) = \frac{1}{1-\alpha}\int_{\alpha}^{1} VaR_{\beta}(X)d\beta$$

From the above formula, $CVaR_{\alpha}$ can be explained as the average VaR_{β} for $\beta \in [\alpha, 1]$.

For the purpose of illustration, assuming that the loss is distributed continuously and uniformly between 0 and 100, as a result, $f_X(y) = \frac{1}{100}$ $0 \leq y \leq 100$. The VaR at confidence level β is given as VaR_{β} (X) = $100 \times \beta$. Then the CVaR at confidence level α can be

calculated as below:

$$CVaR_{\alpha}(X) = \frac{1}{1-\alpha}\int_{\alpha}^{1} VaR_{\beta}(X)d\beta = \frac{1}{1-\alpha}\int_{\alpha}^{1} 100 \times \beta \, d\beta$$

$$= \frac{100}{1-\alpha}\left[\frac{1}{2}\beta^2\right]_{\alpha}^{1} = 50 \times (1+\alpha)$$

4.3 Data

In this paper, daily data are required from all listed stocks in Vietnam and Malaysia stock markets. 866 stocks in Vietnam and 929 in Malaysia with 11 sectors are collected and then included in the final sample for this study. Data are collected from Bloomberg. We obtain daily returns for 10 years in which the entire period is divided into two periods: the Global Financial Crisis (GFC) period covering 2007-2009 whereas the post-GFC covering the period from 2010 to 2017.

Descriptive statistics are presented in Table 2 below. It can be seen that while the average returns of all sectors in Malaysia lie in the 0.00-0.07% range, some of their counterparts in Vietnam suffer negative average returns (i.e. Real Estate, Industrials, Financials, and Energy). There is a slight difference between the average standard deviation of returns between two countries, which is 2.88% in Vietnam and 2.92% in Malaysia. In addition, Table 2 reveals that the minimum values of most sectors in Vietnam are smaller than in Malaysia. This implies the extreme risk of sectors (which is based on the calculation of lowest observations in the distribution) in Malaysia could be higher than those from Vietnam.

Table 1

Sectoral Breakdown

Sector	Sub-sectors
Utilities	Gas, Electric, Multi, Water
Real Estate	Real Estate
Materials	Metals & Mining, Construction Materials, Chemicals, Paper & Forest Products, Containers & Packaging
Information Technology	Software & Services, Technology & Equipment, Semiconductors & Semiconductor Equipment
Industrials	Transportation, Capital Goods, Commercial Services & Supplies
Health Care	Equipment & Services, Pharmaceuticals & Biotechnology
Financials	Banks, Diversified Financials, Insurance
Energy	Oil & Gas, Energy Equipment & Services
Consumer Discretionary	Media, Hotels Restaurants & Leisure, Retailing, Consumer Durables & Apparel, Automobile & Components
Consumer Staples	Food Beverage & Tobacco, Food & Staples Retailing, Household & Personal Products

Source: Bloomberg.com

Table 2

Daily commodity market price movements in Vietnam and Malaysia (2007–2017)

Sector	Vietnam				Malaysia			
	Max (%)	Min (%)	Average (%)	S.D (%)	Max (%)	Min (%)	Average (%)	S.D (%)
Utilities	10.00	-29.84	0.02	2.33	30.34	-78.97	0.01	1.98
Real Estate	15.00	-66.13	-0.04	2.91	172.22	-65.48	0.04	2.78
Materials	12.20	-44.75	0.00	2.87	140.00	-66.39	0.01	3.12
IT	12.52	-37.63	0.00	3.14	266.67	-78.88	0.07	4.24
Industrials	17.65	-63.33	-0.01	3.14	80.00	-75.09	0.05	3.24
Health Care	10.04	-56.30	0.04	2.69	22.73	-52.44	0.04	2.43
Financials	16.67	-56.72	-0.03	2.88	187.27	-51.18	0.03	2.34
Energy	27.78	-57.42	-0.02	3.21	290.38	-48.10	0.00	3.62
Cons. Stap.	20.61	-48.64	0.01	2.68	227.27	-80.55	0.03	2.56
Cons. Disc.	25.00	-57.01	0.00	2.90	97.50	-79.82	0.01	2.86

5. Empirical Results

Daily VaR and CVaR are calculated at a 95 per cent confidence level using both parametric and historical approaches. Market risks using VaR and CVaR across sectors (industries) in the two sub-periods are presented: (i) *the GFC period* (2007-2009) presented in Table 3 and 4; and (ii) *the post-GFC period* (2010-2017) presented in Table 5 and 6. Relative level of the market risk across sectors is also compared for Vietnam and Malaysia.

In addition, an association among industry rankings between GFC and post-GFC period by utilizing VaR (Table 7) and CVaR (Table 8) in Vietnam is also considered.

Using VaR as the proxy for the market risk, results presented in Table 3 indicate that, as the percentage of total investment, parametric approach appears to present high estimates (i.e. high market risk) in comparison with the historical approach for all industries in Vietnam and Malaysia. In addition, all industries in Vietnam appear to experience higher market risk in comparison with their counterparts from Malaysia under both parametric and historical approaches. The same conclusion can be reached for the post-GFC period as presented in Table 5 below.

When the level of the market risk of different sectors in Vietnam is considered in isolation, it can be concluded that, across the two approaches, *Utilities, Industrials*, and *Consumers Staples* can be considered "low risk" sectors in Vietnam whereas *Real estates, IT*, and *Financials* are at the other extreme of the market risk level in Vietnam. For Malaysia, *Utilities, Energy,* and *Financials* are considered "low risk" in Malaysia. It is interesting to note that *Financial* is considered very low risk whereas this sector belongs to a group of high market risk in Vietnam.

Table 3

Market risk proxied by VaR in Vietnam and Malaysia during GFC (2007-2009)

	VaR 95 per cent during the GFC period							
	Vietnam				Malaysia			
	Values		Ranking		Values		Ranking	
	Parametric	Historical	Parametric	Historical	Parametric	Historical	Parametric	Historical
Utilities	0.0503	0.0479	1	5	0.0269	0.0223	1	1
Real Estate	0.1083	0.0479	10	6	0.0440	0.0363	5	8
Materials	0.0551	0.0482	2	9	0.0541	0.0393	9	9
IT	0.0677	0.0513	9	10	0.0533	0.0409	8	10
Industrials	0.0566	0.0473	3	4	0.0440	0.0363	6	7
Health Care	0.0595	0.0456	7	2	0.0438	0.0320	4	5
Financials	0.0618	0.0480	8	7	0.0309	0.0275	2	2
Energy	0.0583	0.0463	6	3	0.0404	0.0290	3	3
Cons. Stap.	0.0579	0.0455	5	1	0.0499	0.0294	7	4
Cons. Disc.	0.0571	0.0481	4	8	0.0661	0.0340	10	6

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

Table 4

Market risk proxied by CVaR in Vietnam and Malaysia during GFC (2007-2009)

	CVaR 95 per cent in GFC period							
	Vietnam				Malaysia			
	Values		Ranking		Values		Ranking	
	Parametric	Historical	Parametric	Historical	Parametric	Historical	Parametric	Historical
Utilities	0.0934	0.0503	1	8	0.0424	0.0377	1	1
Real Estate	0.5449	0.0482	10	5	0.0734	0.0564	3	7
Materials	0.1327	0.0493	2	7	0.1290	0.0699	7	9
IT	0.1643	0.0559	4	10	0.1271	0.0712	6	10
Industrials	0.1706	0.0479	5	4	0.0794	0.0554	4	6
Health Care	0.2839	0.0473	8	1	0.0843	0.0585	5	8
Financials	0.2128	0.0532	6	9	0.0448	0.0407	2	2
Energy	0.3014	0.0473	9	2	0.1558	0.0450	8	3
Cons. Stap.	0.2441	0.0476	7	3	0.2050	0.0472	9	4
Cons. Disc.	0.1429	0.0491	3	6	0.3471	0.0529	10	5

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

Table 5

Market risk proxied by VaR in Vietnam and Malaysia post-GFC (2010-2017)

	VaR 95 per cent in post-GFC period							
	Vietnam				Malaysia			
	Values		*Ranking*		*Values*		*Ranking*	
	Parametric	Historical	Parametric	Historical	Parametric	Historical	Parametric	Historical
Utilities	0.0367	0.0363	4	6	0.0233	0.0184	3	2
Real Estate	0.0446	0.0347	7	3	0.0302	0.0272	6	6
Materials	0.0411	0.0385	5	7	0.0363	0.0314	8	9
IT	0.0344	0.0304	1	1	0.0484	0.0404	10	10
Industrials	0.0470	0.0427	10	9	0.0260	0.0231	4	4
Health Care	0.0416	0.0344	6	5	0.0404	0.0284	9	8
Financials	0.0366	0.0356	3	4	0.0201	0.0161	1	1
Energy	0.0447	0.0442	8	10	0.0311	0.0275	7	7
Cons. Stap.	0.0358	0.0308	2	2	0.0225	0.0200	2	3
Cons. Disc.	0.0460	0.0419	9	8	0.0279	0.0248	5	5

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

When the market risk is proxied by the CVaR, which is designed to estimate the risk of extreme loss, *Utilities, IT,* and *Financial* appear to suffer a much largest loss, when the extreme risk does occur, in comparison with other industries in Vietnam. It is a surprise for *Financials* which indicate that it is a safe industry in Malaysia. However, when risk does occur, the magnitude of the loss will be very extreme.

Across the two approaches for the post-GFC period, *IT, Consumers Staples* and *Financials* can be considered "low risk" sectors in Vietnam whereas *Industrial, Energy* and *Consumer Discretionary* are at the other extreme of the market risk level in Vietnam. For Malaysia, *Utilities, Consumers Staples* and *Financials* are considered "low risk" in Malaysia. It is interesting to note that, after crisis *IT* is considered very low risk in Vietnam whereas this sector belongs to a group of high market risk in Malaysia.

When the market risk is proxied by the CVaR, which is designed to estimate the risk of extreme loss, *Industrial,* and *Health Care* appear to suffer a much largest loss, when the extreme risk does occur, in comparison with other industries in Vietnam. It is a surprise for *IT* which indicates that it is a safe industry in Vietnam whereas this sector belongs to a group of high market risk in Malaysia.

The level of the market risk under both approaches, being the Parametric and the Historical approaches, indicates that industries in Vietnam and Malaysia have managed to reduce the risk after the GFC. This conclusion is drawn on the basis that the estimates from both VaR and CVaR for all industries in Vietnam and Malaysia during the GFC period (2007-2009) are relatively higher than those from the post-GFC period (2010-2017). The findings are expected but it is interesting to be confirmed in the empirical findings.

We now shift our attention to the market risk level of industries/sectors in Vietnam, and their ranking, for the GFC period (2007-2009) and the post-GFC period (2010-2017) under both parametric and historical approaches. Only estimates from the parametric approach

are presented in Tables 7 and 8 below, it is noted that the findings are similar when the historical approach is considered.

The market risk level using VaR presented in Table 7 indicates that industries have enjoyed a sharp reduction in the post-GFC period (2010-2017) in comparison with the GFC period (2007-2009). *Industrials* is an interesting industry to be considered. While the market risk level has reduced in the post-GFC period, market risk level of this industry is relatively higher than other industries. As a consequence, while the industry is ranked third in the GFC period, it is now ranked 10^{th}, the riskiest industry among all 10 industries in Vietnam, in the post GFC period. Another extreme, *IT* is ranked 9^{th} in the GFC period, the industry has jumped into the ladder of the market, being the "safest" industry in Vietnam after the GFC. These findings highlight the reality that the market risk level may have reduced, there is no guarantee the ranking, representing how relative the marker risk level of the particular industry in comparison with other industries in the same market, to remain unchanged or improved.

In addition, Table 8 below presents the ranking shifts in term of the market risk, measured by CVaR, of various industries in Vietnam between the GFC period and the post-GFC period. The results suggest that while extreme loss has been substantially reduced across industries between the GFC period and the post GFC period, the rankings among industries in Vietnam appear to be stable.

6. Concluding Remarks

Vietnam has emerged as a new economic engine for the South-East Asian region with many important industries. The three pillars contributing the most value to the Vietnam economy over the last decade are agriculture, manufacturing, and food & beverage. In order to maximize the potential benefits from the partnership with any country worldwide, it is time to recognize the important role of sectoral risk, in particular, for key sectors (industries) relative to similar sectors in Malaysia, Vietnam's key market competitor.

Table 6

Market risk proxied by CVaR in Vietnam and Malaysia post-GFC (2010-2017)

	CVaR 95 per cent in post-GFC period							
	Vietnam				Malaysia			
	Value		Ranking		Value		Ranking	
	Parametric	Historical	Parametric	Historical	Parametric	Historical	Parametric	Historical
Utilities	0.0501	0.0466	1	6	0.0531	0.0297	5	2
Real Estate	0.1205	0.0433	9	3	0.0522	0.0420	3	7
Materials	0.0783	0.0480	6	7	0.0934	0.0476	8	9
IT	0.0663	0.0404	4	1	0.1093	0.0637	9	10
Industrials	0.1072	0.0527	8	9	0.0527	0.0352	4	4
Health Care	0.1210	0.0463	10	5	0.1605	0.0411	10	6
Financials	0.0558	0.0455	2	4	0.0509	0.0243	2	1
Energy	0.0649	0.0562	3	10	0.0658	0.0445	7	8
Cons. Stap.	0.0726	0.0415	5	2	0.0403	0.0306	1	3
Cons. Disc.	0.1061	0.0510	7	8	0.0531	0.0380	5	5

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

Table 7

VaR Ranking Shifts in Vietnam

Industry	VaR GFC	VaR post-GFC	Change	VaR Rank GFC	VaR Rank post-GFC
Utilities	0.0503	0.0367	0.0137	1	4
Real Estate	0.1083	0.0446	0.0637	10	7
Materials	0.0551	0.0411	0.0139	2	5
IT	0.0677	0.0344	0.0333	9	1
Industrials	0.0566	0.0470	0.0097	3	10
Health Care	0.0595	0.0416	0.0178	7	6
Financials	0.0618	0.0366	0.0252	8	3
Energy	0.0583	0.0447	0.0137	6	8
Cons. Stap.	0.0579	0.0358	0.0220	5	2
Cons. Disc.	0.0571	0.0460	0.0111	4	9

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

Table 8

CVaR Ranking Shifts in Vietnam

Industry	CVaR GFC	CVaR post-GFC	Change	CVaR Rank GFC	CVaR Rank post-GFC
Utilities	0.0934	0.0501	0.0433	1	1
Real Estate	0.5449	0.1205	0.4244	10	9
Materials	0.1327	0.0783	0.0544	2	6
IT	0.1643	0.0663	0.0980	4	4
Industrials	0.1706	0.1072	0.0634	5	8
Health Care	0.2839	0.1210	0.1628	8	10
Financials	0.2128	0.0558	0.1570	6	2
Energy	0.3014	0.0649	0.2365	9	3
Cons. Stap.	0.2441	0.0726	0.1715	7	5
Cons. Disc.	0.1429	0.1061	0.0368	3	7

Note: Rankings are from 1 (lowest risk) to 10 (highest risk).

This paper is conducted to measure the level of the market risk at the sectoral levels which has attracted great attention from academia, investment bankers, and policymakers for 10 industries/sectors in Vietnam and Malaysia - the most comparable country in the Asia Pacific region to Vietnam. Two periods are considered, including: (i) the GFC period (2007-2009); and (ii) the post-GFC period (2010-2017). The market risk level is measured using the parametric approach and the historical approach for both Value at Risk (VaR), the potential losses in the future over the given time period at a given confidential level, and Conditional Value at Risk (CVaR), which is designed to estimate the risk of extreme loss.

Findings from the paper indicate that, estimating the market risk level using VaR Vietnam's industries have enjoyed a sharp reduction in the post-GFC period in comparison with the GFC period. These findings highlight the reality that the market risk level may have reduced, there is no guarantee the ranking, representing how relative the marker risk level of the particular industry in comparison with other industries in the same market, to remain unchanged or improved. However, CVaR has been substantially reduced across industries between the GFC period and the post GFC period, the ranking among industries appear to be stable.

The empirical findings confirm that Vietnam sectors are relatively riskier than their counterparts in Malaysia and that the market risk level across sectors in both countries has substantially reduced in the post-GFC period. Financials including Banks, Diversified Financials, and Insurance have been largely ignored from the Vietnam Government's focus. This particular industry is considered relatively risky in Vietnam whereas it is ranked as a very safe sector in Malaysia. With the ambition to be a financial hub in the Asia Pacific region in the regional integration and a modern industrial economy, a shift of the attention to this particular and important sector in Vietnam is the near future is strongly recommended.

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