An Analysis of ASEAN+3 Firms' Solvency-based Trading Strategies

Review of Integrative Business & Economics Research

Nongnit Chancharat
Faculty of Business Administration and Accountancy, Khon Kaen University, Khon Kaen, Thailand

Parichat Sinlapates*
Faculty of Business Administration and Accountancy, Khon Kaen University, Khon Kaen, Thailand

ABSTRACT

Since the onset of the COVID-19 pandemic, it has caused a negative impact on the global economy and financial market. This condition impacts the liquidity of firms in several sectors across multiple nations. Several stock markets have seen falls, however there has been significant variance across different nations. This raises the inquiry of which trading technique would be appropriate for an investor to employ to handle the situation. This research presents empirical evidence of solvency premium for the full sample period in China, Japan, South Korea, Malaysia, Singapore, and Thailand. Indonesia and the Philippines do not have solvency premium or discount, whereas Vietnam only has solvency discount. In Indonesia, the Philippines, and Thailand, solvency discounts existed before the COVID-19 pandemic. The discovery suggests innovative approaches that recommend investors to maintain portfolios consisting of highly solvent companies over the whole duration. In addition, the Fama and French (2015) five-factor model provides a limited explanation for the observed solvency premium/discount over the whole data period. The sample period has been divided into two parts: the pre-COVID-19 and the COVID-19 period. Nevertheless, the results obtained from both groups do not display any significant differences when compared to full sample period.

Keywords: Trading strategy, Solvency ratio, Fama and French (2015) five-factor model, COVID-19 pandemic.

Received 6 May 2024 | Revised 25 August 2024 | Accepted 14 December 2024.

1. INTRODUCTION

Since the pandemic of Covid-19 in early 2020, the global pandemic has inflicted severe loss of lives and continues to cause ongoing damage to the global economy and financial market (Indrastuti, 2021). Numerous firms are compelled to cease operations due to the implementation of the shutdown. The disease mitigation measures taken in many nations have resulted in substantial declines in income, an increase in the unemployment rate, and disruptions in the transportation, service, and industrial sectors. (Najmi and Faturohman, 2024). This situation effects firm's liquidity of almost all industries in many countries. Several stock markets have had drops exceeding 30% from their most recent peaks, however there has been significant variance across different nations. The IMF's global growth estimate indicates that the term "slower global growth" is really an

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

understatement for the slower growth of developed markets (DM). Smaller economies in emerging markets (EM) countries account for a significant portion of global growth, already contributing 74%. As a result, the stock market in ASEAN countries attracts investor attention due to an influx of funds into the financial markets of these countries. This prompts the inquiry of what would be the suitable trading technique for an investor to use in order to address the circumstance.

Investors often engage in stock trading based on certain trading strategies. A trading strategy is a systematic approach designed to generate profits by taking positions in the stock market, either by buying (going long) or selling (going short). Some commonly recognized trading methods include momentum, contrarian, and value vs growth. There are several advantages to employing a trading strategy for both institutional and individual investors. Mullainathan (2002) argues that categorization reduces the complexity of decision-making and enables effective processing of huge amounts of information. Allocating funds among several investment types is more straightforward than choosing securities from a multitude of listed its. According to Sharpe (1992), categorizing assets helps investors evaluate the performance of money managers. This is because each trading technique creates peer groups of investors who follow the same approach. A novel investment trading method has emerged as a result of identifying a certain collection of assets that consistently yield higher profits. This paper presents a solvency trading method that involves taking both long and short bets depending on the solvency ratios of corporations. Gaining comprehension of the novel trading techniques provides supplementary avenues for engaging in stock trading and generating returns amidst the atypical circumstances.

Solvency refers to the capacity firms have to fulfill their financial liabilities. Solvent businesses are defined as firms that have enough cash flows to meet all of their financial commitments. The solvency ratio assesses the ability of companies to generate enough cash flow to cover their immediate and future financial obligations. The solvency ratio is commonly employed as a means of forecasting business insolvency (Geng et al., 2015). Increased solvency reduces the likelihood of defaulting on financial commitments. The ratio of solvency is additionally used to assess the risk of firms. Businesses with low solvency are those that do not have enough cash flow to meet all of their financial commitments. These firms are considered distressed in terms of their stock value (Wruck, 1990). Firms with strong fundamentals, such as a high level of solvency, have a tendency to attract investors who are interested in investing in their stocks. This, in turn, results in better returns on the stocks. Previous research has not investigated the correlation between the solvency ratio and stock returns.

There are several methods to assess the solvency of firms. Firms' leverage is a reliable indicator of their solvency. Leverage often refers to the extent to which companies utilize fixed-income instruments in relation to their equity. The firm's increased utilization of debt financing results in a corresponding increase in its financial leverage. The significant degree of leverage results in increased interest payments, which have a detrimental impact on the earnings per share of firms. The increasing prominence of fixed-income assets, such as preferred stocks and debt, results in an escalation of financial risk for shareholders. The significant degree of leverage might indicate a low level of solvency. Previous research has indicated a negative correlation between leverage and stock performance (George and Hwang, 2010, Hall and Weiss, 1967, Arditti, 1967). In contrast, prior research such as Gomes and Schmid (2010), Fama and French (1992), and Bhandari (1988), have discovered a positive correlation between

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

financial leverage and stock performance. Research has identified an unconnected link between the two variables under consideration, as demonstrated by Obreja (2013).

Financial distress is directly linked to the solvency of firms. Financial hardship arises when the cash flow of a business is inadequate to fulfill its current financial commitments, resulting in a low degree of solvency (Wruck, 1990). Prior research indicates firms with high distress risk are associated with higher anticipated stock returns. In theory, a firm that assumes a high level of risk is rewarded with a correspondingly high level of return. The financially troubled company, which has a higher level of risk, should have a positive correlation with the anticipated stock return. Previous investigations, however, discovered a contrasting indication of this correlation. Vassalou and Xing (2004) and Griffin and Lemmon (2002) discovered that indicators of financial hardship had a favourable correlation with stock returns. Subsequent research yielded conflicting findings. Several studies (Hilscher et al. (2011), Avramov et al. (2009), Garlappi, Shu, and Yan (2008), Campbell, Hilscher, and Szilagyi (2008), and Dichev (1998)) have discovered an inverse correlation between financially struggling businesses and their stock returns, utilizing credit risk, bankruptcy risk, failure risk, and default risk, as measures of financial hardship. The connection between financial difficulty and stock returns is neither consistently increasing or decreasing, according to Garlappi and Yan (2011).

The studies of the relation between firms' solvency represented by financial leverage and financial distressed and stock return also gain interested from many researchers. Nevertheless, the earlier studies suggested ambiguous results and there is no evidence in ASEAN+3 markets. This paper intends to empirically investigate the presence of a solvency premium in ASEAN+3 markets, addressing the gap in the existing literature, if any of solvency premium, is it explained by five-factor model of Fama and French (2015). The solvency trading strategy involving long positions on firms with high solvent conditions and short positions on firms with poor solvent conditions is also intended to be provided by this study. To provide an alternative option for investors within unpredictable circumstances.

2. LITERATURE REVIEW

2.1 Financial leverage and returns

Prior research has discovered conflicting data about the correlation between financial leverage and stock performance. Several research, including Johnson et al. (2011), George and Hwang (2010), and Penman et al. (2007), have found a adverse correlation among stock returns and financial leverage. The inverse correlation implies that a significant amount of debt results in diminished returns on stocks. According to Johnson et al. (2011), they examined whether the natural selection of leverage influences the negative correlation between stock returns and financial leverage. The researchers used a commonly accepted method to measure the variation in profitability and risk across different sections, indicating that there is a negative correlation between financial leverage and stock returns. In their study, George and Hwang (2010) discovered a strong negative correlation between stock returns and financial leverage, as shown by the endogenous options of the model of asset pricing and financial leverage. They clarified that firms with high costs opt for modest leverage to prevent financial difficulties but maintain exposure to systemic risk. Their findings indicate that there is a statistically significant relationship between the return of stock and low financial leverage profits, both in terms of risk-adjusted returns and raw returns. Penman et al.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

(2007) discovered an adverse correlation among anticipated the stock returns and financial leverage that is a component of the book-to-price ratio.

Conversely, Gomes and Schmid (2010) found the correlation among returns of stock and leverage. Researchers discovered that the correlation between profits and leverage is intricate and relies on the investment possibilities available to companies. There exists a notable association between investment and financial leverage. High financial leverage's firms are often well-established firms with substantial book assets and limited development prospects. The researchers discovered that their findings align with Fama and French (1992), which states that an increase in market leverage is associated with greater stock returns, whereas an increase in book leverage is associated with worse stock returns. The study utilized a quantitative model that incorporated economic mechanisms. This quantitative model successfully replicates the observed correlation between stock returns and financial leverage, even when controlling for both book-to-market ratio and size. Livdan et al. (2009) also investigate the relationship among returns of stock and financial leverage by considering financial limitations. The theory of leverage states that a considerable market leverage is associated with a high level of stock's beta, assuming that the beta of asset remains constant. This means that there will be larger returns of stock. The inflexibility of the mechanism is responsible for the increase in asset beta when debt is larger. Companies with higher leverage have a significant amount of debt that must be paid off before obtaining finance for future investments. Companies with a high amount of debt appear to be limited, inflexible, and more prone to risk. Their findings suggest that the inflexibility of the mechanism posits a convex correlation among expected profits and financial leverage. Additionally, they proposed that the inflexibility mechanism, which is rooted in the positive correlation between financial constraints and stock returns, offers a comprehensive analysis of the relationship among stock returns, financial leverage, and risk.

Prior research has identified an uncorrelated connection between leverage and the financial returns of companies. In the study of Hurdle (1974), which discovered an uncorrelated connection between the rate of return and the degree of leverage. Hurdle (1974) endeavored to examine the correlation between risk, return of stock, and leverage. This study discovered that the degree of financial leverage had no impact on a stock return. This study also noted that the degree of leverage has a distinct impact on a return of stock. Obreja (2013) employed the dynamic model to elucidate the correlation among the degree of financial leverage and premium of (a) value and (b) book leverage. This study explained that companies with a substantial degree of financial and operating leverage have a greater level of risk premium. Firms that have a high level of debt tend to have a lower ratio of debt to equity. The book explains that the variation in expected stock returns is specifically attributed to the book-to-market ratio. It further states that businesses with low productivity tend to have excessive financial leverage. The book leverage ratio is not a reliable indicator for explaining the disparity in expected returns. Businesses that have extremes of book-to-leverage ratios may experience increased risk premiums. Grauer and Hakansson (1985) asserted that the act of rebalancing among the primary asset classes significantly enhances investment performance. Although leverage does not enhance portfolio performance, it does increase the performance of portfolios when used in conjunction with a growth optimum strategy.

2.2 Financial distress and returns

To examine the correlation among book-to-market ratio, distress risk, and returns of stock. Among the subset of distressed firms, which encompasses firms exhibiting a

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

significant level of distress risk as determined by Ohlson's O-score, the change in returns among equities with a high book-to-market ratio and those with a low book-to-market ratio is twice as substantial compared to non-distressed firms. They explained that the three-factor from Fama and French (1993) model and the differences in economic fundamentals economic fundamentals were inadequate in explaining this heightened return. It has been found that both the effects of size and value are linked to distress risk. Distressed firms see the most significant increases in value during the earning release, aligning with the concept of mispricing. In addition, Vassalou and Xing (2004) used Merton (1974) option-pricing model to assess the likelihood of default and present a reasoning based on risk for both its impact on value and the consequences of size. Their research revealed a correlation between the size and value impacts and financial difficulty. Value stocks have superior stock returns compared to growth equities in periods of elevated default risk. Moreover, they said that firms with a high likelihood of default see greater gains in stock returns compared to firms with a low likelihood of default, specifically targeting small businesses with a significant ratio of book value to market value. Additionally, Da and Gao (2010) demonstrated that the default risk premium identified by Vassalou and Xing (2004) is not produced by default risk but rather by short-term reversal.

Previous research has identified a adverse correlation among financial strain and return of stock. Dichev (1998) employed risk of bankruptcy as a measure of a firm's financial difficulty. The findings indicated that an elevated level of bankruptcy risk did not result in increased returns. Regrettably, firms experiencing financial trouble and a high likelihood of bankruptcy tend to have stock returns that are below the norm. Therefore, the risk-based view is insufficient in fully explaining the book-to-market impact. According to, Garlappi and Yan (2011), financial hardship has a role in comprehending the variation in stock returns across various firms. Campbell et al. (2008) categorized stocks according to their assessment of the likelihood of failure. They assessed the risk and returns of portfolios for the period from 1981 to 2003. They discovered that financially unstable businesses with a high risk of failing to produce abnormal and below-average results. More precisely, a portfolio that includes firms in a financial crisis has lower investment returns but has higher market betas, standard deviations, and exposure to value risks and small-cap, as defined by Fama and French (1993). This finding diverges from the prior study that demonstrated that the value and size impact had a role in the premium of financial distress. Furthermore, Garlappi et al. (2008) utilized default risk as a measure of the firm's financial difficulty. The evidence suggests that a higher default risk is not associated with higher expected profits. Their findings indicate that there is a positive correlation among average of stock return and default risk for firms with low level shareholder benefit, while there is a negative correlation for firms with high shareholder advantage. This suggests that distressed firms with high shareholder advantage tend to have lower expected stock returns across different sectors.

In addition, Avramov et al. (2009) said that in the event where distress risk is systematic, financial institutions that have a high credit risk would provide stock returns that are equivalent to those that have a low credit risk status. They employed a significant degree of credit risk to elucidate the situation of the financially troubled firm. These empirical findings, however, indicated that firms with low credit risk tend to generate high stock returns, indicating a negative correlation between credit risk and anticipated stock returns. In the study of Campbell et al. (2011), which introduced a firm failure model that incorporates market-based variables to predict future financial difficulty. The

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

study focused on the period from 1981 to 2008. It was discovered that distressed stock generally performs worse than safe stock. Investors who take on the considerable risk of distressed stocks are not being adequately compensated for their efforts. The underperforming stock has a poor return across all size and value categories. Avramov et al. (2013) investigated how financial distress is interpreted in relation to the abnormal returns of trading strategies based on anomalies. These strategies include price momentum, earning momentum, credit risk, idiosyncratic volatility, capital investment, and dispersion gain profitability. The study especially examined the profitability of investors who sell stocks with significant credit risk that are undergoing worsening financial circumstances. The value approach, on the other hand, generates profits by purchasing stocks with a high level of credit risk that are able to withstand financial difficulties and achieve significant returns. The accruals anomaly persists consistently among enterprises with both high and low credit risk, regardless of the prevailing financial circumstances. In this study, Nugraha et al. (2023) examine the impact of liquidity, profitability, and solvency on the returns of stock of manufacturing companies listed on the Indonesia Stock Exchange between 2016 and 2020. The research findings suggest that liquidity has a favorable and statistically significant influence on stock returns, whereas profitability has an unfavorable and statistically negligible impact on stock returns. In addition, solvency has little impact on stock returns. This outcome is associated with the study conducted by Pratama et al. (2022).

3. RESEARCH QUESTIONS AND HYPOTHESES

The deficiency in the existing body of knowledge has been noted in the preceding section. The objective of this study is to examine the presence of a solvency premium in ASEAN+3 markets and determine if it can be attributed to risk factors. In order to fill the void in the current body of knowledge, the subsequent research inquiries are investigated:

3.1 Does trading strategy based on firm's solvency generate abnormal return in ASEAN+3 markets?

In order to address the first research question, the stocks from the ASEAN+3 markets, which include all listed firms, are categorized into two groups: high solvency stocks and low solvency stocks. This categorization is based on their solvency ratio, with the stocks being arranged in ascending order. The initial research inquiry gives rise to the primary hypothesis that may be empirically tested:

> *H_1: Long positions on high solvency equities and short positions on poor solvency stocks in ASEAN+3 markets result in profitable trading strategies.*

3.2 Is the observed solvency premium (if any) can be explained by Fama and French (2015) five-factor model in ASEAN+3 markets?

It is crucial to carefully select the most suitable asset pricing model from a range of models in order to analyze the correlation between solvency premium and risk. Research indicates that the multifactor approach is more effective than the one-factor model in explaining market anomalies, such as the solvency premium. Fama and French (2015) five-factor model, classified as a multifactor model, was introduced to improve performance of the Fama and French (1993) three-factor model. The Fama and French (2015) five-factor model has been selected to analyze the correlation between solvency

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

premium and risk in this study. Consequently, a second hypothesis that may be tested arises:

H_2: The solvency premium is explained by time-varying risk using Fama and French (2015) five-factor model

4. METHODOLOGY AND SAMPLE

4.1 Defining factors from Fama and French (2015) five factors model.

The Fama and French (2015) five factors are derived from the combination of six portfolios that are weighted based on size and book-to-market ratio, six portfolios that are weighted based on size and operational profitability, and six portfolios that are weighted based on size and investment. The five elements consist of market factors, size factor, value factors, profitability factors, and investment factors.

4.1.1 Market factor (Rm-Rf) is an excess return on the market. Specifically, this factor represents the different between market return and risk-free return of all listed firms in ASEAN+3 markets.

4.1.2 Size factor (SMB) is constructed by the average return on the nine small portfolios minus the average return on the nine big portfolios. This study calculates SMB as follows:

SMB(B/M) =1/3 (Small Value + Small Neutral + Small Growth) - 1/3 (Big Value + Big Neutral + Big Growth) *1.1*

SMB(OP) =1/3 (Small Robust + Small Neutral + Small Weak) - 1/3 (Big Robust + Big Neutral + Big Weak) *1.2*

SMB(INV) =1/3 (Small Conservative + Small Neutral + Small Aggressive) - 1/3 (Big Conservative + Big Neutral + Big Aggressive) *1.3*

SMB = 1/3 (SMB(B/M) + SMB(OP) + SMB(INV)) *1.4*

4.1.3 Value factor (HML) is constructed by the average return on the two value portfolios minus the average return on the two growth portfolios. This study calculates HML as follows:

HML =1/2 (Small Value + Big Value) - 1/2 (Small Growth + Big Growth) *2*

4.1.4 Profitability factor (RMW) is constructed by the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. This study calculates RMW as follows:

RMW =1/2 (Small Robust + Big Robust) - 1/2 (Small Weak + Big Weak) *3*

4.1.5 Investment factor (CMA) is constructed by the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios. This study calculates CMA as follows:

CMA =1/2 (Small Conservative + Big Conservative)- 1/2 (Small Aggressive + Big Aggressive) *4*

4.2 Methodology

4.2.1 The existence of solvency premium

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

This approach is utilized to construct portfolios and assess the portfolio's return. This examination is anticipated to yield a statistical positive significant deviation from zero in returns of solvency portfolios (long minus short portfolios).

The solvency portfolios are constructed based on three financial ratios: long-term debt to asset ratio, debt to equity ratio, and cash flow to debt ratio, arranged in ascending order. The ratios are measured using a three-month data lag from the financial report. Once the ratios have been determined, they are employed as criterion to determine solvent stocks. Each quarter, the sample equities are categorized into 10 portfolios constructed on their solvency ratios, arranged in ascending order. The solvency of a firm is negatively correlated with its long-term debt-to-asset ratio and debt-to-equity ratio. This implies that a greater ratio results in worse solvency, while a lower ratio leads to higher solvency. Nevertheless, the solvency of a firm is directly correlated with its cash flow to debt ratio, indicating that a higher ratio results in more solvency, while a lower ratio results in less solvency. The solvency premium is calculated by taking a long position on high solvency stocks and taking a short position on poor solvency stocks. After establishing the long and short positions, portfolios are maintained for six specific periods: 3, 6, 9, 12, 15, and 18 months. Upon the conclusion of the designated duration of ownership. Once the portfolios have been created and maintained for each specific period, the returns of the portfolios with high solvency and low solvency are computed. The solvency premium is calculated by subtracting the average returns of low solvency portfolio from the average returns of high solvency portfolio. If the positive disparity between the returns of a high solvency portfolio and a low solvency portfolio exists, it indicates the presence of a solvency premium. However, in the case of an adverse result, there is clear evidence of solvency discount.

4.2.2 The impact of five factors from Fama and French (2015) model on Solvency premium

The five-factor model of Fama and French (2015) is applied in this study to investigate whether the solvency premium in ASEAN+3 markets is explained by the five-factor model by Fama and French (2015). The five-factor model of Fama and French (2015) is described below:

$$Sol_t = \alpha_t + \beta_t^{RmRf} RmRf_t + \beta_t^{SMB} SMB_t + \beta_t^{HML} HML_t + \beta_t^{RMW} RMW_t + \beta_t^{CMA} CMA_t + \varepsilon_t \quad 5$$

where (a) Sol_t is the solvency premium or discount in time t, (b) $RmRf_t$ represents market factor, market excess return in time t, (c) SMB_t represents size factor in time t, and (d) HML_t represents value factor in time t. (e) RMW_t represents profitability factor in time t. CMA_t represents investment factor in time t. $\alpha_i, \beta_i^{RmRf}, \beta_i^{SMB}, \beta_i^{HML}, \beta_t^{RMW}$, and β_t^{CMA} are parameters to be estimated. $\varepsilon_{i,t}$ is the residual return of stock i in time t.

4.3 Sample description

Among the stocks included in the sample are those that are listed in ASEAN+3 markets including China (CN), Indonesia (ID), Japan (JP), South Korea (KR), Malaysia (MY), the Philippines (PH), Singapore (SG), Thailand (TH), and Vietnam (VN). Myanmar (Burma), Cambodia, Brunei, and Laos are excluded due to the limitation of available data. To test the hypotheses, relevant indicators were collected from Refintiv Eikon. The sample period starts from March 2015 to December 2021. The financial sector is excluded from this sample because their asset structure is different from other non-

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

financial stocks. The data of Fama and French (2015) five-factor model are constructed following section 4.1. According to the announcement of first COVID19 case in December 2019, the sample period is divided into 2 sub-periods; pre-COVID19 period (before December 2019) and COVID19 period (from December 2019).

Table 1: Data description for portfolio sorting variables

Sample description for portfolio sorting variables							
ASEAN+3 markets	Portfolio sorting variables	Min	Max	Mean	Median	S.D.	Firm-month Observations
CN	LDA	0.0000	0.6675	0.1121	0.0825	0.1107	40,701
	DE	0.0000	1497.6607	1.9999	0.7316	26.6090	40,701
	CFD	-0.6036	0.4215	0.0465	0.0468	0.0725	40,701
ID	LDA	0.0000	55.9661	0.2474	0.1301	1.6267	26,598
	DE	0.0000	694.8592	1.1352	0.5137	15.1144	26,598
	CFD	-1.3131	10.6025	0.0662	0.0426	0.3327	26,598
JP	LDA	0.0000	0.8393	0.1044	0.0731	0.1054	41,592
	DE	0.0000	43.1217	0.2889	0.3311	20.2498	41,592
	CFD	-1.3624	0.3834	0.0618	0.0657	0.0701	41,592
KR	LDA	0.0000	29.7728	0.1218	0.0746	0.6476	27,741
	DE	0.0000	49.1097	1.0336	0.5948	2.6149	27,741
	CFD	-1.1819	1.1441	0.0418	0.0457	0.0965	27,741
MY	LDA	0.0000	0.8237	0.1199	0.0770	0.1267	38,811
	DE	0.0000	125.6251	0.7119	0.3669	2.7096	38,811
	CFD	-0.6207	0.8078	0.0383	0.0347	0.0894	38,811
PH	LDA	0.0000	100.6241	0.0174	0.1992	9.2829	8,527
	DE	0.0000	21.2872	0.9324	0.7088	3.1558	8,527
	CFD	-0.2971	0.3665	0.0484	0.0464	0.0783	8,527
SG	LDA	0.0000	1.3717	0.1566	0.1207	0.1472	23,416
	DE	0.0000	40.9417	0.8253	0.4937	2.0258	23,416
	CFD	-3.8839	0.8817	0.0356	0.0349	0.1407	23,416
TH	LDA	0	0.6875	0.1484	0.1096	0.1429	29,759
	DE	0	154.1626	0.9956	0.5619	3.5658	29,760
	CFD	-0.8288	0.5057	0.0579	0.0577	0.1001	29,759
VN	LDA	0.0000	12.8398	0.1267	0.0724	0.4208	13,612
	DE	0.0000	185.2762	1.1825	0.6345	6.1348	13,612
	CFD	-0.4406	0.8148	0.0482	0.0411	0.1144	13,612

Note: China (CN), Indonesia (ID), Japan (JP), South Korea (KR), Malaysia (MY), the Philippines (PH), Singapore (SG), Thailand (TH), Vietnam (VN), Long-term debt-to-asset ratio (LDA), Debt-to-equity ratio (DE), and Cash flow-to-debt ratio (CFD)

Table 1 shows descriptive statistic of portfolio sorting variables including long-term debt to asset ratio, debt to equity ratio, and cash flow to debt ratio for China, Indonesia, Japan, South Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. The long-term debt to asset ratio in China exhibits the lowest standard deviation, indicating greater consistency compared to other countries, whereas the Philippines has the largest standard deviation. The debt-to-equity ratio in Singapore has the lowest standard deviation, indicating that the debt-to-equity ratio in China is more constant in

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

comparison to other countries. The cash flow to debt ratio in Singapore has the lowest standard deviation, indicating greater consistency compared to other regions.

Table 2: Data description for Fama/French factor model

Sample description for Fama/French factor model							
ASEAN+3 markets	Fama/French factors	Min	Max	Mean	Median	S.D.	Number of Observations
CN	Rm-Rf	-0.2392	0.1479	-0.0009	0.0006	0.0570	71
	SMB	-0.0001	0.0001	0.0000	0.0000	0.0000	71
	HML	-0.0281	0.0370	0.0030	0.0030	0.0134	71
	RMW	-0.0490	0.0342	0.0001	0.0031	0.0160	71
	CMA	-0.0384	0.0307	0.0008	0.0025	0.0144	71
JP	Rm-Rf	-0.1233	0.0993	0.0044	0.0107	0.0498	83
	SMB	-0.0058	0.0036	0.0000	0.0000	0.0009	83
	HML	-0.0554	0.0340	0.0012	0.0023	0.0119	83
	RMW	-0.0655	0.0531	0.0031	0.0032	0.0209	83
	CMA	-0.0579	0.0423	0.0029	0.0047	0.0202	83
KR	Rm-Rf	-0.1462	0.1514	0.0064	0.0125	0.0544	65
	SMB	-0.0002	0.0002	0.0000	0.0000	0.0001	65
	HML	-0.0512	0.0434	-0.0028	-0.0065	0.0212	65
	RMW	-0.0554	0.0695	-0.0002	0.0024	0.0221	65
	CMA	-0.0719	0.0796	-0.0008	-0.0023	0.0279	65
MY	Rm-Rf	-0.1299	0.3455	0.0059	-0.0050	0.0768	71
	SMB	-0.0003	0.0003	0.0000	0.0000	0.0001	71
	HML	-0.0430	0.0911	0.0000	-0.0014	0.0196	71
	RMW	-0.0722	0.0703	0.0011	0.0027	0.0219	71
	CMA	-0.0488	0.0466	0.0012	0.0003	0.0208	71
SG	Rm-Rf	-0.2004	0.1597	0.0041	0.0056	0.0506	80
	SMB	-0.0003	0.0006	0.0000	0.0000	0.0001	80
	HML	-0.0729	0.1185	0.0055	0.0031	0.0289	80
	RMW	-0.0551	0.0603	0.0012	0.0000	0.0253	80
	CMA	-0.0658	0.0938	0.0043	0.0021	0.0328	80
TH	Rm-Rf	-0.5211	0.3125	0.0007	0.0025	0.1154	82
	SMB	-0.0008	0.0156	0.0002	0.0000	0.0017	82
	HML	-0.0259	0.2718	0.0039	-0.0001	0.0335	82
	RMW	-0.0586	0.2949	0.0022	0.0013	0.0372	82
	CMA	-0.0601	0.0602	0.0004	0.0001	0.0196	82
VN	Rm-Rf	-0.2915	0.2458	0.0294	0.0352	0.0807	65
	SMB	-0.0003	0.0005	0.0000	0.0000	0.0002	65
	HML	-0.0636	0.0598	0.0002	-0.0013	0.0273	65
	RMW	-0.0802	0.1380	0.0097	0.0056	0.0368	65
	CMA	-0.1692	0.1530	0.0065	0.0059	0.0552	65

Note: China (CN), Japan (JP), South Korea (KR), Malaysia (MY), Singapore (SG), Thailand (TH), Vietnam (VN), Long-term debt-to-asset ratio (LDA), Market factor (Rm-Rf), Size factor (SMB), Value factor (HML), Profitability factor (RMW), and Investment factor (CMA)

Additionally, summary statistics of Fama/French factors including market factor, size factor, value factor, profitability factor, and investment factor for China, Japan, South Korea, Malaysia, Singapore, Thailand, and Vietnam are shown on Table 2. The size factor

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

has lowest standard deviation, indicating greater consistency in all countries compared to other factors.

5. RESULTS

5.1 The existence of solvency premium

Table 3 reports an existence of solvency premium when assessing portfolios using the long-term debt-to-asset ratio. To examine *H_1: Long positions on high solvency equities and short positions on poor solvency stocks in ASEAN+3 markets result in profitable trading strategies*, this test is expected to have positive and significant results to confirm the existence of the solvency premium. When considering the full sample period, there is statistically significant evidence (at a 5% significance level) of a solvency premium in South Korea when portfolios are held for 15 and 18 months. The solvency premiums are 0.0113 and 0.0109, respectively. The solvency premiums are observed in Malaysia for all holding periods except for 18 months. The solvency premiums are 0.0091, 0.0104, 0.0118, 0.01227, and 0.0139, respectively. The solvency premium was not evident in China, Indonesia, Japan, the Philippines, Singapore, Thailand, and Vietnam. There is a slight indication of a solvency discount in Vietnam when portfolios are held for 15 and 18 months. The solvency discounts are 0.0141 and 0.0139, respectively.

Table 3: The solvency premium or discount resulted from assessing portfolios using the long-term debt-to-asset ratio.

ASEAN+3 markets		Holding Periods					
		3	6	9	12	15	18
Full sample period							
CN	HS-LS	0.0067	0.0053	0.0041	0.0013	0.0004	0.0042
	(t-stat)	(1.5875)	(1.2242)	(0.8720)	(0.2743)	(0.0819)	(0.8251)
ID	HS-LS	0.0037	-0.0029	-0.0023	-0.0071	-0.0077	-0.0061
	(t-stat)	(0.6499)	(-0.4920)	(-0.3836)	(-1.0996)	(-1.1510)	(-0.8694)
JP	HS-LS	0.0020	0.0013	0.0011	0.0030	-0.0004	-0.0028
	(t-stat)	(0.6846)	(0.4368)	(0.3492)	(0.9584)	(-0.1067)	(-0.6964)
KR	HS-LS	0.0016	0.0015	0.0028	0.0082	0.0113	0.0109
	(t-stat)	(0.3065)	(0.2627)	(0.4677)	(1.3984)	(2.0536**)	(2.1170**)
MY	HS-LS	0.0091	0.0104	0.0118	0.0127	0.0139	0.0088
	(t-stat)	(2.0772**)	(2.0700**)	(2.2697**)	(2.3327**)	(2.4490**)	(1.5834)
PH	HS-LS	0.0042	0.0014	-0.0038	-0.0058	-0.0001	0.0006
	(t-stat)	(0.7759)	(0.2264)	(-0.6286)	(-0.8514)	(-0.0135)	(0.0850)
SG	HS-LS	0.0025	0.0027	0.0037	0.0025	0.0024	0.0037
	(t-stat)	(0.3762)	(0.4238)	(0.5820)	(0.3545)	(0.3754)	(0.5733)
TH	HS-LS	0.0025	0.0023	0.0027	0.0026	0.0012	0.0030
	(t-stat)	(0.4924)	(0.4808)	(0.5594)	(0.4895)	(0.2369)	(0.5306)
VN	HS-LS	0.0014	-0.0048	-0.0093	-0.0060	-0.0141	-0.0132
	(t-stat)	(0.1837)	(-0.5963)	(-1.2332)	(-0.7733)	(-1.7688*)	(-1.6934*)
pre-COVID19 period							
CN	HS-LS	0.0071	0.0071	0.0062	0.0022	-0.0051	0.0022
	(t-stat)	(1.2289)	(1.2319)	(0.9486)	(0.3034)	(-0.6943)	(0.2775)
ID	HS-LS	0.0040	-0.0012	0.0093	0.0072	0.0080	0.0084
	(t-stat)	(0.3595)	(-0.0920)	(0.6048)	(0.4355)	(0.4255)	(0.4070)
JP	HS-LS	-0.0011	-0.0020	-0.0016	-0.0005	-0.0068	-0.0117
	(t-stat)	(-0.2140)	(-0.3650)	(-0.2555)	(-0.0833)	(-0.9287)	(-1.2233)
KR	HS-LS	-0.0043	-0.0106	-0.0144	-0.0040	0.0044	0.0147
	(t-stat)	(-0.5719)	(-1.3140)	(-1.7663*)	(-0.3876)	(0.3720)	(1.1393)

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

MY	HS-LS	0.0047	0.0082	0.0107	0.0145	0.0144	0.0133
	(t-stat)	(0.9854)	(1.5504)	(1.8936*)	(1.8583*)	(2.0444*)	(1.6408)
PH	HS-LS	0.0105	0.0089	0.0111	0.0014	0.0175	0.0203
	(t-stat)	(1.0944)	(0.7232)	(0.8042)	(0.0820)	(0.8557)	(0.8717)
SG	HS-LS	0.0060	0.0060	0.0062	0.0012	0.0026	0.0077
	(t-stat)	(0.5738)	(0.5913)	(0.6191)	(0.1130)	(0.2446)	(0.7483)
TH	HS-LS	-0.0053	-0.0032	-0.0009	-0.0030	-0.0026	-0.0024
	(t-stat)	(-0.6843)	(-0.4160)	(-0.1108)	(-0.3293)	(-0.2427)	(-0.1977)
VN	HS-LS	0.0161	0.0012	-0.0060	-0.0055	-0.0282	-0.0267
	(t-stat)	(1.3862)	(0.0751)	(-0.4654)	(-0.3836)	(-2.2094**)	(-2.3802**)
COVID19 period							
CN	HS-LS	0.0065	0.0043	0.0031	0.0009	0.0023	0.0048
	(t-stat)	(1.1042)	(0.7241)	(0.4949)	(0.1494)	(0.3913)	(0.7726)
ID	HS-LS	0.0035	-0.0038	-0.0079	-0.0131	-0.0133	-0.0103
	(t-stat)	(0.5641)	(-0.6465)	(-1.5074)	(-2.1974**)	(-2.1753**)	(-1.5114)
JP	HS-LS	0.0037	0.0029	0.0023	0.0043	0.0016	-0.0005
	(t-stat)	(0.9973)	(0.7864)	(0.5878)	(1.2133)	(0.3768)	(-0.1232)
KR	HS-LS	0.0050	0.0077	0.0107	0.0133	0.0137	0.0098
	(t-stat)	(0.7037)	(1.0217)	(1.4027)	(1.8792*)	(2.2097**)	(1.7616*)
MY	HS-LS	0.0114	0.0115	0.0123	0.0121	0.0138	0.0077
	(t-stat)	(1.8374*)	(1.6321)	(1.7434*)	(1.7405*)	(1.9217*)	(1.1403)
PH	HS-LS	0.0004	-0.0027	-0.0110	-0.0088	-0.0063	-0.0051
	(t-stat)	(0.0615)	(-0.4213)	(-1.8310*)	(-1.3851)	(-0.9952)	(-0.7515)
SG	HS-LS	0.0006	0.0011	0.0027	0.0031	0.0023	0.0026
	(t-stat)	(0.0689)	(0.1357)	(0.3289)	(0.3351)	(0.3009)	(0.3439)
TH	HS-LS	0.0072	0.0053	0.0044	0.0049	0.0026	0.0046
	(t-stat)	(-1.0999)	(0.8572)	(0.7472)	(0.7682)	(0.4356)	(0.7157)
VN	HS-LS	-0.0076	-0.0081	-0.0108	-0.0062	-0.0090	-0.0093
	(t-stat)	(-0.8011)	(-0.8763)	(-1.1622)	(-0.6658)	(-0.9289)	(-0.9760)

Note: China (CN), Indonesia (ID), Japan (JP), South Korea (KR), Malaysia (MY), the Philippines (PH), Singapore (SG), Thailand (TH), Vietnam (VN), High solvency portfolio (HS), Low solvency portfolio (LS), and *, ** and *** denote the statistical significance levels of 10%, 5% and 1%, respectively.

In the period before COVID-19, there is mild evidence of solvency premium in Malaysia for holding durations of 9 months (0.0107), 12 months (0.0145), and 15 months (0.0144). As well as the full sample period, the solvency discount exists in Vietnam. When portfolios are held for a duration of 15 and 18 months. The solvency discounts are 0.0282 and 0.0267, respectively. During the COVID19 period, the solvency premium exists in South Korea and Malaysia while the solvency discount exists in Indonesia and the Philippines. Neither solvency premium nor discount can be found in Indonesia and the Philippines when the full sample is applied. However, if we narrow our attention, the solvency discount is present just during the COVID-19 era.

Table 4 shows the presence of a solvency premium when evaluating portfolios based on the debt-to-equity ratio. Statistically significant evidence (at a 5% significance level) of a solvency premium in Singapore is seen when portfolios are held for 3, 6, and 9 months, considering the entire sample period. The solvency premiums are 0.0149, 0.0157, and 0.0115, respectively. In Thailand, the solvency discount is evident when holding periods last 15 months. The solvency discount detected is 0.0081. China, Indonesia, Japan, South Korea, Malaysia, the Philippines, and Vietnam do not offer solvency premiums or discounts.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 4: The solvency premium or discount resulted from assessing portfolios using the debt-to-equity ratio.

ASEAN+3 markets		Holding Periods					
		3	6	9	12	15	18
Full sample period							
CN	HS-LS	0.0062	0.0065	0.0063	0.0047	0.0039	0.0032
	(t-stat)	(1.6026)	(1.5831)	(1.5197)	(1.1168)	(0.9448)	(0.7327)
ID	HS-LS	0.0014	0.0003	0.0019	0.0052	0.0055	0.0016
	(t-stat)	(0.2289)	(0.0527)	(0.2745)	(0.7380)	(0.6788)	(0.1925)
JP	HS-LS	0.0004	-0.0007	-0.0002	0.0005	0.0008	0.0014
	(t-stat)	(0.1200)	(-0.1802)	(-0.0491)	(0.1100)	(0.1757)	(0.3200)
KR	HS-LS	-0.0016	-0.0040	-0.0024	-0.0008	-0.0024	-0.0027
	(t-stat)	(-0.2562)	(-0.6109)	(-0.3774)	(-0.1244)	(-0.4182)	(-0.4925)
MY	HS-LS	0.0041	0.0022	0.0214	0.0273	0.0331	0.0321
	(t-stat)	(0.7765)	(0.3955)	(0.8848)	(1.0916)	(1.2677)	(1.1754)
PH	HS-LS	0.0054	-0.0055	-0.0015	-0.0025	-0.0022	0.0068
	(t-stat)	(0.5789)	(-0.9346)	(0.2552)	(0.4171)	(0.3582)	(1.0295)
SG	HS-LS	0.0149	0.0157	0.0115	0.0106	0.0071	0.0106
	(t-stat)	(2.5252**)	(2.6224**)	(1.9848*)	(1.7255)	(1.0423)	(1.4772)
TH	HS-LS	0.0028	-0.0017	-0.0054	-0.0048	-0.0081	-0.0056
	(t-stat)	(0.6955)	(-0.0653)	(-1.3665)	(-1.1216)	(-1.6928*)	(-1.1004)
VN	HS-LS	0.0070	0.0017	0.0025	-0.0009	0.0030	-0.0013
	(t-stat)	(0.9434)	(0.2074)	(0.2827)	(-0.1039)	(0.3195)	(-0.1293)
pre-COVID19 period							
CN	HS-LS	0.0062	0.0056	0.0026	0.0032	-0.0026	0.0026
	(t-stat)	(1.0108)	(0.8573)	(0.3439)	(0.4111)	(-0.3528)	(0.3590)
ID	HS-LS	0.0103	0.0143	0.0210	0.0266	0.0314	0.0375
	(t-stat)	(1.1810)	(1.3264)	(1.5937)	(1.8917*)	(1.7939*)	(1.8046*)
JP	HS-LS	-0.0046	-0.0075	-0.0070	-0.0076	-0.0115	-0.0083
	(t-stat)	(-0.8782)	(-1.2588)	(-1.0500)	(-1.0795)	(-1.4525)	(-0.9485)
KR	HS-LS	-0.0060	-0.0036	-0.0023	-0.0045	0.0040	0.0048
	(t-stat)	(-0.6082)	(-0.3538)	(-0.2135)	(-0.4552)	(0.4097)	(0.4587)
MY	HS-LS	-0.0057	-0.0064	-0.0083	-0.0001	0.0010	0.0063
	(t-stat)	(-0.8141)	(-0.8384)	(-0.9668)	(-0.0119)	(0.1339)	(0.7728)
PH	HS-LS	0.0199	-0.0090	0.0056	0.0019	0.0052	0.0325
	(t-stat)	(0.8793)	(-0.7183)	(0.4248)	(0.1380)	(0.3552)	(2.4132**)
SG	HS-LS	0.0236	0.0269	0.0170	0.0163	0.0112	0.0138
	(t-stat)	(2.1321**)	(2.5734**)	(1.8926*)	(1.8076*)	(0.9283)	(1.0117)
TH	HS-LS	0.0025	-0.0056	-0.0113	-0.0139	-0.0102	-0.0041
	(t-stat)	(0.3965)	(-1.0722)	(-1.8808*)	(-2.1551**)	(-1.4687)	(-0.5130)
VN	HS-LS	0.0010	0.0082	0.0096	0.0003	0.0136	0.0131
	(t-stat)	(0.0791)	(0.5423)	(0.6097)	(0.0182)	(0.9334)	(0.7365)
COVID19 period							
CN	HS-LS	0.0063	0.0069	0.0081	0.0054	0.0062	0.0033
	(t-stat)	(1.2339)	(1.3192)	(1.6100)	(1.0529)	(1.2532)	(0.6408)
ID	HS-LS	-0.0041	-0.0073	-0.0072	-0.0038	-0.0037	-0.0089
	(t-stat)	(-0.5101)	(-0.9352)	(-0.8811)	(-0.4892)	(-0.4212)	(-1.0692)
JP	HS-LS	0.0030	0.0026	0.0026	0.0034	0.0046	0.0039
	(t-stat)	(0.6601)	(0.5297)	(0.5402)	(0.6434)	(0.9215)	(0.8026)
KR	HS-LS	0.0009	-0.0042	-0.0025	0.0007	-0.0045	-0.0048
	(t-stat)	(0.1162)	(-0.4953)	(-0.3089)	(0.0921)	(-0.6557)	(-0.7428)
MY	HS-LS	0.0094	0.0064	0.0341	0.0374	0.0431	0.0388
	(t-stat)	(1.3046)	(0.8566)	(0.9939)	(1.0955)	(1.2627)	(1.1298)
PH	HS-LS	-0.0034	-0.0036	-0.0049	-0.0044	-0.0049	-0.0007

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

	(t-stat)	(-0.5550)	(-0.5887)	(-0.8158)	(-0.6979)	(-0.7307)	(-0.1007)
SG	HS-LS	0.0102	0.0103	0.0092	0.0084	0.0058	0.0097
	(t-stat)	(1.4925)	(1.4210)	(1.2481)	(1.0913)	(0.7096)	(1.1669)
TH	HS-LS	0.0029	0.0004	-0.0025	-0.0010	-0.0073	-0.0061
	(t-stat)	(0.5664)	(0.0691)	(-0.4971)	(-0.1940)	(-1.2187)	(-0.9762)
VN	HS-LS	0.0106	-0.0018	-0.0009	-0.0015	-0.0008	-0.0055
	(t-stat)	(1.1812)	(-0.1833)	(-0.0831)	(-0.1383)	(-0.0668)	(-0.4638)

Note: China (CN), Indonesia (ID), Japan (JP), South Korea (KR), Malaysia (MY), the Philippines (PH), Singapore (SG), Thailand (TH), Vietnam (VN), High solvency portfolio (HS), Low solvency portfolio (LS), and *, ** and *** denote the statistical significance levels of 10%, 5% and 1%, respectively.

Prior to the COVID-19 pandemic, there is strong statistical evidence (with a significance level of 5%) indicating the presence of a solvency premium in Singapore for all holding durations, except for 15 and 18 months. The solvency premiums are 0.0236, 0.0269, 0.0170, and 0.0163, respectively. Solvency premiums are also evident in Indonesia and the Philippines. Both solvency premium and discount are not present in Indonesia and the Philippines when the entire sample is used. However, the solvency discount is only observed during the pre-COVID19 period if we focus our attention on a certain timeframe. There is mild evidence of solvency premium in Indonesia for holding durations of 12 months (0.0266), 15 months (0.0314), and 18 months (0.0375). In addition, the solvency premium in the Philippines is 0.0325 when a holding term of 18 months is used. Conversely, in Thailand, a solvency discount is applicable to portfolios maintained for a period of 9 and 12 months. The solvency discounts are 0.0113 and 0.0139, respectively. There is no indication of either a solvency premium or discount during the COVID-19 era.

Table 5 presents the existence of a solvency premium when assessing portfolios using the cash flow-to-debt ratio. Across the whole sample period, there is clear evidence of a solvency premium in China, Japan, Malaysia, and Thailand. Solvency premiums are present in all holding periods in China. The solvency premiums are as follows: 0.0131, 0.0124, 0.0140, 0.0106, 0.0096, and 0.0085. In Japan, the solvency premium is 0.0087, whereas in Malaysia it is 0.0126 when the portfolio is maintained for 3 months. The solvency premium in Thailand is observable when holding durations extend between 3 and 6 months. The solvency premiums are 0.0142 and 0.0092, respectively. Indonesia, South Korea, the Philippines, Singapore, and Vietnam do not provide solvency premiums or discounts.

Table 5: The solvency premium or discount resulted from assessing portfolios using the cash flow-to-debt ratio.

ASEAN+3 markets		Holding Periods					
		3	6	9	12	15	18
Full sample period							
CN	HS-LS	0.0131	0.0124	0.0140	0.0106	0.0096	0.0085
	(t-stat)	(2.2866**)	(3.1502***)	(3.5299***)	(2.3719**)	(2.0728**)	(1.6972*)
ID	HS-LS	0.0077	-0.0009	-0.0013	0.0021	0.0003	0.0004
	(t-stat)	(1.2577)	(-0.1470)	(-0.2064)	(0.3622)	(0.0422)	(0.0648)
JP	HS-LS	0.0087	0.0046	0.0007	0.0012	0.0004	0.0020
	(t-stat)	(2.3412**)	(1.3237)	(0.1952)	(0.3405)	(0.1097)	(0.7165)
KR	HS-LS	0.0095	0.0045	0.0063	0.0043	0.0047	0.0069
	(t-stat)	(1.3552)	(0.6360)	(0.9551)	(0.6533)	(0.6776)	(1.0682)
MY	HS-LS	0.0126	0.0062	-0.0123	-0.0204	-0.0173	-0.0153
	(t-stat)	(2.0443**)	(1.0466)	(0.5668)	(-0.9850)	(-0.7440)	(-0.6279)
PH	HS-LS	0.0112	0.0016	0.0057	0.0087	0.0075	0.0006

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

	(t-stat)	(1.6306)	(0.2254)	(0.7981)	(1.2481)	(1.1191)	(0.0892)
SG	HS-LS	0.0022	0.0008	-0.0027	-0.0012	-0.0013	0.0047
	(t-stat)	(0.2835)	(0.0936)	(-0.3872)	(-0.1675)	(-0.1692)	(0.5860)
TH	HS-LS	0.0142	0.0092	0.0059	0.0029	-0.0069	-0.0073
	(t-stat)	(3.3663***)	(2.1638**)	(1.5916)	(0.8865)	(-1.1453)	(-0.9339)
VN	HS-LS	0.0111	0.0090	0.0030	-0.0010	-0.0059	-0.0083
	(t-stat)	(1.6269)	(1.3819)	(0.4270)	(-0.1539)	(-0.8618)	(-1.1945)
pre-COVID19 period							
CN	HS-LS	0.0029	0.0109	0.0141	0.0119	0.0105	0.0064
	(t-stat)	(0.2422)	(2.1774**)	(2.5181**)	(1.9479*)	(1.5011)	(0.6629)
ID	HS-LS	0.0112	0.0033	0.0051	0.0043	-0.0034	-0.0014
	(t-stat)	(1.9116*)	(0.6370)	(0.7613)	(0.4907)	(-0.3423)	(-0.1016)
JP	HS-LS	0.0104	0.0023	-0.0017	0.0011	0.0025	0.0073
	(t-stat)	(1.4745)	(0.3558)	(-0.2647)	(0.1535)	(0.4298)	(1.5053)
KR	HS-LS	0.0027	-0.0025	0.0056	0.0073	0.0097	0.0157
	(t-stat)	(0.2203)	(-0.2216)	(0.6250)	(0.9860)	(1.0572)	(1.4646)
MY	HS-LS	0.0139	0.0112	0.0108	0.0114	0.0000	-0.0077
	(t-stat)	(2.2464**)	(1.7994*)	(1.5452)	(1.3764)	(0.0024)	(-0.7765)
PH	HS-LS	0.0156	0.0053	0.0117	0.0157	0.0052	-0.0140
	(t-stat)	(1.4865)	(0.4592)	(0.9756)	(1.0855)	(0.3908)	(-0.9656)
SG	HS-LS	0.0150	0.0205	0.0109	0.0029	0.0071	0.0117
	(t-stat)	(1.1209)	(1.4453)	(0.8307)	(0.2105)	(0.5394)	(0.7704)
TH	HS-LS	0.0269	0.0192	0.0103	0.0101	0.0069	0.0066
	(t-stat)	(4.7332***)	(3.2856***)	(1.6738)	(1.6175)	(1.0474)	(0.8363)
VN	HS-LS	0.0310	0.0289	0.0264	0.0183	0.0049	-0.0169
	(t-stat)	(2.7825***)	(2.7536**)	(1.9518*)	(1.2843)	(0.3424)	(-1.3292)
COVID19 period							
CN	HS-LS	0.0193	0.0133	0.0140	0.0101	0.0093	0.0091
	(t-stat)	(3.4954***)	(2.4216**)	(2.6550**)	(1.7263*)	(1.6005)	(1.5517)
ID	HS-LS	0.0056	-0.0032	-0.0043	0.0012	0.0015	0.0009
	(t-stat)	(0.6098)	(-0.3561)	(-0.5125)	(0.1615)	(0.2064)	(0.1359)
JP	HS-LS	0.0078	0.0057	0.0017	0.0013	-0.0003	0.0006
	(t-stat)	(1.8015*)	(1.3771)	(0.3878)	(0.3027)	(-0.0874)	(0.1907)
KR	HS-LS	0.0136	0.0083	0.0066	0.0031	0.0029	0.0043
	(t-stat)	(1.6040)	(0.9167)	(0.7523)	(0.3495)	(0.3290)	(0.5569)
MY	HS-LS	0.0119	0.0038	-0.0218	-0.0321	-0.0225	-0.0172
	(t-stat)	(1.3348)	(0.4588)	(-0.7147)	(-1.1440)	(-0.7453)	(-0.5655)
PH	HS-LS	0.0085	-0.0004	0.0029	0.0057	0.0084	0.0048
	(t-stat)	(0.9387)	(-0.0405)	(0.3222)	(0.7308)	(1.0607)	(0.7013)
SG	HS-LS	-0.0046	-0.0087	-0.0085	-0.0027	-0.0039	0.0029
	(t-stat)	(-0.4783)	(-0.8710)	(-1.0348)	(-0.3147)	(-0.4290)	(0.3086)
TH	HS-LS	0.0065	0.0037	0.0037	0.0000	-0.0118	-0.0114
	(t-stat)	(1.2284)	(0.7033)	(0.7000)	(0.0043)	(-1.7685*)	(-1.7261*)
VN	HS-LS	-0.0009	-0.0018	-0.0082	-0.0091	-0.0097	-0.0057
	(t-stat)	(-0.1131)	(-0.2240)	(-1.0389)	(-1.2284)	(-1.2461)	(-0.7027)

Note: China (CN), Indonesia (ID), Japan (JP), South Korea (KR), Malaysia (MY), the Philippines (PH), Singapore (SG), Thailand (TH), Vietnam (VN), High solvency portfolio (HS), Low solvency portfolio (LS), and *, ** and *** denote the statistical significance levels of 10%, 5% and 1%, respectively.

Before the outbreak of the COVID-19 pandemic, there is substantial evidence suggesting the existence of a solvency premium in China, Indonesia, Malaysia, Thailand, and Vietnam. The solvency premiums in China for the holding periods of 6 months, 9 months, and 12 months are 0.0109, 0.0141, and 0.0119, respectively. The solvency premiums in Malaysia are 0.0139 and 0.0112, whereas in Thailand they are 0.0269 and 0.0192. In Vietnam, the solvency premiums for the 3-month, 6-month, and 9-month

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

holding periods are 0.0310, 0.0289, and 0.0264, respectively. During the COVID-19 period in China, solvency premiums were seen for all holding periods except 15 and 18 months. The solvency premiums are 0.0193, 0.0133, 0.0140, and 0.0101, in that order. In Thailand, the solvency premium transformed into a solvency discount with the emergence of COVID-19. The solvency discounts for portfolios held for 15 and 18 months are 0.0118 and 0.0114, respectively.

5.2 The impact of five factors from Fama and French (2015) model on Solvency premium

Table 6 reports whether the observed solvency premium/discount can be explained by Fama and French (2015) five-factor model in ASEAN+3 markets. To examine *H_2: The solvency premium is explained by time-varying risk using Fama and French (2015) five-factor model*, this test is expected to have statistically significant coefficient of five-factor; market factor, size factor, value factor, profitability factor, and investment factor; to confirm the relationship between solvency premium/discount and five-factor from Fama and French (2015). When considering the full sample period, the Fama and French (2015) five-factor provides a limited explanation for the observed solvency premium/discount. The adjusted r-square values are below 39%. The Fama and French (2015) five-factor model failed to account for the solvency premium in Thailand and Vietnam. The solvency premium in Japan and Malaysia can be attributed to market factors. The value factor also offers an explanation for the solvency premium in Malaysia and Singapore. The solvency premium in China, South Korea, and Malaysia can be attributed to the investment factor.

Table 6: The influence of the five-factor model proposed by Fama and French (2015) on the solvency premium or discount.

ASEAN+3 markets	Factors of Fama-French model						
	intercept (t-stat)	RmRf (t-stat)	SMB (t-stat)	HML (t-stat)	RMW (t-stat)	CMA (t-stat)	Adj.RSQ
Full sample period							
CN	-0.0149 (-3.6960***)	0.0392 (0.5065)	10.8471 (0.0713)	0.5175 (1.5596)	0.2489 (0.6256)	-0.8310 (-2.0959**)	3.63%
JP	-0.0082 (-2.5823**)	-0.3193 (-4.8253***)	-6.1620 (-1.4729)	0.3856 (1.3675)	-0.1354 (-0.2717)	0.2537 (0.4912)	29.90%
KR	0.0114 (2.0921**)	-0.1217 (-1.1812)	82.0351 (1.0221)	0.0918 (0.3086)	0.1972 (0.6594)	0.5594 (2.2887**)	9.15%
MY	0.0116 (2.3430**)	0.2156 (3.2821***)	-13.9618 (-0.1883)	-0.9243 (-3.1608***)	0.4162 (1.5842)	0.5136 (1.7096*)	24.60%
SG	0.0146 (2.4126***)	-0.1726 (-1.4367)	-24.2182 (-0.4804)	0.4667 (1.7140*)	0.3024 (1.093)	-0.2106 (-0.7928)	39.00%
TH	-0.0129 (-3.1418***)	-0.0022 (-0.0622)	104.4693 (1.1203)	-0.1840 (-0.7202)	0.2279 (0.8705)	-0.0986 (-0.3816)	0.23%
VN	-0.0158 (-1.8193*)	-0.0811 (-0.7784)	-29.6981 (-0.5492)	0.2615 (0.8029)	0.5109 (1.5351)	0.0001 (0.0002)	6.10%
pre-COVID19 period							
CN	-0.0121 (-2.5566**)	0.1323 (1.3915)	14.8006 (0.06831)	0.3100 (0.7157)	-0.1878 (-0.3343)	-0.3702 (-0.7093)	0.00%
JP	-0.0096 (-2.3354**)	-0.2977 (-3.6868***)	1.2103 (0.0669)	0.7434 (1.4157)	-0.3862 (-0.4946)	0.8111 (0.9788)	31.20%
KR	0.0062 (1.1048)	-0.2125 (-1.6955*)	56.8343 (0.7133)	-0.0803 (-0.2596)	-0.4650 (-1.4719)	0.9469 (3.1808***)	19.70%

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

MY	0.0120	0.1624	-86.1840	0.0613	0.2923	0.2051	0.00%
	(2.1893*)	(1.1368)	(-0.4042)	(0.1184)	(0.5220)	(0.5948)	
SG	0.0204	0.0891	-81.8497	0.1619	0.6878	-0.2766	4.28%
	(2.8450***)	(0.5256)	(-1.0377)	(0.4732)	(1.8305*)	(-0.6820)	
TH	-0.0172	-0.0224	68.3000	-0.3674	0.2158	0.1562	10.40%
	(-4.1361***)	(-0.4525)	(0.6042)	(-1.2190)	(0.7720)	(0.5482)	
VN	-0.0245	-0.0390	33.0555	-0.0267	0.4962	-0.5260	0.00%
	(-2.4656**)	(-0.3166)	(0.5668)	(-0.0594)	(1.3445)	(-1.8195*)	
COVID19 period							
CN	-0.0225	-0.2230	52.4037	1.2301	0.6312	-1.6959	23.70%
	(-3.0844***)	(-1.5499)	(0.2348)	(2.2760**)	(1.1039)	(-2.7077**)	
JP	-0.0053	-0.3681	-7.5833	0.1592	-0.1497	-0.0589	30.40%
	(-0.9897)	(-2.9158***)	(-1.6325)	(0.4707)	(-0.2259)	(-0.0883)	
KR	0.0211	-0.1551	48.7134	-0.4711	1.4681	0.5112	13.00%
	(1.7663*)	(-0.9122)	(0.2585)	(-0.7273)	(2.2066**)	(1.2225)	
MY	0.0099	0.2319	-10.2108	-1.3530	0.3017	0.9102	34.70%
	(1.0236)	(2.5703**)	(-0.1052)	(-3.1359***)	(0.8139)	(1.5855)	
SG	0.0068	-0.3113	17.0369	0.8596	0.1400	-0.3220	5.74%
	(0.6326)	(-1.6693)	(0.2405)	(1.7439*)	(0.2871)	(-0.8174)	
TH	-0.0026	0.0374	-243.6175	0.4546	0.4151	-0.5237	0.00%
	(-0.2760)	(0.6390)	(-1.0929)	(0.9029)	(0.6182)	(-1.0132)	
VN	-0.0068	-0.1981	-48.7549	0.1690	0.6418	0.2217	18.90%
	(-0.4352)	(-1.0537)	(-0.4049)	(0.3343)	(1.0082)	(0.5714)	

Note: China (CN), Japan (JP), South Korea (KR), Malaysia (MY), Singapore (SG), Thailand (TH), Vietnam (VN), Long-term debt-to-asset ratio (LDA), Market factor (Rm-Rf), Size factor (SMB), Value factor (HML), Profitability factor (RMW), Investment factor (CMA) and *, ** and *** denote the statistical significance levels of 10%, 5% and 1%, respectively.

During the pre-COVID19 period. Similar to the whole study period, the Fama and French (2015) five-factor model offers a restricted explanation for the observed solvency premium/discount. The adjusted R-squared values are less than 31.2%. The market, profit, and investment factors possess the capacity to explain the solvency premium. In Japan, the solvency premium is mostly attributed to market factors, but in South Korea, it is primarily attributed to investment factors. The results of the COVID-19 period are also displayed in Table 4. The Fama and French (2015) five-factor model, like the whole research period, provides a limited explanation for the observed solvency premium/discount. The adjusted R-squared values are less than 34.7%. The solvency premium in China, Japan, South Korea, Malaysia, and Singapore may be explained by factors such as the market, value, profit, and investment.

6. CONCLUSIONS

This study confirms that solvency premium/discount exists in ASEAN+3 markets. The findings suggest that there is solvency premium when examining the whole sample period in China, Japan, South Korea, Malaysia, Singapore, and Thailand. Neither solvency premium nor discount can be found in Indonesia and the Philippines while only solvency discount is observed in Vietnam.

Stocks exhibiting strong solvency in Indonesia and the Philippines may not provide the solvency premium owing to several structural and market-specific variables. In Indonesia and the Philippines, investors frequently choose high-growth prospects over mere balance sheet reliability (solvency). Numerous high-solvency firms in these areas are stable yet mature, resulting in constrained development potential and diminished investor appeal. Moreover, elevated solvency often signifies prudent

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

financial management; nevertheless, it may also suggest that the company is not actively seeking development prospects. Investors may opt to deploy capital to firms with greater growth potential, despite the associated marginally elevated risk. In Vietnam, investors frequently emphasize growth potential rather than balance sheet robustness. If investors redirect their attention to faster-growing or higher-yielding assets, high-solvency companies may encounter diminished demand, resulting in decreased pricing. High-solvency stocks are often associated with established enterprises with constrained growth potential. If investors anticipate growth that fails to materialize, they may get disinterested and divest, resulting in price decreases despite robust solvency.

However, the result from Indonesia and the Philippines becomes increasingly obvious when the sample period is split into two groups: the time before COVID-19 and the period during COVID-19. Before the emergence of COVID-19, holding portfolios that had high solvency levels led to a significant high in returns, sometimes referred to as a solvency premium. On the other hand, there is a statistically significant decrease in returns (solvency discount) seen over the COVID-19 period.

The solvency premium exists as a result of firms' anxiety over their liquidity. This finding suggests that investors have apprehensions regarding the solvency of firms. Insolvent firms are those that lack adequate cash flows to meet all of their financial obligations. These firms are considered distressed in terms of their stock value (Wruck, 1990). Firms with strong underlying financial stability, such as high solvency, have a tendency to attract investors who are interested in investing in their stocks. This, in turn, results in better returns on the stocks. Therefore, investors focus on the degree of risk associated with an investment.

The presence of solvency discounts in certain countries like Indonesia, the Philippines, and Thailand before the COVID-19 pandemic can be explained by the study conducted by Gomes and Schmid (2010). Their research shows that the connection between the solvency of a firm and its returns is complex and depends on its investment opportunities. High solvency within businesses requires a significant amount of cash flow to be held. Keeping a large amount of cash incurs a significant opportunity cost for potential investments, which indicates a negative sign to investors. Furthermore, in theory, a solvent-deficient firm that carries a high level of risk can be compensated by a correspondingly high level of return. The financially unstable firm with a greater level of risk should have a positive correlation with the expected stock return. Therefore, before to the pandemic, investors were actively searching for firms that might provide them with the greatest returns, regardless of the level of risk involved.

The Fama and French (2015) five-factor model provides a restricted explanation for the observed solvency premium/discount for the whole data period. The sample period is divided into two distinct groups: the time prior to the onset of COVID-19 and the period during the pandemic. However, the results obtained from these two groups do not exhibit any significant differences when compared to the data obtained from the whole sample period. The market, value, investment factors are the primary component that accounts for the observed solvency premium.

In conclusion, this study provides the empirical evidence of solvency discount during the pre-COVID19 period and solvency premium during the pandemic. This finding presents novel strategies that recommend investors to maintain portfolios consisting of highly solvent firms throughout the crisis, and conversely, to avoid those with low solvency. To provide an alternative option for investors within the unpredictable circumstances. Because the transaction cost was not taken into consideration in this

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

research, it is the limitation of this study that the transaction cost is not taken into account.

ACKNOWLEDGEMENTS

We gratefully acknowledge the financial support from the Faculty of Business Administration and Accountancy, Khon Kaen University [grant number 006/2564]. Furthermore, express gratitude to the anonymous reviewer for their constructive remarks and recommendations.

REFERENCES

[1] ARDITTI, F. D. 1967. Risk and the required return on equity. *The Journal of Finance,* 22**,** 19-36.
[2] AVRAMOV, D., CHORDIA, T., JOSTOVA, G. & PHILIPOV, A. 2009. Credit ratings and the cross-section of stock returns. *Journal of Financial Markets,* 12**,** 469-499.
[3] AVRAMOV, D., CHORDIA, T., JOSTOVA, G. & PHILIPOV, A. 2013. Anomalies and financial distress. *Journal of Financial Economics,* 108**,** 139-159.
[4] CAMPBELL, J. Y., HILSCHER, J. & SZILAGYI, J. 2008. In search of distress risk. *The Journal of finance,* 63**,** 2899-2939.
[5] CAMPBELL, J. Y., HILSCHER, J. D. & SZILAGYI, J. 2011. Predicting financial distress and the performance of distressed stocks. *Journal of Investment Management*.
[6] DA, Z. & GAO, P. 2010. Clientele change, liquidity shock, and the return on financially distressed stocks. *Journal of Financial and Quantitative Analysis,* 45**,** 27-48.
[7] DICHEV, I. D. 1998. Is the risk of bankruptcy a systematic risk? *the Journal of Finance,* 53**,** 1131-1147.
[8] FAMA, E. F. & FRENCH, K. R. 1992. The cross-section of expected stock returns. *the Journal of Finance,* 47**,** 427-465.
[9] FAMA, E. F. & FRENCH, K. R. 1993. Common risk factors in the returns on stocks and bonds. *Journal of financial economics,* 33**,** 3-56.
[10] FAMA, E. F. & FRENCH, K. R. 2015. A five-factor asset pricing model. *Journal of financial economics,* 116**,** 1-22.
[11] GARLAPPI, L., SHU, T. & YAN, H. 2008. Default risk, shareholder advantage, and stock returns. *The Review of Financial Studies,* 21**,** 2743-2778.
[12] GARLAPPI, L. & YAN, H. 2011. Financial distress and the cross-section of equity returns. *The journal of finance,* 66**,** 789-822.
[13] GENG, R., BOSE, I. & CHEN, X. 2015. Prediction of financial distress: An empirical study of listed Chinese companies using data mining. *European Journal of Operational Research,* 241**,** 236-247.
[14] GEORGE, T. J. & HWANG, C.-Y. 2010. A resolution of the distress risk and leverage puzzles in the cross section of stock returns. *Journal of financial economics,* 96**,** 56-79.
[15] GOMES, J. F. & SCHMID, L. 2010. Levered returns. *The journal of finance,* 65**,** 467-494.
[16] GRAUER, R. R. & HAKANSSON, N. H. 1985. Returns on Levered, Actively Managed Long-Run Portfolios of Stocks, Bonds, and Bills, 1934–1983. *Financial Analysts Journal,* 41**,** 24-43.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[17] HALL, M. & WEISS, L. 1967. Firm size and profitability. *The Review of Economics and Statistics***,** 319-331.
[18] HURDLE, G. J. 1974. Leverage, risk, market structure and profitability. *The Review of Economics and Statistics***,** 478-485.
[19] INDRASTUTI, D. K. 2021. Impact of confirmed, death, and recovered cases of COVID-19 toward stock exchange composite index. *Review of Integrative Business and Economics Research,* 10**,** 1-10.
[20] JOHNSON, T. C., CHEBONENKO, T., CUNHA, I., D'ALMEIDA, F. & SPENCER, X. 2011. Endogenous leverage and expected stock returns. *Finance Research Letters,* 8**,** 132-145.
[21] LIVDAN, D., SAPRIZA, H. & ZHANG, L. 2009. Financially constrained stock returns. *The Journal of Finance*, 64**,** 1827-1862.
[22] MERTON, R. C. 1974. On the pricing of corporate debt: The risk structure of interest rates. *The Journal of finance*, 29**,** 449-470.
[23] MULLAINATHAN, S. 2002. Thinking through categories. Working Paper, Harvard University.
[24] NAJMI, N. & FATUROHMAN, T. 2024. Does the COVID-19 Pandemic Affect Consumption Decision in the New Normal Era? A Consumer Vulnerability Perspective in Indonesia. *Review of Integrative Business and Economics Research,* 13**,** 420-440.
[25] NUGRAHA, A. S., KARYATUN, S. & DIGDOWISEISO, K. 2023. The Effect of Liquidity, Profitability and Solvency on Stock Returns In Manufacturing Companies Listed on The Indonesia Stock Exchange For The 2016-2020 Period. *INTERNATIONAL JOURNAL OF ECONOMICS, MANAGEMENT, BUSINESS, AND SOCIAL SCIENCE (IJEMBIS)*, 3**,** 1164-1171.
[26] OBREJA, I. 2013. Book-to-market equity, financial leverage, and the cross-section of stock returns. *The Review of financial studies,* 26**,** 1146-1189.
[27] PENMAN, S. H., RICHARDSON, S. A. & TUNA, I. 2007. The book-to-price effect in stock returns: accounting for leverage. *Journal of accounting research,* 45**,** 427-467.
[28] PRATAMA, M. I. S., AJI, T. S. & WITJAKSONO, A. D. 2022. Analysis of the Effect of Profitability Ratio, Solvency Ratio, Market Value Ratio, Inflation, and Exchange Rate on Stock Return (Case Study of the Agriculture Sector on the IDX from 2016 to 2019). *International Journal of Multicultural and Multireligious Understanding,* 9**,** 166-175.
[29] SHARPE, W. F. 1992. Asset allocation: Management style and performance measurement. *Journal of portfolio Management,* 18**,** 7-19.
[30] VASSALOU, M. & XING, Y. 2004. Default risk in equity returns. *The journal of finance,* 59**,** 831-868.
[31] WRUCK, K. H. 1990. Financial distress, reorganization, and organizational efficiency. *Journal of financial economics,* 27**,** 419-444.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)