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The Predictive Ability of U.S. Stock Market Skewness on Indonesian Stock Market Returns

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ABSTRACT: The three-moment capital asset pricing model (three-moment CAPM) suggests that the expected excess return on stocks should include compensation for skewness risk. This study aims to investigate the ability of U.S. stock market skewness to predict Indonesian stock market returns. The data used in this research includes the S&P500 Index, JCI, JII, and LQ45 from January 2001 to December 2022. The results of this study indicate that U.S. stock market skewness can predict future excess returns of the Indonesian stock market. Additionally, when the estimation model incorporates alternative variables from both the U.S. and Indonesian stock markets, the predictive ability of U.S. stock market skewness remains significant and outperforms these alternative variables. The findings of this research can be used as a strategy for investors when trading in the Indonesian stock market. When the skewness of the U.S. stock market increases, the return of the Indonesian stock market is expected to decrease in the following month.

KEYWORDS: Intertemporal CAPM; Sample skewness; Stock market; Return; Three-moment CAPM

I. INTRODUCTION

Since Rubinstein (1973) and Kraus & Litzenberger (1976), the field of finance has increasingly delved into the significance of skewness risk in elucidating asset returns. Harvey & Siddique (2000a) introduced the three-moment capital asset pricing model (three-moment CAPM), suggesting that anticipated excess stock returns should incorporate compensation for the risk associated with conditional skewness. Harvey & Siddique (2000b) indicated that not only does conditional skewness account for variations in expected equity returns across different sectors, but it also influences the fluctuations in equity market risk premiums over time. Moreover, they found evidence supporting a negative correlation between market conditional skewness and future excess equity market returns.

The role of market skewness can be explained from two perspectives. The first perspective states that negative skewness measures the risk of large negative realizations and can be seen as a source of tail risk (Kelly & Jiang, 2014; and Bollerslev et al., 2015). The second perspective argues that a preference for skewness captures investors' gambling nature (Barberis & Huang, 2008). Therefore, investor decisions tend to be highly sensitive to the level of skewness (Kumar, 2009).

Several researchers have considered incorporating skewness into asset pricing models (Kraus & Litzenberger, 1976; and Harvey & Siddique, 2000a). Amaya et al. (2015) found predictive power of skewness for individual stock returns, while Byun & Kim (2016) found it for stock option returns. Ghysels et al. (2016) obtained similar findings in emerging markets. Although there has been research on the predictive ability of skewness, few studies have tested the cross-country predictive ability of skewness. Chen et al. (2019) showed that U.S. market skewness could predict the time variation of international market excess returns.

This study examines the predictive power of U.S. stock market skewness risk on Indonesian stock market returns. The U.S. market skewness is utilized due to the U.S. being the largest economic entity globally and the focal point for international investors. The 2008 financial crisis demonstrated how a collapse in the U.S. stock market could quickly spread to other countries, ultimately resulting in a global crisis. Consequently, U.S. market skewness is viewed as an indicator of global downside risk, reflecting the global investment opportunity set (Lustig et al., 2014). International market excess returns include a component that compensates for adverse changes in the investment opportunity set, as indicated by U.S. stock market skewness. This establishes a connection between U.S. stock market skewness and international market excess returns.

II. LITERATURE REVIEW

a. Three-moment Capital Asset Pricing Model (Three-moment CAPM)

Harvey & Siddique (2000a) proposed the three-moment CAPM, which incorporates conditional skewness into the model under the assumption that the stochastic discount factor (SDF) is a quadratic function of market returns:

$$\mathrm{m_{t+1}} = \mathrm{a_t} + \mathrm{b_t R_{M,t+1}} + \mathrm{c_t R^2_{M,t+1}} \quad (1)$$

where R_M represents aggregate excess market returns, $b_t < 0$ and $c_t < 0$. According to Equation (1), the expected excess return of an asset is influenced by its conditional covariance with the market return and the squared market return (conditional co-skewness). Furthermore, Harvey & Siddique (2000a) demonstrated that conditional skewness empirically aids in explaining the cross-sectional variation in expected U.S. stock returns.

Harvey & Siddique (2000b) further developed the three-moment CAPM proposed in Harvey & Siddique (2000a) to explain the time-series behavior of excess market returns. They argued that the expected market risk premium ($E_t[R_{M,t+1}]$) contains compensation for conditional skewness risk:

$$\mathrm{E_t\left[R_{M,t+1}\right]} = \mathrm{-b_t R_{f,t+1} Var_t\left[R_{M,t+1}\right] - c_t R_{f,t+1} Skew_t\left[R_{M,t+1}\right]} \quad (2)$$

where $R_{f,t+1}$ is one plus the risk-free rate, $Var_t\left[R_{M,t+1}\right]$ represents conditional market variance, and $Skew_t\left[R_{M,t+1}\right]$ denotes conditional market skewness. Intuitively, the three-moment CAPM in Equation (2) shows that the time-series variation of the expected market risk premium can be decomposed into contributions from conditional market variance and conditional market skewness. In this study, the researcher uses sample skewness as a proxy for conditional market skewness because it reflects investors' expectations of future market uncertainty at t + 1.

Since the expected market risk premium is unobservable, we can consider a simple linear model:

$$R_{M,t+1} = E_t\left[R_{M,t+1}\right] + \epsilon_{t+1} \quad (3)$$

where $R_{M,t+1}$ is the realized excess market return at time t+1, $E_t\left[R_{M,t+1}\right]$ represents the expected market risk premium measured at time t, and ϵ_{t+1} is the noise term. Based on Equation (2), conditional market skewness determines the expected market risk premium $E_t\left[R_{M,t+1}\right]$, and therefore should be related to the future realized excess market return $R_{M,t+1}$ in Equation (3). This means that combining model (2) with model (3) implies a forecasting relationship between conditional market skewness and future excess market returns. Furthermore, in model (2), $c_t > 0$, indicating that a decrease in conditional market skewness is associated with an increase in the expected market risk premium, and the predictive power of skewness should be negative.

b. Intertemporal Capital Asset Pricing Model (ICAPM)

The three-moment CAPM suggests a negative relationship between conditional market skewness and the expected market risk premium. However, the reason why U.S. market skewness significantly impacts international equity market returns, even when local market skewness is accounted for, remains unclear. To understand this cross-country effect of U.S. equity market skewness, an ICAPM framework is necessary. Merton's (1973) research on ICAPM showed that the expected excess return of the market portfolio is influenced by both the conditional variance and the conditional covariance between market excess returns and changes in state variables that affect the investment opportunity set:

$$\mathrm{E\left(R_{M,t} \middle| \Omega_{t\text{-}1}\right)} = \beta \cdot \mathrm{Var\left(R_{M,t} \middle| \Omega_{t\text{-}1}\right)} + \beta \cdot \mathrm{Cov(R_{M,t}, X_t | \Omega_{t\text{-}1})} \quad (4)$$

where $R_{M,t}$ represents the excess return of the market portfolio, X_t represents innovations in state variables, $Var\left(R_{M,t} \middle| \Omega_{t-1}\right)$ represents the conditional variance at time t of market excess returns, and $Cov(R_{M,t}, X_t | \Omega_{t-1})$ represents the conditional covariance at time t between market excess returns and shocks in the investment opportunity set conditioned on information up to time t-1. Equation (4) states that the expected return compensates investors for bearing both market risk and the risk of adverse shifts in the investment opportunity set.

Additionally, Campbell (1996) employed a two-factor ICAPM and found that positive return covariance with declines in the investment opportunity set or optimal consumption predicts lower stock returns. In Campbell's ICAPM context, risk-averse investors will demand more shares with returns that positively correlate with declines in optimal consumption or adverse shifts in the investment opportunity set. This occurs because they will be compensated by higher wealth levels through positive return

correlation. Such stocks can be seen as hedging instruments. Increased hedging demand in equilibrium reduces the expected return on these stocks.

In our research, equity market skewness is considered a measure of downside or crash risk. Thus, a reduction in market skewness signals an increase in downside risk and is likely linked to a deteriorating investment opportunity set(Chang et al., 2013). According to the international version of ICAPM, the investment opportunity set for international investors is influenced by both local and U.S. market skewness due to the pivotal role of the U.S. in the global economy. As the largest economic entity, the U.S. market is a primary focus for international investors. The 2008 financial crisis illustrated how a U.S. stock market collapse could rapidly impact other countries, evolving into a global crisis. Consequently, U.S. risk is often used as a global risk index in literature (Sarno et al., 2012). Therefore, U.S. market skewness is a reasonable indicator of global stock market downside risk. A decline in U.S. market skewness suggests an adverse shift in the investment opportunity set both domestically and internationally. According to ICAPM, international investors demand higher expected market excess returns as compensation for the shocks indicated by U.S. market skewness.

III. METHODOLOGY

This study uses data comprising monthly prices from the Jakarta Composite Index (JCI), the LQ45 Index, and the Jakarta Islamic Index (JII) from January 2001 to December 2022, amounting to 262 monthly observations. Data for the U.S. stock market utilizes the S&P500 Index over the same period. Sample skewness is estimated using a rolling window of 100 months, resulting in an out-of-sample period containing the last 162 observations. Excess returns are calculated as the difference between stock index returns and the risk-free rate, proxied by the 1-Month Bank Indonesia Certificate for the period January 2001 – June 2005, the BI Rate for the period July 2005 – July 2016, and the BI 7-Day Repo Rate for the period August 2016 – December 2022. The measure of market skewness used to predict the next month's excess return is sample skewness, estimated with a rolling window technique from the previous 100 monthly returns.

Let $R_{m,t}$ and $R_{f,t}$ represent the market return and the risk-free rate in month t. The excess market return in month t is then $r_{m,t} = R_{m,t} - R_{f,t}$. Sample skewness in month t is calculated using the following formula:

$$Sk_{s,t} = \frac{1}{100}\sum_{i=t-1}^{t-100}\left(\frac{r_{m,i}-\bar{r}_{m,t}}{\sigma_{m,t}}\right)^3 \quad (5)$$

where $\bar{r}_{m,t}$ and $\sigma_{m,t}$ are the sample mean and sample standard deviation of the excess returns over the previous 100 months, representing the average and volatility at month t. This method provides 162 monthly estimates of sample skewness.

This study investigates the ability of U.S. stock market sample skewness to predict future excess returns in the Indonesian stock market using the following basic regression equation:

$$r_{m,t+1} = \alpha + \beta_1 Sk_{U.S.,t} + \varepsilon_{t+1} \quad (6)$$

where $r_{m,t+1}$ is the excess market return in month t+1 and $Sk_{U.S.,t}$ is the estimated sample skewness in month t, which is estimated using a rolling window technique from excess market returns from t−1 to t−100.

In addition to the basic regression equation above, the researcher also compares sample skewness with alternative predictive variables from the U.S. for future excess returns of the Indonesian stock market. Rapach et al. (2013) found that lagged U.S. stock market returns can predict stock returns in several countries, while Londono (2011) found that U.S. stock market volatility has predictive power for international stock market excess returns. The testing is conducted using the following equation:

$$r_{m,t+1} = \alpha + \beta_1 Sk_{U.S.,t} + \beta_2 r_{U.S.,t} + \beta_3 VIX_{U.S,t} + \varepsilon_{t+1} \quad (7)$$

where $r_{U.S.,t}$represents the return of the U.S. stock market in month t, calculated using the log return of the S&P500 index, and $VIX_{U.S.,t}$ represents the volatility index in month t, proxied using the CBOE Volatility Index.

The researcher also attempted to compare the predictive ability of the sample skewness of the U.S. stock market with the sample skewness of the Indonesian stock market and alternative domestic variables using the following equation:

$$r_{m,t+1} = \alpha + \beta_1 Sk_{U.S.,t} + \beta_2 Sk_{m,t} + \beta_3 h_{m,t} + \beta_4 r_{m,t} + \varepsilon_{t+1} \quad (8)$$

where $Sk_{m,t}$ represents the sample skewness of the Indonesian stock market in month t, and $h_{m,t}$ represents the sample variance of the Indonesian stock market in month t.

IV. RESULT AND DISCUSSION

Figure 1 illustrates the development over time of the four excess returns of the stock markets used in this study, namely JCI, LQ45, JII, and S&P500, from July 2009 to December 2022. A significant decrease in excess returns occurred at the beginning of 2020 due to the Covid-19 pandemic.

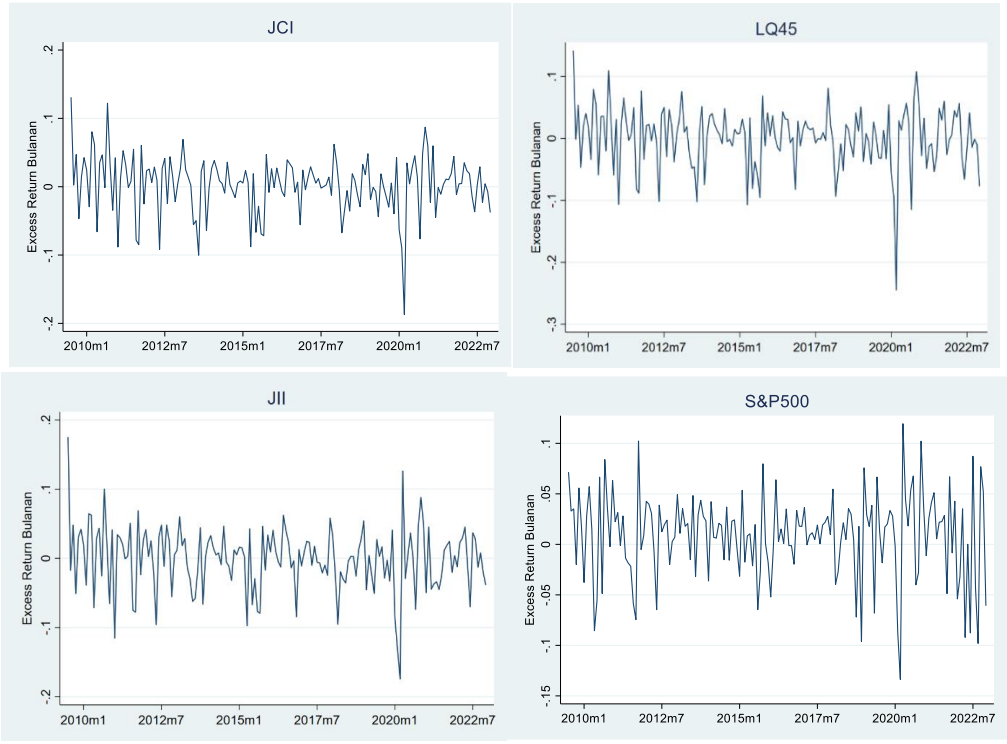

Figure 1. Stock Market Excess Returns

Figure 2 depicts the estimation of sample skewness calculated using a rolling window technique of 100 months of excess returns from July 2009 to December 2022. This graph shows extreme changes in sample skewness.

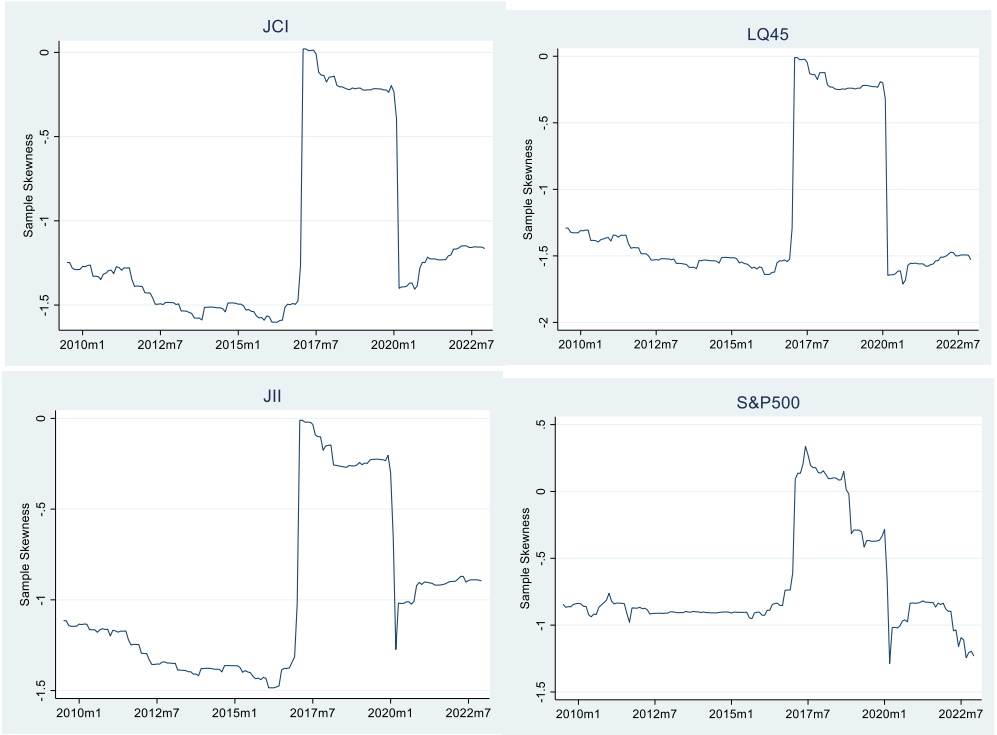

Figure 2. Sample Skewness

The Predictive Ability of U.S. Stock Market Skewness on Indonesian Stock Market Returns

Before conducting the tests, descriptive statistics of the data used in this study need to be presented. Table 1 presents a summary of the statistics of excess returns of the Indonesian and U.S. stock markets, skewness of the U.S. stock market, and the Volatility Index of the U.S. stock market. The average monthly excess return of the Indonesian stock market is 0.0028 (0.28%) for the JCI index, 0.0006 (0.06%) for the LQ45 index, and -0.0010 (-0.10%) for the JII index. The standard deviation ranges from 0.0424 to 0.0498. The distribution of all excess returns of the Indonesian stock market has negative skewness with values ranging from -0.2736 to -0.9178. The monthly excess return of the U.S. stock market has an average of 0.0088 (0.88%) with a standard deviation of 0.0427. All excess return variables have low first-order autocorrelation coefficients (ρ(1)), indicating no autocorrelation issues. The monthly average sample skewness of the U.S. stock market is -0.7117 with a standard deviation of 0.3846. Meanwhile, the Volatility Index (VIX) of the U.S. has a monthly average of 19.3146 with a standard deviation of 7.0706.

Table 1. Descriptive Statistics

	Mean	Std. Dev.	Min.	Max.	Skew.	Kurt.	$\rho(1)$
JCI Return	0,0028	0,0424	-0,1872	0,1309	-0,7050	5,3715	0,0583
LQ45 Return	0,0006	0,0498	-0,2448	0,1418	-0,9178	6,0458	0,0365
JII Return	-0,0010	0,0470	-0,1743	0,1753	-0,2736	4,7079	-0,0247
S&P500 Return	0,0088	0,0427	-0,1337	0,1194	-0,5260	3,6345	-0,1369
S&P500 Return	-0,7117	0,3834	-1,2863	0,3380	1,4115	3,7194	0,9636
VIX U.S.	19,3146	7,0706	9,5100	53,5400	1,4819	6,2024	0,6922

All values reported are in decimal form.

The results of investigating the predictive ability of sample skewness of the U.S. stock market in predicting future excess returns of the Indonesian stock market are presented in Table 2. The estimated coefficients of sample skewness of the US for all Indonesian stock markets are negative and statistically significant. The adjusted r2 values range from 11.77% to 13.31%. These results indicate that an increase in the skewness of the U.S. stock market can predict low future returns in both conventional and Shariah stock markets in Indonesia.

Table 2. Regression Estimation Results (Sample Skewness of the U.S. Only)

Variable ($r_{m,t+1}$)	**Coefficient (*p-value*)**		
	JCI	**LQ45**	**JII**
Intercept	-0,0001	-0,0012	-0,0082
	(0,984)	(0,875)	(0,206)
$Sk_{U.S.,t}$	-0,1613**	-0,1861**	-0,1821**
	(0,015)	(0,035)	(0,018)
No. of Observations	161	161	161
Adj. R^2	12,34%	11,87%	13,34%
F-statistic	12,26	11,77	13,31
Prob (F)	0,000	0,000	0,000

The numbers in parentheses represent p-values based on Newey-West heteroskedasticity and autocorrelation-consistent standard error.

* indicates significance at 10%, ** at 5%, and *** at 1%.

Furthermore, researchers attempted to compare the predictive ability of sample skewness of the US with alternative variables from the U.S. stock market in predicting the Indonesian stock market return. Equation (7) was used to test this question, and the results are presented in Table 3. After including other alternative variables, the regression coefficients of the sample skewness of the US remain negative and statistically significant. These results are consistent with the findings in Table 2. Unfortunately, the alternative variables from the U.S. stock market (S&P500 return and VIX) are not significant. This is also evident from the unchanged adjusted r2 values when the alternative variables from the U.S. stock market are added. These results prove that the sample skewness of the U.S. stock market has a better predictive ability compared to alternative variables from the U.S. stock market for the next month's Indonesian stock market return.

Table 3. Regression Estimation Results (Sample Skewness + U.S. Alternative Variables)

Variable ($r_{m,t+1}$)	Coefficient (*p-value*)		
	JCI	**LQ45**	**JII**
Intercept	-0,0060	-0,0043	-0,0154
	(0,524)	(0,706)	(0,101)
$Sk_{U.S.,t}$	-0,1605**	-0,1856**	-0,1808**
	(0,023)	(0,033)	(0,022)
$r_{U.S.,t}$	0,0156	0,0144	-0,0711
	(0,845)	(0,885)	(0,396)
$VIX_{U.S.,t}$	0,0004	0,0002	0,0006
	(0,444)	(0,747)	(0,220)
No. of Observations	161	161	161
Adj. R^2	11,58%	11,87%	14,01%
F-statistic	6,24	5,84	7,51
Prob (F)	0,000	0,000	0,000

The numbers in parentheses are p-values based on Newey-West heteroskedasticity and autocorrelation-consistent standard error. * indicates significance at 10%, ** at 5%, and *** at 1%.

After comparing the predictive ability of the sample skewness of the U.S. stock market with alternative variables from the U.S. stock market, researchers attempted to compare it with alternative variables from the Indonesian stock market. To test this question, researchers used equation (8) and the estimation results are presented in Table 4. Similar to the previous estimation results, these findings are consistent with those in Table 2. The sample skewness of the U.S. stock market still has predictive ability even when estimated simultaneously with alternative variables from the Indonesian stock market. Unfortunately, alternative variables from the Indonesian stock market consisting of sample skewness, sample variance, and Indonesian stock market returns are not significant. This is also evident from the unchanged adjusted r2 values when alternative variables from the Indonesian stock market are added. These results demonstrate that the sample skewness of the U.S. stock market has better predictive ability compared to alternative variables from the Indonesian stock market.

Table 4. Regression Estimation Results (Sample Skewness + Indonesian Alternative Variables)

Variable ($r_{m,t+1}$)	Coefficient (*p-value*)		
	JCI	**LQ45**	**JII**
Intercept	-0,0022	-0,0073	-0,0107
	(0,742)	(0,396)	(0,172)
$Sk_{U.S.,t}$	-0,1329**	-0,1426*	-0,1955**
	(0,025)	(0,067)	(0,010)
$Sk_{m,t}$	-0,0213	-0,0226	0,0174
	(0,763)	(0,186)	(0,419)
$h_{m,t}$	0,4330	0,2989	2,7819
	(0,874)	(0,897)	(0,389)
$r_{m,t}$	0,0416	0,0277	-0,0655
	(0,572)	(0,688)	(0,394)
No. of Observations	161	161	161
Adj. R^2	10,53%	11,24%	12,46%
F-statistic	4,14	5,05	5,55
Prob (F)	0,001	0,000	0,000

The numbers in parentheses are p-values based on Newey-West heteroskedasticity and autocorrelation-consistent standard error. * indicates significance at 10%, ** at 5%, and *** at 1%.

Based on the three estimation models tested in this study, it is found that the skewness of the U.S. stock market has predictive ability for the return of the Indonesian stock market. This finding is consistent with the study by Chen et al. (2019), which also found the predictive ability of the skewness of the U.S. stock market for several returns of world stock markets. In terms of predictive ability, the skewness of the U.S. stock market outperforms several other variables, both from the US and Indonesian stock markets. The results of this study can be theoretically understood through the international version of the three-moment CAPM and ICAPM. According to the three-moment CAPM, the expected market risk premium includes compensation for the market's conditional skewness, with the skewness risk carrying a negative price. Conversely, within the ICAPM framework, the expected excess return of the market compensates for the downside risk associated with investment opportunity sets. The skewness of the stock market measures the risk of a downturn in the US equity market and thus is likely related to international investment sets due to the primary role of the US in the world economy.

V. CONCLUSION

In this study, researchers aim to investigate whether the skewness of the U.S. stock market has predictive ability for future returns of the Indonesian stock market. To address this question, researchers estimate sample skewness, which serves as a proxy for the skewness of the U.S. stock market, using the S&P500 index from January 2001 to December 2022. The results of this study indicate that a decrease in the skewness of the U.S. stock market significantly predicts an increase in the excess returns of the Indonesian stock market in the future. When testing involves alternative variables from both the US and Indonesian stock markets, the predictive ability of the skewness of the U.S. stock market remains significant and outperforms these alternative variables. The findings of this study can be utilized as a strategy for investors when trading in the Indonesian stock market. An increase in the skewness of the U.S. stock market predicts a decrease in the returns of the Indonesian stock market in the following month.

This study certainly has limitations that are expected to be addressed in future research. First, researchers use sample skewness as a proxy for the skewness of the stock market. Future research is advised to utilize other measures of skewness, such as conditional skewness, which responds more rapidly to changes in monthly excess returns. Second, this study employs the returns and variance of both the US and Indonesian stock markets as alternative variables in predicting the returns of the Indonesian stock market. Future research is recommended to consider other alternative variables such as macroeconomic variables of the US and Indonesia. Third, researchers use the US economy as a proxy for the world economy. It is suggested for future researchers to use other countries' economies as proxies for the world economy, such as the UK, Japan, and China.

REFERENCES

1) Amaya, D., Christoffersen, P., Jacobs, K., & Vasquez, A. (2015). Does realized skewness predict the cross-section of equity returns? *Journal of Financial Economics*, *118*(1), 135–167. https://doi.org/https://doi.org/10.1016/j.jfineco.2015.02.009
2) Barberis, N., & Huang, M. (2008). Stocks as Lotteries: The Implications of Probability Weighting for Security Prices. *American Economic Review*, *98*(5), 2066–2100. https://doi.org/10.1257/aer.98.5.2066
3) Bollerslev, T., Todorov, V., & Xu, L. (2015). Tail risk premia and return predictability. *Journal of Financial Economics*, *118*(1), 113–134. https://doi.org/https://doi.org/10.1016/j.jfineco.2015.02.010
4) Byun, S.-J., & Kim, D.-H. (2016). Gambling preference and individual equity option returns. *Journal of Financial Economics*, *122*(1), 155–174. https://doi.org/https://doi.org/10.1016/j.jfineco.2016.06.004
5) Campbell, J. (1996). Understanding Risk and Return. *Journal of Political Economy*, *104*(2), 298–345. https://econpapers.repec.org/RePEc:ucp:jpolec:v:104:y:1996:i:2:p:298-345
6) Chang, B. Y., Christoffersen, P., & Jacobs, K. (2013). Market skewness risk and the cross section of stock returns. *Journal of Financial Economics*, *107*(1), 46–68. https://doi.org/https://doi.org/10.1016/j.jfineco.2012.07.002
7) Chen, J., Jiang, F., Xue, S., & Yao, J. (2019). The world predictive power of U.S. equity market skewness risk. *Journal of International Money and Finance*, *96*, 210–227. https://doi.org/10.1016/j.jimonfin.2019.05.003
8) Ghysels, E., Plazzi, A., & Valkanov, R. (2016). Why Invest in Emerging Markets? The Role of Conditional Return Asymmetry. *The Journal of Finance*, *71*(5), 2145–2192. https://doi.org/https://doi.org/10.1111/jofi.12420
9) Harvey, C. R., & Siddique, A. (2000). Conditional Skewness in Asset Pricing Tests. *The Journal of Finance*, *55*(3), 1263–1295. https://doi.org/https://doi.org/10.1111/0022-1082.00247
10) Harvey, C., & Siddique, A. (2000). Time-Varying Conditional Skewness and the Market Risk Premium. *Research in Banking and Finance*, *1*. https://doi.org/10.2139/ssrn.795386
11) Kelly, B., & Jiang, H. (2014). Tail Risk and Asset Prices. *The Review of Financial Studies*, *27*(10), 2841–2871. https://doi.org/10.1093/rfs/hhu039
12) Kraus, A., & Litzenberger, R. H. (1976). SKEWNESS PREFERENCE AND THE VALUATION OF RISK ASSETS*. *The Journal of*

Finance, *31*(4), 1085–1100. https://doi.org/https://doi.org/10.1111/j.1540-6261.1976.tb01961.x

13) Kumar, A. (2009). Who Gambles in the Stock Market? *The Journal of Finance*, *64*(4), 1889–1933. https://doi.org/https://doi.org/10.1111/j.1540-6261.2009.01483.x
14) Londono, J. M. (2011). *The variance risk premium around the world* (International Finance Discussion Papers, Issue 1035). Board of Governors of the Federal Reserve System (U.S.). https://econpapers.repec.org/RePEc:fip:fedgif:1035
15) Lustig, H., Roussanov, N., & Verdelhan, A. (2014). Countercyclical currency risk premia. *Journal of Financial Economics*, *111*(3), 527–553. https://doi.org/https://doi.org/10.1016/j.jfineco.2013.12.005
16) Merton, R. C. (1973). An Intertemporal Capital Asset Pricing Model. *Econometrica*, *41*(5), 867–887. https://doi.org/10.2307/1913811
17) Rapach, D. E., Strauss, J. K., & Zhou, G. (2013). International Stock Return Predictability: What Is the Role of the United States? *The Journal of Finance*, *68*(4), 1633–1662. https://doi.org/https://doi.org/10.1111/jofi.12041
18) Rubinstein, M. E. (1973). The Fundamental Theorem of Parameter-Preference Security Valuation. *The Journal of Financial and Quantitative Analysis*, *8*(1), 61–69. https://doi.org/10.2307/2329748
19) Sarno, L., Schneider, P., & Wagner, C. (2012). Properties of foreign exchange risk premiums. *Journal of Financial Economics*, *105*(2), 279–310. https://doi.org/https://doi.org/10.1016/j.jfineco.2012.01.005