Higher Order Moment of IDXNONCYC on Stock Return PT Nippon Indosari Corpindo Tbk Predictability

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Abstract

This study predicts the stock return's of PT Nippon Indosari Tbk with higher order moment of IDXNONCYC. The research method used is time series. Data used are ratios. The tool used is GARCH (1,1). The results are the IDXNONCYC coskewness and cokurtosis lag 1 are significant predicting the stock return's PT Nippon Indosari Corporindo Tbk. However, IDXNONCYC risk premium lag 1 short fall to predict .

Keywords: IDXNONCYC; Co-skewness; Co-kurtosis; GARCH (1,1)

JEL Classification: G21

Introduction

Forecasting is essential for risk management. Several variables are used to predict stock retun that are dividend price ratio, dividend yield, earning price ratio, dividend payout rasio, stock variance, book-to-market ratio, net equity expansion, treasury bill rate, long-term yield, term spread, default yield spread, default return spread, and inflation (Pan et al., 2020), and oil price increases(Wang et al., 2019)

Previous studies were made to study the higher order moment. Intertemporal CAPM was connected higher order moments and stochastic investment opportunities(Jang & Kang, 2017). Augmented High-order CAPM perform better than three Fama Factors French and Four Carhart Model (Chen et al., 2019). Crude oil, gold and bitcon have linkages in high order moments (Gkillas et al., 2020).

Coskewness and cokurtosis have a strong copula relationship (measurement of fall regime). Beta and coskewness have a positive relationship and cokurtosis has a negative relationship to copula (Cerrato et al., 2017). Entering high order moments can also increase portfolio performance (Jondeau & Rockinger, 2012)(Martellini & Ziemann, 2010). Using panel data, market skewness and kurtosis have not signified to future ekuitas risk premium but if skewness or kurtosis model is alone both have significantly affected(Lubis, 2021)

Average skewness has the ability to predict future market returns more than macroeconomic and other financial variables (Jondeau et al., 2019). Extreme downside risk has a systematic effect by including downside beta, coskewness, and cokurtosis with a positive risk premium(Harris et al., 2019). The GJR-GARCH (1,1) method is able to produce skewness and unbiased kurtosis (Alexander et al., 2021). Using institutional ownership and market capitalization as proxies for information accuracy, they found a significant negative proxy for the third-moment absolute future returns on Chinese firm returns (Zhen, 2020)

The manufacturing industry in Indonesia is considered to have quite strong competitiveness in facing global market competition. This is in line with efforts to implement industrial technology 4.0 in a number of sectors that spur innovation and productivity. The strategic steps for implementing industrial technology 4.0 are in accordance with the direction of the Making Indonesia 4.0 roadmap which was launched on April 4, 2018 by President Joko Widodo. Through this roadmap, Indonesia seeks to revitalize the manufacturing sector and build an innovation-based economy.

The Indonesian Stock Exchange (IDX) has had an industry classification that has been used since 1996 namely "Jakarta Stock Industrial Classification" (JASICA). However, with the development

of the sector economy and new types of Listed Companies today and to harmonize the principles classification to conform to common practice, IDX seems it necessary to carry out adjustments to JASICA.

Therefore, the IDX has conducted a preliminary study of the classifications industry used by the financial industry in the world, soliciting input from market participants such as capital market analysts and investment managers, and communicating with regulators and government institutions. From the results of these studies and discussions, IDX launched a classification industry, "Indonesia Stock Exchange Industrial Classification (IDX-IC)," to become the classification of companies listed on the IDX. List of shares per sector IDX-IC (Indonesia Stock Exchange Industrial Classification) on the Indonesia Stock Exchange (IDX) is effective starting January 25, 2021

Primary Consumer Goods Sector Index is an index that measures the price performance of all stocks on the Main Board and Development Boards in the Goods Sector Primary Consumers, referring to the IDX Industrial classification Classification (IDX-IC). The Classification is D sector that is IDXNONCYC. IDXNONCYC consists of Food & Staples Retailing (D11), Beverages (D21), Processed Foods (D22), Agricultural Products (D23), Tobacco (D31), Household Products (D41), and Personal Care Products (D42).

Businesses engaged in the F&B sector, such as restaurants and cafes, are often the choice of places to carry out these gathering activities. Such as hanging out activities for young people, meetings, meetings, dating, or even family time. The increasing awareness of entrepreneurship in Indonesia and even globally has made F&B a field often chosen by people who are just starting to become entrepreneurs.

In addition to obtain raw materials, the ease of processing food and beverages to be served as products of entrepreneurial activities is also often a consideration for new entrepreneurs. To start a business, taking this F&B field tends not to require a lot of money for initial capital. Even today, prospective entrepreneurs are also facilitated by a franchise business system that already has standardization and can be run by paying a license at a fairly low cost.

PT Nippon Indosari Corpindo Tbk is an Indonesia-based company primarily engaged in the production of packaged bread and cakes. The company classifies its products into three categories: white bread, sweet bread, cakes and bread flour. The white bread and sweet bread products as well as bread flour are marketed under the Sari Roti brand, while the cake products are marketed under the Sari Cake name. Its products are distributed through modern markets, such as minimarkets and traditional markets. The Company operates a number of production

facilities in Indonesia, including those in Cikarang, Pasuruan, Semarang, Medan, Palembang and Makassar.

This research investigates the prediction of stock return's PT Nippon Indosari Corporindo, Tbk. Several previous studies have been made. Financial ratios such as debt-to-equity ratio and earning price share can not significantly affect the stock price PT Nippon Indosari Corporindo Tbk. (Saputra, 2021). EVA method shows that PT Nippon Indosari Corpindo Tbk does not succeed in adding economic value to shareholders(Suhud et al., 2022). Profitability is affected by working capital (Astuti & Lestari, 2019). Between 2015 and 2019, profitability PT Nippon Indosari Corporindo Tbk. is 19.82% which shows the company is suitable for operating and competing in consumer goods(Hardiyanti, 2022). From the explanation above, we consider looking for higher-order moments consist of return, coskewness and cokurtosis from IDXNONCYC to predict to predict future risk premium PT. Nippon Indosari Corpindo Tbk. This research uses GARCH (1,1) to predict stock return's PT Nippon Indosari Corporindo Tbk which the previous studies have never made for this company.

Literature Review

The first to point out that the distribution of good and bad news from companies can result in negative skewness. This is because the companies tend to release better news than bad news, and bad news is typically released in clumps (Damodaran, 1985).

In Subsequent research Harvey and Siddique (2000) make a strong case for including skewness in the asset-pricing framework. They find that the standard CAPM does not adequately assess returns on equity, particularly the smallest capitalized decile, and suggest inclusion in the third-moment. The smallest decile is the skewed return. Their findings suggest that systematic skewness is economically important.

Dittmar (2002) finds a strong case for entering into the fourth-moment(Dittmar, 2002). He found the conditions required for standard risk aversion to decrease in absolute prudence and theoretically correlate such a preference for kurtosis avoidance . Then this model provides rationale for including kurtosis. Dittmar (2002) and Fai and Lai (1997) found that the four-moment CAPM evaluates the cross-section of returns better than the traditional CAPM(Fang & Lai, 1997). Clearly, a strong argument can be made to include skewness and kurtosis in returns in equities.

Several researches tested the effect on unconditional skewness, a measure of the asymmetric distribution (Maheu et al., 2013); (Chabi-Yo et al., 2014), (Conrad et al., 2013).

$$\bar{W} = \sum_j \theta_j \bar{R}_j + \theta_f R_f. \tag{1}$$

$$\sigma_w = \sum_j \theta_j \beta_{jp} \sigma_p \tag{2}$$

$$S_w = \sum_j \theta_j \gamma_{jp} S_p \tag{3}$$

$$K_w = \sum_j \theta_j \delta_{jp} K_p \tag{4}$$

$$\bar{\bar{R}}_J - R_f = \alpha_1 \beta_j + \alpha_2 \gamma_j + \alpha_3 \partial_j \tag{5}$$

$$\beta_j = \frac{E\left[(R_J - \widetilde{\bar{R}_J})(R_m - \widetilde{\bar{R}_m})\right]}{\sigma_m^2} \tag{6}$$

$$\gamma_j = \frac{E\left[(R_J - \widetilde{\bar{R}_J})(R_m - \widetilde{\bar{R}_m})^2\right]}{S_m^3} \tag{7}$$

$$\vartheta_j = \frac{E\left[(R_J - \widetilde{\bar{R}_J})(R_m - \widetilde{\bar{R}_m})^3\right]}{K_m^4} \tag{8}$$

$$\sigma_m = E\left[\left(R_m - \widetilde{\bar{R}_m}\right)^2\right]^{\frac{1}{2}} \tag{9}$$

$$S_m = E\left[\left(R_m - \widetilde{\bar{R}_m}\right)^3\right]^{\frac{1}{3}} \tag{10}$$

$$K_m = E\left[\left(R_m - \widetilde{\bar{R}_m}\right)^4\right]^{\frac{1}{4}} \tag{11}$$

Where:

$\bar{R}_j$: The expected return on risky assets j + 1

R_f: The expected return on the asset is not at risk f + 1

θ_j : Proportion of investors holding risky assets

θ_f : Proportion of investors holding risk − free assets

According to Harvey and Shiddique (2000)

$$E_{t-1}[r_{i,t} - r_{f,t}] = \gamma_{M,t} Cov_{t-1}(r_{i,t}, r_{m,t}) + \gamma_{M^2,t} Cov(r_{i,t}, r_{M^2,t}) \tag{12}$$

where r $_{f,t}$ is the risk-free rate for the period; r $_{M,t}$ is the market portfolio (index) of returns for period t; $\gamma_{M,t}$ and $\gamma_{m}{}^2{}_{,t}$ are respectively, time t prices of covariance and coskewness risk; and $E_{t-1}[r_{i,t} - r_{f,t}]$ and $Cov_{t-1}(r_{i,t}, r_{m,t})$ denotation, order, expected value and covariance conditional on information at time t -1.

Systematic Skewness is:

$$Cos_{i,t} = Cov_{t-1}(r_{i,t} r_{M,t}^2) \tag{13}$$

$$\beta_{HS,i,t} = \frac{E_{t-1}(\epsilon_{i,t}, \epsilon_{M,t}^2)}{\sqrt{\epsilon_{t-1}[\epsilon_{i,t}^2] \epsilon_{t-1}[\epsilon_{M,t}^2]}} \tag{14}$$

where $\epsilon_{i,t} = r_{i,t} - r_{f,t} - \alpha_i - \beta_{M,i}(r_{M,t} - r_{f,t})$ is the residual value of the regression on stocks with excess returns at constant and market excess returns, and $r_{M,t}^2 = ((r_{M,t} - r_{f,t}) - \mu_M)^2$ is the deviation of market excess returns from the average. The three measurements $Cos_{i,t}, r_{M,t}^2$, and $\beta_{HS,i,t}$ are correlated via specification on the regression of $r_{M,t}^2$ or both r_M and r_M^2. The advantage of using $\beta_{HS,i,t}$ is zero on the market portfolio, unit free, and similar to factor loading. Since the market index has a benchmark value of zero, we use $\beta_{HS,i,t}$ to measure and compare the realized systematic skewness of the different factors formed by the different risk factors constructed below.

Systematic kurtosis is

$$Kurt_{i,t} = Cov_{t-1}(r_{i,t}, r^3{}_{M,t}) \tag{15}$$

$$\beta_{HK,i,t} = \frac{E_{t-1}(\epsilon_{i,t}, \epsilon_{M,t}^3)}{\sqrt{\epsilon_{t-1}[\epsilon_{i,t}^3] \epsilon_{t-1}[\epsilon_{M,t}^3]}} \tag{16}$$

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The three-factor model (Fama & French, 1993) is:

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{Mt} - r_{ft}) + s_i SMB_t + h_i HML_t + \epsilon_{it} \tag{17}$$

In this equation, rit is the return on portfolio I period t; rft is the risk free rate; rMt is the return on the value-weighted market portfolio. SMBt is the return on a diversified portfolio of small stocks minus

the return on a diversified portfolio of large stocks. HMLt is the difference between returns on diversified portfolios of high and low B/M stocks, and it is a zero-mean residual value.

Four factor model (Carhart, 1997):

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{Mt} - r_{ft}) + s_i SMB_t + h_i HML_t + p_i PR1YR_t + \epsilon_{it} \qquad (18)$$

PR1YR is Winner Minus Loser.

The five factor models (Fama & French, 2015) are:

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{Mt} - r_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \epsilon_{it} \qquad (19)$$

RMWt is the difference between robust and weak profitability; CMAt is the difference between low and high investment.

Hypothesis:

H1: IDXNONCYC index risk premium lag 1 has effect on the stock return of PT Nippon Indosari Corpindo Tbk.

H2: IDXNONCYC coskewness lag 1 has effect on stock returns of PT Nippon Indosari Corpindo Tbk

H3: IDXNONCYC cokurtosis lag 1 has effect on stock returns of PT Nippon Indosari Corpindo Tbk

H4: IDXNONCYC index risk premium, coskewness and cokurtosis lag 1 of PT Nippon Indosari Corpindo Tbk

Research Methods

According to the level of explanation or explanatory level, namely where the research explains the position of the variables studied and the relationship between one variable and another. Based on this research can be grouped into descriptive, comparative and associative. This research uses associative research. As for what is meant by associative research, namely research that aims to determine the effect or also the relationship between two or more variables. This research has the highest level compared to descriptive and comparative because with this research a theory can be built that can function to explain, predict and control a symptom (Sugiyono, 2017).

I use daily data on yields on the common stock of Nippon Indosari Corpindo Limited Company that is listed on the Indonesian Stock Exchange (IHSG) and Index Non Cycle that is avaliable on Januari 25th . I use daily yield data from 26th January 2021 to 7 Januari 2022.

Data process technique are that first, the independent and dependent variables must be followed unit root test. Second, we built the model multivariate predictive regression, then, it was tested by arch test.If the result under 5% the model must be continued by GARCH (1,1) model.

$$r_t - r_f = c + \beta_{t-1}(r_m - r_f)_{t-1} + \gamma_{t-1}(r_m - \bar{r}_m)^2_{t-1} + \delta_{t-1}(r_m - \bar{r}_m)^3_{t-1} + \varepsilon_t \qquad (20)$$

$$\varepsilon_t = \sigma_t z_t, z_t \sim i.i.d. N(0,1) \qquad (21)$$

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \qquad (22)$$

R_t is stock return's PT Nippon Indosari Corpindo Tbk; r_f is BI rate; r_m is IDXNONCYC return; $(r_m - \bar{r}_m)^2$ is IDXNONCYC coskewness; $(r_m - \bar{r}_m)^3$ is IDXNONCYC cokurtosis.

Results and Discussions

The first step analysis data is descibing the data. Describing data uses several tools such as mean, median, maximum, minimum, deviation, skewness, kurtosis, jarque bera probability and the total data. Tabel 1 shows the risk premium PT Nippon Indosari Corporindo Tbk and IDXNONCYC.

Table 1 Descriptive Statistics

	$r_t - r_f$	$r_m - r_f$
Mean	-0.035222	-0.035595
Median	-0.035000	-0.035900
Maximum	0.100300	-0.009200
Minimum	-0.102800	-0.061000
Std. Dev.	0.016760	0.009028
Skewness	3.990299	0.005478
Kurtosis	34.67551	3.342865
Jarque-Bera	10492.44	1.157150
Probability	0.000000	0.560697
Sum	-8.312400	-8.400500
Sum Sq. Dev.	0.066008	0.019153

Observations	236	236

Source: Self-processed by Eviews 9

The mean of risk premium PT Nippon Indosari Corpindo Tbk is discount. It is not different with market risk premium. Company risk premium has skewness and kurtosis distribution data or non-normality data, it is looked by probability of Jarque-Bera shown under 5 percent. Contrary IDXNONCYC is normal distribution.

Table 2 tell unit root test. Unit root test look for the stationary data. Does time affect the distribution data? If probability above 5 %, the distribusi data is affected by time.

Table 2 Unit Root Test

Group unit root test: Summary

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-35.8334	0.0000	4	939
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-30.9184	0.0000	4	939
ADF - Fisher Chi-square	459.676	0.0000	4	939
PP - Fisher Chi-square	393.476	0.0000	4	940

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Table 2 shows the unit root test for risk premium company, market, coskewness and cokurtosis. All of them are significant under 5 percent. It means the variables have not unit root.

Table 3 shows that to predict stock return's PT Nippon Indosari Corporindo Tbk. the independent variables uses IDXNONCYC risk premium, coskewness and cokurtosis lag 1

Table 3 Model Linear Multivariate Predictive Regression IDXNONCYC Beta lag 1, coskewness lag 1 and cokurtosis lag 1

Dependent Variable: $r_i - r_f$

Variable	Coefficient	Std. Error	t-Statistic	Prob.

β_{t-1}	-0.277081	0.215515	-1.285667	0.1998
γ_{t-1}	-4.393679	8.825958	-0.497813	0.6191
δ_{t-1}	783.3240	654.0050	1.197734	0.2322
C	-0.044738	0.007811	-5.727774	0.0000

R-squared	0.008595	Mean dependent var	-0.035223
Adjusted R-squared	-0.004280	S.D. dependent var	0.016795
S.E. of regression	0.016831	Akaike info criterion	-5.314279
Sum squared resid	0.065441	Schwarz criterion	-5.255393
Log likelihood	628.4278	Hannan-Quinn criter.	-5.290539
F-statistic	0.667548	Durbin-Watson stat	2.275491
Prob(F-statistic)	0.572756		

Source: Self-processed by Eviews 9

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Table 3 shows that future risk premium PT Nippon Indosari Corpindo is not affected by IDXNONCYC beta (IDXNONCYC risk premium), coskewness, and cokurtosis lag 1. It is shown by the probability above 5 percent.

To see the heteroscedasticity in model, if the probability under 5% the data has heteroscedasticity. Table 4 shows the arch test to heteroscedasticity test.

Table 4 ARCH test

Heteroskedasticity Test: ARCH

F-statistic	3.938560	Prob. F(1,232)	0.0484
Obs*R-squared	3.906199	Prob. Chi-Square(1)	0.0481

Source: Self-processed by Eviews 9

Table 4 shows that model above has arch. It shows that the model is not acceptable as linear model, then, it must be extended to ARCH family model. This research used the GARCH (1,1) to capture the future volatility.

Using arch test, the GARCH (1,1) model can be one alternative to predict stock return PT Nippon Indosari Corporindo. Table 5 shows below.

Table 5 Model GARCH (1,1) multivariate Predictive Regression

Dependent Variable:

Variable	Coefficient	Std. Error	z-Statistic	Prob.

β_{t-1}	-0.071118	0.063303	-1.123462	0.2612
γ_{t-1}	4.189476	1.963656	2.133508	0.0329
δ_{t-1}	631.9350	159.5577	3.960542	0.0001
C	-0.040171	0.002340	-17.16399	0.0000
Variance Equation				
C	-2.17E-06	5.50E-06	-0.394376	0.6933
RESID(-1)^2	2.869091	0.299071	9.593353	0.0000
GARCH(-1)	0.289173	0.038014	7.607016	0.0000
R-squared	-0.018971	Mean dependent var		-0.035223
Adjusted R-squared	-0.032204	S.D. dependent var		0.016795
S.E. of regression	0.017064	Akaike info criterion		-5.883193
Sum squared resid	0.067260	Schwarz criterion		-5.780142
Log likelihood	698.2752	Hannan-Quinn criter.		-5.841648
Durbin-Watson stat	2.234061			

Source: Self-processed by Eviews 9

Table 5 shows that industrial beta cannot predict the stock return PT Nippon Indosari Corpindo Tbk with probability beyond 5 percent. It is rather different with IDXNONCYC coskewness and IDXNONCYC cokurtosis that are 3.29 percent and 0,1 percent.

Discussions

IDXNONCYC coskewness and cokurtosis have significantly predicted stock return's PT Nippon Indosari Corporindo Tbk. It is contrast to Lubis (Lubis, 2021) which used IDX that coskewness and cokurtosis did not predict stock return's companies listed in IDX during pandemic COVID-19 recession. This research is inline with (Harvey & Siddique, 2000)(Dittmar, 2002)(Estrada, 2002)(Estrada & Serra, 2005). IDXNONCYC coskewness and cokurtosis have positive effect on stock return's PT Nippon Indosari Corporindo Tbk about 4.1 and 631.9. The total Residual quadrat and Garch are 2.9 add 0.29 equal to 3.19. It means the volatility high order moment can affect 3.1 times to stock return 's PT Nippon Indosari Corporindo Tbk.

Conclusions

In conclusion, IDXNONXCYC index risk premium lag 1 has no effect but the IDXNONCYC coskewness and cokurtosis lag 1 have significant effect on stock return's PT

Nippon Indosari Corporindo Tbk. This research inline with (Harvey & Siddique, 2000)(Dittmar, 2002)(Estrada, 2002)(Estrada & Serra, 2005). However, it is contrary on (Lubis, 2021). The limitation research is the IDXNONCYC index risk premium should be used downside risk because the previous studies with downside risk into model (Estrada, 2007)(Rashid & Hamid, 2015). The further research is to incorporate downside risk in model higher order moments evidence Indonesia. Model asymmetric such as th EGARCH, GJR-GARCH, and GARCH SK to compare on GARCH.

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