“The idiosyncratic risk during the Covid-19 pandemic in Indonesia”

AUTHORS	Winston Pontoh Novi Swandari Budiarso

ARTICLE INFO	Winston Pontoh and Novi Swandari Budiarso (2021). The idiosyncratic risk during the Covid-19 pandemic in Indonesia. *Investment Management and Financial Innovations*, *18*(4), 57-66. doi:10.21511/imfi.18(4).2021.06
DOI	http://dx.doi.org/10.21511/imfi.18(4).2021.06
RELEASED ON	Wednesday, 13 October 2021
RECEIVED ON	Friday, 03 September 2021
ACCEPTED ON	Tuesday, 05 October 2021

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Winston Pontoh (Indonesia), **Novi Swandari Budiarso** (Indonesia)

THE IDIOSYNCRATIC RISK DURING THE COVID-19 PANDEMIC IN INDONESIA

Abstract

Conservatism in the CAPM and L-CAPM standards often emphasizes systematic risk to explain the phenomenon of the risk-return relationship and ignores idiosyncratic risk with the assumption that the risk can be diversified. The effect of the Covid-19 outbreak raises the question of whether the idiosyncratic risk can still be ignored considering that the risk has a close relationship to firm-specific risk. This study sets a portfolio consisting of 177 active public firms in the Indonesia Stock Exchange before and after the Covid-19 pandemic. On portfolio set, idiosyncratic risk is estimated by the standard CAPM and L-CAPM in the observation range from January 2, 2019, to June 30, 2021. The results of the analysis show that L-CAPM and CAPM produce significantly different idiosyncratic risks. Empirical evidence shows that the highest firm-specific risk is in the third period and has a stable condition since the fourth period. This condition is confirmed by regression results that idiosyncratic risk together with systematic risk positively affects stock returns in the fourth period as suggested by the efficient market hypothesis. Uniquely, both systematic risk and idiosyncratic risk based on L-CAPM do not show a significant effect on stock returns in the fifth period, so it is a strong indication that liquidity is an important factor that must be considered in making investments.

Received on: 3rd of September, 2021
Accepted on: 5th of October, 2021
Published on: 13th of October, 2021

Winston Pontoh, Lecturer, Professor, Economics and Business Faculty, Accounting Department, Sam Ratulangi University, Indonesia. (Corresponding author)

Novi Swandari Budiarso, Lecturer, Economics and Business Faculty, Accounting Department, Sam Ratulangi University, Indonesia.

Conflict of interest statement:
Author(s) reported no conflict of interest

Keywords returns, risk, illiquidity, idiosyncratic, CAPM, L-CAPM

JEL Classification G11, G14, G41

INTRODUCTION

The capital asset pricing model (CAPM) is the most effective in explaining the risk and return relationship. In the context of CAPM, the risk itself refers to the systematic risk. Tinic and West (1984) prove that the stock return is mostly affected by systematic risk. Lakonishok and Shapiro (1986) provide evidence that systematic risk could be positive to stock return when the market is at normal condition but negative while the market is down. French et al. (1987) also demonstrate that the risk premium and expected stock returns are correlating positively. Confirming those results, Theriou et al. (2010) support that firms with higher systematic risks have higher returns as the market risk premium is positive but they will have lower returns as the market falls. Lakonishok and Shapiro (1986) provide interesting evidence that the idiosyncratic or unsystematic risk holds its role in circumstances of a not well-diversified portfolio.

Malkiel and Xu (1997) noticed that idiosyncratic risk arises from specific events and can be diversified. In most cases, it can be assumed that the Covid-19 pandemic is a specific event that influences the capital markets around the world through firm-specific risk such as reported by He et al. (2020b), Mishra and Mishra (2020), He et al. (2020a), Hong et al. (2021), and Narayan et al. (2021). The local studies of Budiarso et al. (2020), Malini (2020), Trisnowati and Muditomo

(2021), and Rahmayani and Oktavilia (2020) also report that in the earlier 2020, the Covid-19 pandemic also affects the firm conditions that causes the panic condition in the Indonesian capital market. Those phenomena show that idiosyncratic risk requires special attention from investors in considering and compiling their investment portfolio as this risk reflects the firm condition which is the basis of information in making investment decisions for investors.

1. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

1.1. The efficient market hypothesis

The efficient market hypothesis (EMH) relies on the concept that stock prices fully reflect all available information (Fama, 1970, 1991, 1998; Fama & MacBeth, 1973). Pontiff (2006) states that market efficiency means the stock prices are directly affected by the information. On the concept, the hypothesis posits that under the condition of uncertainty higher risks result in higher returns (Markowitz, 1952; Lintner, 1965). Consistent with Lintner (1965), Fama and MacBeth (1973) find that both systematic and unsystematic risks move linearly with the optimum returns. They propose that most investors shall face the risk for desired returns in terms of the efficient market. However, as a limitation, Borges (2010) suggests not applying the EMH to emerging and illiquid markets, as they are generally not efficient.

Many studies use asset pricing models to explain the risk-return stock relationship in the capital market under the assumption of uncertain conditions with the information provided according to the EMH. The original CAPM assumes that idiosyncratic risk could be ignored in the assumption that the investors set the portfolio at best to diversify this risk (Wei & Zhang, 2005; Bali & Cakici, 2008). However, Fama (1991) emphasizes that the risk of firm business conditions also affects the asset pricing model. According to Malkiel (2003), there is a condition that stock betas tend not to be the main risk if investors tend to compile their portfolios by considering large company sizes with high liquidity levels. Supporting the opinion of Fama and French (1993), Malkiel (2003) agrees that there are other factors (for example firms that have a certain level of financial distress) that are not taken into account by the CAPM so that they tend to justify the systematic risk. Kumari et al. (2017) find that high idiosyncratic risk is relevant to the under-diversified portfolios by investors. Pontiff (2006) argues that idiosyncratic risk is not a myth but it plays a significant role in determining whether the market is efficient or not.

Most finance literature defines that idiosyncratic or unsystematic risk refers to the result of firm-specific factors (Lakonishok & Shapiro, 1986; Malkiel & Xu, 1997; Fu, 2009; Maiti, 2019). Practically, the original CAPM is commonly used to estimate the idiosyncratic risk. Bali et al. (2005), and Bali and Cakici (2008) demonstrate that the CAPM produces the estimated residuals to test the relationship of idiosyncratic risk and returns. Recently, Shahzad et al. (2020) also have used CAPM to capture the residuals to detect the idiosyncratic risk based on the level of the firm life cycle. Reber et al. (2021) also show that the effect of firm-specific risk estimated by CAPM on initial public offerings is reduced by environmental, social, and governance disclosure and performance.

1.2. The liquidity-adjusted capital asset pricing model

Amihud (2002) posits that the excess of expected stock return represents the illiquidity premium. Amihud (2002) defines the asset's illiquidity as the absolute value of the ratio of daily return to trading volume (in currency). It is demonstrated that illiquidity and stock return have a negative relationship, which means liquidity is the important factor for CAPM. Batten and Vo (2014) offer interesting evidence from the case of Vietnam as an emerging market. They suspect that the positive relationship between liquidity and stock returns tends to be due to the lack of integration of emerging markets with global markets. The recent studies by Miralles-Quirós et al. (2017) in the Portuguese stock market, and Jain and Singla (2021) in the Indian stock market confirm that entities with high market liquidity have high stock

http://dx.doi.org/10.21511/imfi.18(4).2021.06

returns compared to entities with low market liquidity. The study of Le and Gregoriou (2021) in the United States market confirms that a portfolio based on the highest level of liquidity can provide the best asset valuation model. In another case, Baker and Stein (2004) demonstrate that a high level of market liquidity reflects positive investor sentiment on securities with high systematic risk but low returns. Their findings seem to support Jacoby et al. (2000) who find that market liquidity cannot be separated from systematic risk. Loukil et al. (2010) explain that the possibility of a positive relationship between illiquidity and stock returns is due to the tendency of investors to prefer stocks with low liquidity levels to get the expected premium or less trade the securities to reduce the impact of liquidity risk.

Acharya and Pedersen (2005) develop the further CAPM into liquidity-adjusted capital asset pricing model (L-CAPM), which assumes that the required returns depend on its liquidity factor together with the covariance of stock return and liquidity and the market return and liquidity. Recently, some empirical evidence has used L-CAPM to explain the risk-return relationship. Kumar et al. (2019) demonstrate that L-CAPM explains the risk-return relationship. It was found that liquidity is priced both for the systematic risk and idiosyncratic risk, which means liquidity is an important factor to determine those risks. In similar, Altay and Çalgıcı (2019) also emphasize that low illiquidity means high liquidity that gives higher returns. They also find that the original CAPM cannot explain the stock return behavior in emerging markets. Confirming those results, Grillini et al. (2019) find that negative market risk in L-CAPM depicts a possibility premium by liquidity risk to investors.

1.3. The hypothesis development

Most relevant studies explain the role of idiosyncratic risk based on CAPM. At the first point, Lintner (1965) emphasizes that the relevant risk of firm stocks depends on not only its market risk but also the total variance. The finding of Lintner (1965) can be interpreted as that idiosyncratic risk also affects the stock return significantly. Confirming the result, Goyal and Santa-Clara (2003) over the period from July 1962 to December 1999 prove that on trading strategy the idiosyncratic risk positively affects the stock returns in the United States. Fu (2009) also finds a similar result by examining the returns over the period from July 1963 to December 2006. On modified CAPM, Kumari et al. (2017) demonstrate high idiosyncratic risk lowering the return over a period from September 1996 to August 2013 in the National Stock Exchange of India. They also emphasize that as the firm-specific fundamentals higher liquidity means higher unsystematic risk. On similar results, Bozhkov et al. (2020) emphasize that idiosyncratic risk is higher during the recession period. The findings from Kumari et al. (2017) and Bozhkov et al. (2020) seem reasonable as it is consistent with the findings of Datar et al. (1998), who proves that the illiquid stock offers high returns. Moreover, Liu (2015) also convinces that high investor sentiment makes securities liquid but on the contrary, it will reduce stock prices, which means reducing stock returns.

On the other hand, some empirical evidence refutes the positive relationship of risk-return. French et al. (1987) provide little evidence that there is a negative relationship between returns and unsystematic volatility. Ang et al. (2006) cast doubt for a positive relationship between expected return and idiosyncratic risk. They estimate the idiosyncratic volatility by three factors of CAPM and examine the risk-return relationship based on a trading strategy, which gives high idiosyncratic risk results for low returns. Cao and Han (2013) test the relationship of idiosyncratic risk and option returns in the assumption of an imperfect market. They assume that idiosyncratic risk is the manifest of arbitrage cost, which makes the portfolio of option return not sensitive to stock price movement in the market as the trading strategy is daily rebalanced. Cao and Han (2013) find that there is a negative relationship between idiosyncratic risk and stock return. In addition, Hua et al. (2016) provide a good hint about the idiosyncratic risk that tends to affect the returns in the market. They presume that firms with a better level of performance tend to play safe and that makes them reduce the firm-specific risk with the hope that it can increase the stock price. Moreover, He et al. (2020a) report that abnormal returns in the Chinese stock market vary after the impact of the Covid-19 pandemic. They find that the firm-specific factor or characteristics determine the abnormal return fluctuations. He et al. (2020a) prove that Shanghai Stock Exchange mostly lists the traditional industries (which gain the negative impact of Covid-19) while Shenzhen Stock Exchange lists the high-tech enterprises (which gain the positive impact of Covid-19 as they have growth opportunities).

Conversely, some empirical evidence shows that idiosyncratic risk plays no significant role for return. Wei and Zhang (2005) re-examine the evidence of Goyal and Santa-Clara (2003) as they see that the trading strategy behind the setting of idiosyncratic risk and stock return cannot be sustained for economic gains. On results, they prove that idiosyncratic risk and stock return have no insignificant relationship. Bali et al. (2005) also questioned the evidence of Goyal and Santa-Clara (2003) about the significance of idiosyncratic risk for stock returns. They measure the idiosyncratic risk with CAPM considering market illiquidity. In an extended sample, they find no significant relationship between idiosyncratic risk and stock return. Further study of Bali and Cakici (2008) also find a similar result that the influence of idiosyncratic risk on stock return is insignificant. Based on reviews, this study aims to examine the impact of idiosyncratic risk on stock returns in addition to the impact caused by systematic risk. The idiosyncratic risk is indicated to have significant involvement in determining stock returns in Indonesia during the Covid-19 outbreak. Based on this reason, this study presents the following hypothesis:

H1: Idiosyncratic risk positively affects the stock return.

2. METHOD

This study draws the active public firms in Indonesia Stock Exchange during the period from January 2, 2019, to June 30, 2021, with a total of 607 trading days. The data is divided into 5 periods consisting of the first period (January 2, 2019–June 28, 2019, with a total of 116 trading days), the second period (July 1, 2019–December 30, 2019, with a total of 129 trading days), the third period (January 2, 2020–June 30, 2020, with a total of 121 trading days), fourth period (July 1, 2020–December 30, 2020, with a total of 121 trading days), and fifth period (January 4, 2021–June 30, 2021, with a total of 120 trading days). Purposively, the data also does not contain the firms with zero daily volume trading to capture better figures of the illiquidity. The data sets portfolio based on 177 active public firms which adequate the sample criteria. As details, the set of the portfolio contains 25 firms of the basic materials sector, 18 firms of the consumer cyclical sector, 31 firms of the consumer non-cyclical sector, 20 firms of the energy sector, 23 firms of the financial sector, 7 firms of the healthcare sector, 12 firms of the industrial sector, 21 firms of the infrastructure sector, 13 firms of the properties and real estate sector, 2 firms of the technology sector, and 5 firms of the transportation and logistics sector. This study employs logistic regression to examine how the idiosyncratic risk affects the stock returns in Indonesia during the outbreak of Covid-19.

In terms of hypothesis testing, the dependent variable is stock return $\left(r_{it} - r_{ft}\right)$ measured by dummy while independent variables are idiosyncratic risk (the residuals) and systematic risk (coefficient of determination) as a control variable. The details of measurements for dependent and independent variables are explained as follows: first, the daily net stock return is calculated as return $\left(r_{id}\right)$ after daily risk-free $\left(r_{fd}\right)$.

$$r_{id} = \left(\frac{P_{id+1} - P_{id}}{P_{id}}\right) \cdot 100\%. \tag{1}$$

Eq. (1) presents that P_{id+1} is the closing price for asset *i* for day $d+1$ and P_{id} is the closing price for asset i for day d. $r_{it} - r_{ft}$ is taken for each period as the average of $r_{id} - r_{fd}$ and median is used as the cut-off point to classify it as 1 for high return and zero to otherwise. Second, the market return is calculated similarly to Eq. (1). Third, the daily illiquidity cost of asset $\left(c_{id}\right)$ is estimated as the basic component of L-CAPM based on a formula of Amihud (2002).

$$c_{id} = \frac{\left|r_{id}\right|}{v_{id}}. \tag{2}$$

Eq. (2) presents that $\left|r_{id}\right|$ is the absolute of stock return of asset *i* at day *d* while v_{id} is the trading volume (in currency) of asset i at day d. The

http://dx.doi.org/10.21511/imfi.18(4).2021.06

same procedure is also applied to estimate the market illiquidity. Fourth, idiosyncratic risks and systematic risks are estimated from standard CAPM and L-CAPM to get better comparison results. This study follows L-CAPM of Kumar et al. (2019), and Acharya and Pedersen (2005). The L-CAPM of Kumar et al. (2019) is used to estimate the first idiosyncratic risk which consisting procedures as follows: (1) determines the four betas $\left(\beta_{c_i}^{c_m}, \beta_{c_i}^{r_m}, \beta_{r_i}^{c_m}, \beta_{r_i}^{r_m}\right)$ by Eq. (3) and Eq. (4); and (2) substitutes the four estimated betas to Eq. (5) as independent variables.

$$c_{id} = \alpha_i + \beta_{c_i}^{c_m} \Delta c_{md} + \beta_{c_i}^{r_m} \left(r_{md} - r_{fd}\right) + \mu_{id}. \quad (3)$$

$$r_{id} - r_{fd} = \alpha_i + \beta_{r_i}^{c_m} \Delta c_{md} + \beta_{r_i}^{r_m} \left(r_{md} - r_{fd}\right) + v_{id}. \quad (4)$$

$$\begin{gathered} r_{it} - r_{ft} = \gamma_0 + \gamma_1 \beta_{r_{it}}^{r_m} + \gamma_2 \beta_{c_{it}}^{c_m} + \\ + \gamma_3 \beta_{r_{it}}^{c_m} + \gamma_4 \beta_{c_{it}}^{r_m} + \varepsilon_{it}. \end{gathered} \quad (5)$$

Furthermore, Eq. (6) as the standard CAPM is used to estimate the second idiosyncratic risk.

$$r_{it} - r_{ft} = \alpha_{it} + \beta_{it} \left(r_{mt} - r_{ft}\right) + e_{it}. \quad (6)$$

The third idiosyncratic risk is estimated by Eq. (7) that follows the model of Acharya and Pedersen (2005). Eq. (7) presents r_f as the risk-free return, $E_t\left(c_{t+1}^i\right)$ is the expected illiquidity cost, $\lambda_t = E_t\left(r_{t+1}^m - c_{t+1}^m - r^f\right)$ is the risk premium, $cov_t\left(r_{t+1}^i, r_{t+1}^m\right)$ is market risk, $cov_t\left(c_{t+1}^i, c_{t+1}^m\right)$ is relation between asset's illiquidity with market illiquidity, $cov_t\left(r_{t+1}^i, r_{t+1}^m\right)$ is the relation between asset's return with market illiquidity, and $cov_t\left(c_{t+1}^i, r_{t+1}^m\right)$ is the relation between asset's illiquidity and market return.

$$\begin{gathered} E_t\left(r_{t+1}^i\right) = r_f + E_t\left(c_{t+1}^i\right) + \\ + \lambda_t \frac{cov_t\left(r_{t+1}^i, r_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} + \lambda_t \frac{cov_t\left(c_{t+1}^i, c_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} - \\ - \lambda_t \frac{cov_t\left(r_{t+1}^i, c_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} - \lambda_t \frac{cov_t\left(c_{t+1}^i, r_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)}. \end{gathered} \quad (7)$$

3. RESULTS

Table 1 presents the comparison of idiosyncratic risk between models. The mean difference test shows that models 1 and 3 are significantly different from model 2, which indicates that L-CAPM slightly reduces the effect of idiosyncratic risks rather than CAPM. The results imply that illiquidity risk is a factor causing the difference between CAPM and L-CAPM, which is consistent with Jacoby et al. (2000). On findings, set better portfolio will produce a well-diversified idiosyncratic risk as suggested by Amihud (2002), and Acharya and Pedersen (2005). The test also provides unique results for the first and fifth periods: the idiosyncratic risks based on model 1 and model 3 are significantly different. The first period is the normal period before the impact of the Covid-19 pandemic. If it assumes that the fifth period has a similar condition with the first period then the portfolio will capture the picture of idiosyncratic risk as the normal conditions. Wei and Zhang (2005) suggest that the

Table 1. Mean difference test of idiosyncratic risk (for each model)

Period	Model			Mean difference test		
	1	2	3	1-2	1-3	3-2
1	0.3994	2.5198	0.5361	–2.1204***	–0.1366***	–1.9838***
2	0.4735	2.2531	0.4112	–1.7796***	0.0623	–1.8419***
3	0.5838	3.2530	0.6320	–2.6692***	–0.0482	–2.6210***
4	0.4664	2.8151	0.5362	–2.3487***	–0.0698	–2.2789***
5	0.4044	2.7596	0.5071	–2.3552***	–0.1027**	–2.2525***

Note: This table reports the comparison of idiosyncratic risk between models.
Model 1 is the idiosyncratic risk which is estimated using $r_{it} - r_{ft} = \gamma_0 + \gamma_1 \beta_{r_{it}}^{r_m} + \gamma_2 \beta_{c_{it}}^{c_m} + \gamma_3 \beta_{r_{it}}^{c_m} + \gamma_4 \beta_{c_{it}}^{r_m} + \varepsilon_{it}$.

Model 2 is the idiosyncratic risk which is estimated using $r_{it} - r_{ft} = \alpha_{it} + \beta_{it}\left(r_{mt} - r_{ft}\right) + e_{it}$. Model 3 is the idiosyncratic risk which is estimated using

$$E_t\left(r_{t+1}^i\right) = r_f + E_t\left(c_{t+1}^i\right) + \lambda_t \frac{cov_t\left(r_{t+1}^i, r_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} + \lambda_t \frac{cov_t\left(c_{t+1}^i, c_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} - \lambda_t \frac{cov_t\left(r_{t+1}^i, c_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)} - \lambda_t \frac{cov_t\left(c_{t+1}^i, r_{t+1}^m\right)}{var_t\left(r_{t+1}^m - c_{t+1}^m\right)}.$$

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

idiosyncratic risk is not sustained over time, which means specific-firm risks are random in normal conditions.

Based on the portfolio, the comparison of idiosyncratic risk between periods is examined in Table 2. On results, the three models show that the third period has the highest idiosyncratic risk, which indicates that there is a higher reaction due to the Covid-19 pandemic comparing to previous or further periods. Another interesting result is that the conditions of the fifth and fourth periods do not have a significant difference. This finding confirms the previous result that the existing portfolio can diversify the idiosyncratic risk in the fourth and fifth periods or in other words, those periods are under stable conditions.

Furthermore, the effect of idiosyncratic risk is tested with systematic risk as a control variable by employing the logistic regression as presented in Table 3. In the first, third, and fifth periods, without systematic risk as a control variable idiosyncratic risk based on L-CAPM and CAPM gives different signs of coefficient. However, adding systematic risk, idiosyncratic risk by L-CAPM (except CAPM) gives consistent coefficient signs. Otherwise, in the second and fourth periods, regression results without control variables show that three models give similar coefficient signs for idiosyncratic risk. Consistently, the regression of the three models after adding the systematic risk keeps giving similar coefficient signs for those periods particularly for the fourth period which is fit with our hypothesis. Overall, the models based on L-CAPM give the same explanations about the picture of idiosyncratic risk together with systematic risk. On results, idiosyncratic risk cannot be explained separately from systematic risk. The results of the analysis also show that market liquidity must be taken into account to set the portfolios in order to diversify idiosyncratic risk.

Table 3. Logistic regression test

Independent variables	$r_{it}-r_{ft}$				
	Period 1	Period 2	Period 3	Period 4	Period 5
Model 1					
Constant	–0.160	0.221	–0.007	–0.736	0.015
Idiosyncratic risk	0.429	–0.445	0.032	1.631***	–0.008
Constant	–1.979	3.081	1.533	–6.468	–0.096
Systematic risk	1.854*	–2.835***	–1.538	5.509***	0.115
Idiosyncratic risk	1.209*	–1.901***	–0.323	4.181***	0.019
Model 2					
Constant	–0.689	0.513	1.107	–3.460	0.985
Idiosyncratic risk	0.281**	–0.224	–0.338**	1.284***	–6.245***
Constant	–0.921	0.696	1.957	–5.212	0.609
Systematic risk	1.392	–1.374	–1.693*	3.918***	0.123
Idiosyncratic risk	0.315**	–0.250*	–0.431***	1.627***	–5.993***
Model 3					
Constant	0.122	0.184	0.145	–0.493	–0.037
Idiosyncratic risk	–0.208	–0.424	–0.212	0.959***	0.094
Constant	–0.896	1.449	4.475	–11.209	–1.036
Systematic risk	1.167	–1.372	–4.336***	10.615***	1.065
Idiosyncratic risk	0.031	–0.915*	–1.162***	4.800***	0.409

Note: The table reports the results of the logistic regression effect of systematic risk and idiosyncratic risk for each period. The dependent variable is a category of stock return $\left(r_{it}-r_{ft}\right)$ with firms with lower returns as the reference. The independent variables are idiosyncratic risk (the residuals) and systematic risk (coefficient of determination) as a control variable. *, **, and *** indicate significance at 10%, 5%, and 1%.

Table 2. Mean difference test of idiosyncratic risk (for each period)

Model	Period					Mean difference test			
	1	2	3	4	5	1-2	2-3	3-4	4-5
1	0.3994	0.4735	0.5838	0.4664	0.4044	–0.0741*	–0.1103**	0.1174**	0.0620
2	2.5198	2.2531	3.2530	2.8151	2.7596	0.2667**	–0.9999***	0.4379***	0.0555
3	0.5361	0.4112	0.6320	0.5362	0.5071	0.1248**	–0.2208***	0.0958*	0.0291

Note: This table reports the comparison of idiosyncratic risk between periods. Model 1 is the idiosyncratic risk which is estimated using $r_{it}-r_{ft}=\gamma_0+\gamma_1\beta_{r_{it}}^{r_m}+\gamma_2\beta_{c_{it}}^{c_m}+\gamma_3\beta_{r_{it}}^{c_m}+\gamma_4\beta_{c_{it}}^{r_m}+\varepsilon_{it}$.

Model 2 is the idiosyncratic risk which is estimated using $r_{it}-r_{ft}=\alpha_{it}+\beta_{it}\left(r_{mt}-r_{ft}\right)+e_{it}$.
Model 3 is the idiosyncratic risk which is estimated using

$$E_t\left(r_{t+1}^i\right)=r_f+E_t\left(c_{t+1}^i\right)+\lambda_t\frac{cov_t\left(r_{t+1}^i,r_{t+1}^m\right)}{var_t\left(r_{t+1}^m-c_{t+1}^m\right)}+\lambda_t\frac{cov_t\left(c_{t+1}^i,c_{t+1}^m\right)}{var_t\left(r_{t+1}^m-c_{t+1}^m\right)}-\lambda_t\frac{cov_t\left(r_{t+1}^i,c_{t+1}^m\right)}{var_t\left(r_{t+1}^m-c_{t+1}^m\right)}-\lambda_t\frac{cov_t\left(c_{t+1}^i,r_{t+1}^m\right)}{var_t\left(r_{t+1}^m-c_{t+1}^m\right)}.$$

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

http://dx.doi.org/10.21511/imfi.18(4).2021.06

4. DISCUSSION

This section emphasizes the explanation for idiosyncratic risk. This study reports that all systematic risks of all models show a positive coefficient for all periods even though they have different levels of significance. The findings also show that idiosyncratic risks (after including systematic risks) have largely the same explanation in the context of CAPM and L-CAPM. In the first period, the model of Kumar et al. (2019) captures better figures about the market condition based on the portfolio that idiosyncratic risks positively affect the high stock returns. The results imply that firms with high returns have high risks, which is consistent with Markowitz (1952), Lintner (1965), and Fama and MacBeth (1973) under the EMH. Specifically, the positive significance of idiosyncratic risk supports the findings of Lintner (1965), Goyal and Santa-Clara (2003), and Fu (2009).

In the second period, the model of Kumar et al. (2019) also captures better figures about the market conditions that idiosyncratic risks tend to decrease the returns. Similarly, the model of Acharya and Pedersen (2005) also captures the same figures in the third period when the Covid-19 starts to spread. Both models of Kumar et al. (2019) and Acharya and Pedersen (2005) eliminate the effect of market liquidity so the idiosyncratic risks in those periods tend purely from firm-specific risk. Noticing the work by He et al. (2020a) on Shanghai Stock Exchange, this study suspects that most firm-specific risks for firms with high returns start to increase earlier and during the impact of the Covid-19 pandemic. Reasonably, the findings support the evidence by Kumari et al. (2017), and Bozhkov et al. (2020) that increasing firm-specific risks shall reduce the returns, especially for recession-era. On circumstances, the findings are consistent with Ang et al. (2006), and Cao and Han (2013) about the negative relationship between risk and return.

In the fourth period, the firms with high returns in the portfolio show similar conditions to the first period. Both CAPM and L-CAPM capture similar figures about the risk-return relationship, which is consistent with the EMH. Noticing the work of Budiarso et al. (2020), this study suspects that the idiosyncratic risk is increasing because the investors tend to cover the previous loss by setting their portfolio for optimum returns. On finding, this study supports Markowitz (1952), Lintner (1965), Fama and MacBeth (1973), Goyal and Santa-Clara (2003), and Fu (2009) in the context of the EMH.

In the fifth period, the estimated idiosyncratic risks from both CAPM and L-CAPM have an insignificant effect on stock returns. The idiosyncratic risks by L-CAPM have similar coefficient signs, which indicate the risk as the result of firm characteristics and not of illiquidity risk. Following the evidence of Hua et al. (2016), this study assumes that most firms in this era tend to increase their performance to minimize the firm-specific risk in the objective to increase the stock price in the capital market. The case of the fifth period is supporting the findings of Wei and Zhang (2005), Bali et al. (2005), and Bali and Cakici (2008). The other important piece of evidence is that the idiosyncratic risk by CAPM has negative significance as the model is not excluding the effect of illiquidity risk, which is confirming the finding of Minović and Živković (2014).

CONCLUSION

The relationship between risk and return in the context of the EMH is mostly done using the CAPM approach. An understanding of the standard CAPM concept tends to focus only on systematic risk to explain the relationship between risk and return. The background of this understanding is due to the assumption that unsystematic risk or idiosyncratic risk can be diversified by a good portfolio set. Some previous studies developed the CAPM standard into L-CAPM with the consideration that market liquidity risk also affects the total risk of a security in the capital market. The results of the development of the CAPM into L-CAPM indicate that market liquidity also influences the idiosyncratic risks that arise due to company-specific risks. For decades, most empirical evidence still maintains the assumption of idiosyncratic risk until the world finally experienced a shocking outbreak, namely the Covid-19 outbreak. The outbreak of Covid-19 has a bad impact on the capital market around the world including the market in Indonesia that questioned the assumption of idiosyncratic risk in relation to returns still holds true in the concept of asset valuation models.

This study aimed to examine the impact of idiosyncratic risk on stock returns during the Covid-19 outbreak based on the portfolio set of listed firms since 2019. The results of the analysis show that the idiosyncratic risk for each period estimated based on the L-CAPM has a significant difference from the results obtained from the CAPM. These results indicate that market liquidity cannot be ignored in establishing firm-specific risk. In addition, it was found that idiosyncratic risk has the highest value in the third period, which indicates that there are abnormal internal conditions for the firms in this period. However, idiosyncratic risk shows stable conditions in the fifth period for firms on the portfolio basis, which indicates quite encouraging internal conditions in this period. This condition is confirmed by the regression test, which shows that idiosyncratic risk together with systematic risk has an insignificant impact on stock returns in the fifth period. Empirically, these results indicate that there are stable internal conditions for firms that are on a portfolio basis in the fifth period, especially in terms of financial performance when using the L-CAPM approach. On the other hand, the idiosyncratic risk still shows an important problem with stock returns in the fifth period as evidenced by a significant negative when using the CAPM approach. This indicates that the asset valuation model with the CAPM approach does not fully capture changes in market liquidity and its impact on idiosyncratic risk. However, the idiosyncratic risk by the CAPM approach also indicates that the problem of stock returns is not in the firm's internal conditions but by its market liquidity factor.

AUTHOR CONTRIBUTIONS

Conceptualization: Winston Pontoh.
Data curation: Novi Swandari Budiarso.
Formal analysis: Novi Swandari Budiarso.
Funding acquisition: Winston Pontoh.
Investigation: Novi Swandari Budiarso.
Methodology: Novi Swandari Budiarso.
Project administration: Winston Pontoh.
Resources: Winston Pontoh.
Software: Winston Pontoh.
Supervision: Winston Pontoh.
Validation: Winston Pontoh.
Visualization: Novi Swandari Budiarso.
Writing – original draft: Novi Swandari Budiarso.
Writing – review & editing: Winston Pontoh.

REFERENCES

1. Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics, 77*(2), 375-410. https://doi.org/10.1016/j.jfineco.2004.06.007
2. Altay, E., & Çalgıcı, S. (2019). Liquidity adjusted capital asset pricing model in an emerging market: Liquidity risk in Borsa Istanbul. *Borsa Istanbul Review, 19*(4), 297-309. https://doi.org/10.1016/j.bir.2019.06.002
3. Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets, 5*(1), 31-56. https://doi.org/10.1016/S1386-4181(01)00024-6
4. Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2006). The cross-section of volatility and expected returns. *The Journal of Finance, 61*(1), 259-299. https://doi.org/10.1111/j.1540-6261.2006.00836.x
5. Baker, M., & Stein, J. C. (2004). Market liquidity as a sentiment indicator. *Journal of Financial Markets, 7*(3), 271-299. https://doi.org/10.1016/j.finmar.2003.11.005

http://dx.doi.org/10.21511/imfi.18(4).2021.06

6. Bali, T. G., Cakici, N., Yan, X., & Zhang, Z. (2005). Does idiosyncratic risk really matter? *The Journal of Finance, 60*(2), 905-929. https://doi.org/10.1111/j.1540-6261.2005.00750.x
7. Bali, T., & Cakici, N. (2008). Idiosyncratic volatility and the cross section of expected returns. *Journal of Financial and Quantitative Analysis, 43*(1), 29-58. https://doi.org/10.1017/S002210900000274X
8. Batten, J. A., & Vo, X. V. (2014). Liquidity and return relationships in an emerging market. *Emerging Markets Finance and Trade, 50*(1), 5-21. https://doi.org/10.2753/REE1540-496X500101
9. Borges, M. R. (2010). Efficient market hypothesis in European stock markets. *The European Journal of Finance, 16*(7), 711-726. https://doi.org/10.1080/1351847X.2010.495477
10. Bozhkov, S., Lee, H., Sivarajah, U., Despoudi, S., & Nandy, M. (2020). Idiosyncratic risk and the cross-section of stock returns: The role of mean-reverting idiosyncratic volatility. *Annals of Operations Research, 294,* 419-452. https://doi.org/10.1007/s10479-018-2846-7
11. Budiarso, N. S., Hasyim, A. W., Soleman, R., Zam Zam, I., & Pontoh, W. (2020). Investor behavior under the Covid-19 pandemic: The case of Indonesia. *Investment Management and Financial Innovations, 17*(3), 308-318. https://doi.org/10.21511/imfi.17(3).2020.23
12. Cao, J., & Han, B. (2013). Cross section of option returns and idiosyncratic stock volatility. *Journal of Financial Economics, 108*(1), 231-249. https://doi.org/10.1016/j.jfineco.2012.11.010
13. Datar, V. T., Naik, N. Y., & Radcliffe, R. (1998). Liquidity and stock returns: An alternative test. *Journal of Financial Markets, 1*(2), 203-219. https://doi.org/10.1016/S1386-4181(97)00004-9
14. Fama, E. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417. https://doi.org/10.2307/2325486
15. Fama, E. (1991). Efficient Capital Markets: II. *The Journal of Finance, 46*(5), 1575-1617. https://doi.org/10.2307/2328565
16. Fama, E. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics, 49*(3), 283-306. https://doi.org/10.1016/S0304-405X(98)00026-9
17. Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3-56. https://doi.org/10.1016/0304-405X(93)90023-5
18. Fama, E., & MacBeth, J. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy, 81*(3), 607-636. https://doi.org/10.1086/260061
19. French, K. R., Schwert, G. W., & Stambaugh, R. F. (1987). Expected stock returns and volatility. *Journal of Financial Economics, 19*(1), 3-29. https://doi.org/10.1016/0304-405X(87)90026-2
20. Fu, F. (2009). Idiosyncratic risk and the cross-section of expected stock returns. *Journal of Financial Economics, 91*(1), 24-37. https://doi.org/10.1016/j.jfineco.2008.02.003
21. Goyal, A., & Santa-Clara, P. (2003). Idiosyncratic risk matters! *The Journal of Finance, 58*(3), 975-1007. https://doi.org/10.1111/1540-6261.00555
22. Grillini, S., Ozkan, A., Sharma, A., & Al-Janabi, M. A. M. (2019). Pricing of time-varying illiquidity within the Eurozone: Evidence using a Markov switching liquidity-adjusted capital asset pricing model. *International Review of Financial Analysis, 64,* 145-158. https://doi.org/10.1016/j.irfa.2019.05.002
23. He, P., Sun, Y., Zhang, Y., & Li, T. (2020a). COVID–19's impact on stock prices across different sectors – An event study based on the Chinese Stock Market. *Emerging Markets Finance and Trade, 56*(10), 2198-2212. https://doi.org/10.1080/1540496X.2020.1785865
24. He, Q., Liu, J., Wang, S., & Yu, J. (2020b). The impact of COVID-19 on stock markets. *Economic and Political Studies, 8*(3), 275-288. https://doi.org/10.1080/20954816.2020.1757570
25. Hong, H., Bian, Z., & Lee, C. C. (2021). COVID-19 and instability of stock market performance: Evidence from the U.S. *Financial Innovation, 7,* 12, 1-18. https://doi.org/10.1186/s40854-021-00229-1
26. Hua, N., Dalbor, M. C., Lee, S., & Guchait, P. (2016). An empirical framework to predict idiosyncratic risk in a time of crisis: Evidence from the restaurant industry. *International Journal of Contemporary Hospitality Management, 28*(1), 156-176. https://doi.org/10.1108/IJCHM-03-2014-0134
27. Jacoby, G., Fowler, D. J., & Gottesman, A. A. (2000). The capital asset pricing model and the liquidity effect: A theoretical approach. *Journal of Financial Markets, 3*(1), 69-81. https://doi.org/10.1016/S1386-4181(99)00013-0
28. Jain, M., & Singla, R. (2021). Role of leverage and liquidity risk in asset pricing: Evidence from Indian stock market. *Vilakshan-XIMB Journal of Management*. https://doi.org/10.1108/XJM-08-2020-0088
29. Kumar, G., Misra, A. K., & McMillan, D. (rev.ed.). (2019). Liquidity-adjusted CAPM: An empirical analysis on Indian stock market. *Cogent Economics & Finance, 7*(1), 1573471. https://doi.org/10.1080/23322039.2019.1573471
30. Kumari, J., Mahakud, J., & Hiremath, G. S. (2017). Determinants of idiosyncratic volatility: Evidence from the Indian stock market. *Research in International Business and Finance, 41,* 172-184. https://doi.org/10.1016/j.ribaf.2017.04.022
31. Lakonishok, J., & Shapiro, A. C. (1986). Systematic risk, total risk and size as determinants of stock market returns. *Journal of Banking & Finance, 10*(1), 115-132. https://doi.org/10.1016/0378-4266(86)90023-3

32. Le, H., & Gregoriou, A. (2021). Liquidity and asset pricing: Evidence from a new free-float-adjusted price impact ratio. *Journal of Economic Studies*. https://doi.org/10.1108/JES-04-2021-0182

33. Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics, 47*(1), 13-37. https://doi.org/10.2307/1924119

34. Liu, S. (2015). Investor sentiment and stock market liquidity. *Journal of Behavioral Finance, 16*(1), 51-67. https://doi.org/10.1080/15427560.2015.1000334

35. Loukil, N., Zayani, M. B., & Omri, A. (2010). Impact of liquidity on stock returns: An empirical investigation of the Tunisian stock market. *Macroeconomics and Finance in Emerging Market Economies, 3*(2), 261-283. https://doi.org/10.1080/17520843.2010.498137

36. Maiti, M. (2019). Is idiosyncratic risk ignored in asset pricing: Sri Lankan evidence? *Future Business Journal, 5,* 5. https://doi.org/10.1186/s43093-019-0004-6

37. Malini, H. (2020). Behaviour of stock returns during COVID-19 Pandemic: Evidence from six selected stock market in the world. *Jurnal Ekonomi Indonesia, 9*(3), 247-263. https://doi.org/10.52813/jei.v9i3.70

38. Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives, 17*(1), 59-82. https://doi.org/10.1257/089533003321164958

39. Malkiel, B. G., & Xu, Y. (1997). Risk and return revisited. *The Journal of Portfolio Management, 23*(3), 9-14. https://doi.org/10.3905/jpm.1997.409608

40. Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7*(1), 77-91. https://doi.org/10.2307/2975974

41. Minović, J., & Živković, B. (2014). CAPM augmented with liquidity and size premium in the Croatian stock market. *Economic Research-Ekonomska Istraživanja, 27*(1), 191-206. https://doi.org/10.1080/1331677X.2014.952107

42. Miralles-Quirós, M. d. M., Miralles-Quirós, J. L., & Oliveira, C. (2017). The role of liquidity in asset pricing: The special case of the Portuguese Stock Market. *Journal of Economics, Finance and Administrative Science, 22*(43), 191-206. https://doi.org/10.1108/JEFAS-12-2016-0001

43. Mishra, P. K., & Mishra, S. K. (2020). Corona pandemic and stock market behaviour: Empirical insights from selected Asian Countries. *Millennial Asia, 11*(3), 341-365. https://doi.org/10.1177%2F0976399620952354

44. Narayan, P. K., Gong, Q., & Ahmed, H. J. A. (2021). Is there a pattern in how COVID-19 has affected Australia's stock returns? *Applied Economics Letters*. https://doi.org/10.1080/13504851.2020.1861190

45. Pontiff, J. (2006). Costly arbitrage and the myth of idiosyncratic risk. *Journal of Accounting and Economics, 42*(1-2), 35-52. https://doi.org/10.1016/j.jacceco.2006.04.002

46. Rahmayani, D., & Oktavilia, S. (2020). Does the Covid-19 pandemic affect the stock market in Indonesia? *Jurnal Ilmu Sosial dan Ilmu Politik, 24*(1), 33-47. http://dx.doi.org/10.22146/jsp.56432

47. Reber, B., Gold, A., & Gold, S. (2021). ESG disclosure and idiosyncratic risk in Initial Public Offerings. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-021-04847-8

48. Shahzad, F., Fareed, Z., Wang, Z., & Shah, S. G. M. (2020). Do idiosyncratic risk, market risk, and total risk matter during different firm life cycle stages? *Physica A: Statistical Mechanics and its Applications, 537,* 122550. https://doi.org/10.1016/j.physa.2019.122550

49. Theriou, N. G., Aggelidis, V. P., Maditinos, D. I., & Šević, Ž. (2010). Testing the relation between beta and returns in the Athens stock exchange. *Managerial Finance, 36*(12), 1043-1056. https://doi.org/10.1108/03074351011088441

50. Tinic, S. M., & West, R. R. (1984). Risk and return: January vs. the rest of the year. *Journal of Financial Economics, 13*(4), 561-574. https://doi.org/10.1016/0304-405X(84)90016-3

51. Trisnowati, Y., & Muditomo, A. (2021). COVID-19 and stock market reaction in Indonesia. *Journal of Accounting and Investment, 22*(1), 23-36. https://doi.org/10.18196/jai.v22i1.8859

52. Wei, S. X., & Zhang, C. (2005). Idiosyncratic risk does not matter: A re-examination of the relationship between average returns and average volatilities. *Journal of Banking & Finance, 29*(3), 603-621. https://doi.org/10.1016/j.jbankfin.2004.05.021

http://dx.doi.org/10.21511/imfi.18(4).2021.06