COMMON IDIOSYNCRATIC VOLATILITY IN INDONESIA

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Abstract

This research aims to examine a factor structure in idiosyncratic volatility and how the shock from common idiosyncratic volatility (CIV) is priced in Indonesia. This study is not only to determine the effect of idiosyncratic volatility, but also to know how the factor structure of idiosyncratic volatility and the exposure of CIV shock on firm. As the research on emerging markets, especially Indonesia, is still yet recorded in literature regarding common idiosyncratic volatility. Idiosyncratic volatility in this study is calculated as variance of residuals from market model regression, and estimated using EGARCH method because of the nature of volatility that has time varying behavior. The study found that there is no significant results in CIV-beta investment strategy and show that changes in CIV is not priced as common factor that explain stock returns in Indonesia.

Keywords: *firm volatility, idiosyncratic risk, cross-section of stock returns, emerging market*

JEL Classification: *B59*

INTRODUCTION

Risk in investment is one of the most important thing that should be known and be considered by investor to get expected return. The theory between risk and return is commonly known by capital market investor, higher risk higher return (positive risk premium). There is assumption that investor is risk averse, this a nature to avoid the risk. This nature will induce investors to invest their money in assets that have no risk (risk free assets) if the risk premium in risky assets have zero value. That is why positive risk premium theory

is used to induce investors with risk averse to invest their money in risky assets rather than risk free assets.

At first, investor just look at market risk that has systematically effect (systematic risk), meanwhile risk that come from individual stock is not priced because it has no effect to other stocks and market systematically (unsystematic risk). Some of financial experts argued that risks involved with stocks or assets can be minimized by portfolio diversification so the total risk can close to zero. Unfortunately diversify a portfolio is not easy and not all investors have diversified portfolio.

This unsystematic risks involve with stocks or assets is known as idiosyncratic risks. Although this risks can be eliminated or minimized by diversification, there are always risks that cannot be diversified because of market imperfection, then there is always a compensation for investors that hold undiversified assets. Idiosyncratic risks have become center of interest some of asset pricing researchers and recently has been studied in the form of volatility called idiosyncratic volatility (IVOL).

There are some empirical studies about idiosyncratic risks, unfortunately the results of those studies is still inconsistent and become puzzle until now, even though most the results of studies indicate the importance of idiosyncratic risk. Some researchers such Xu & Malkiel (2003), Goyal & Santa-Clara (2003), Jiang & Lee (2006), Fu (2009), Huang et al. (2010), and Miffre et al. (2013) contended that there is positive relationship between IVOL and stock returns. Meanwhile Ang et al. (2006) and Guo & Savickas (2006) contended that there is negative relationship, the others even concluded that there is no significant relationship between IVOL and stock returns as reported by Bali & Cakici (2008) and Bradrania et al. (2015).

Even though there are some inconsistency in some results, still that results show that idiosyncratic risk is one of important factor in asset pricing. The differences in effects can be caused by several things such as data frequency and treatment of the data (Khovansky & Zhylyevskyy, 2013), or the proxy used as idiosyncratic risk (Vozlyublennaia, 2012). Recent study by Herskovic et al. (2016) reported the commonality in IVOL can explain cross-section stock return by measuring the exposure of stock return against common idiosyncratic volatility.

Study of idiosyncratic volatility mostly done in developed markets, study in emerging markets is still not many seen in the literature. Nartea el al (2011) pointed that it is not equal if generalizing the results about idiosyncratic volatility in developed and emerging markets. Their study found positive relation between IVOL and stock return in four country in South East Asia, Singapore, Thailand, Malaysia, and Indonesia. This result give some evidence that IVOL's effect on stock return in some of emerging markets in Asia and even developed markets such as Singapore give different sign of effect from evidence in US (United States).

The aim of this study is to find the exposure of firm on common idiosyncratic volatility (CIV). The study about CIV recently done on developed markets (US), this CIV term was introduced by Herskovic et al. (2016). CIV is a proxy of all firms idiosyncratic volatility by averaging IVOL across firms, this was done by Herskovic et al. (2016) because of their found on synchronized IVOL of US firms. Therefore, this study will explore the exposure of change in CIV (CIV-shocks) in affecting average stock returns, whether the exposure of CIV-shocks has the same effect as the effect in developed markets. Another aim of this study is to find if the exposure will be different if the proxy of IVOL used on this research is expected IVOL rather than realized or lagged IVOL.

LITERATURE STUDY

Idiosyncratic Risk

Malkiel and Xu (2002) showed that the volatility of individual stock increase over time. Their study also pointed that idiosyncratic volatility had an effect on stock return with condition that idiosyncratic volatility can affect the stock return if all investors do not have diversified portfolio.

Goyal and Santa-Clara (2003) reported the positive relation between idiosyncratic risk, that had average stock risk as a proxy, and return of stocks. They explained that investor hold the non-traded assets that increase risk of investor so then increase the investors' expectation for bigger return as the compensation.

Ang et al. (2006, 2009) found that stock with high idiosyncratic volatility had low average return, this the opposite of the existing theory that pointed the higher the risk the

higher the return. His study not only study the idiosyncratic risk but also aggregate volatility risk, or market risk, the result showed the bigger the sensitivity against the volatility of risk, gave lower average return on the portfolio that sorted on idiosyncratic volatility. Based on the result, they contended that the cause is the sensitivity of stock on the aggregate volatility risk. They also argued that previous study did not examine idiosyncratic volatility on the firm level or did not sorting portfolio based on idiosyncratic volatility (IVOL). Guo & Savickas (2006) also found the negative relationship between IVOL and stock return, same conclusion with Ang et al. (2006, 2009). The difference of both study lie on the positive relation with aggregate volatility risk.

However Bali & Cakici (2008) did not found a significant relationship between idiosyncratic risk and stock return. Even after verified the weakness on the study of Goyal & Santa-Clara (2003) in the previous study, they did not find any significant relation between idiosyncratic risk and the stock return on the portfolio measured with value weighted (Bali et al., 2005).

Expected Idiosyncratic Volatility & Common Idiosyncratic Volatility

Fu (2009) used EGARCH model to estimate the expected idiosyncratic volatility and found a positive relations between IVOL and stock return. He argued the IVOL that usually used in the previous study is realized IVOL and not the expected IVOL that has time series property or volatile over time. This result contradict with conclusion from Ang et al. (2006, 2009) that showed the negative relation. Fu (2009) argued that used of the expected IVOL should on the same period with the expected return not on the one lagged month period, and the negative relation on the conclusion of Ang et al. (2006, 2009) can be caused by the effect of return reversal Huang et al. (2010).

Miffre et al. (2013) indicated that investor demand for additional return when holding undiversified portfolio. Their study explained idiosyncratic volatility on portfolio sorted on size and value weighted, the result still robust even after controlling some factors based on size, value, past performance, liquidity and total volatility.

Bradrania et al. (2015) explained that even after controlling liquidity cost, which suspected as the cause of the positive relation between idiosyncratic risk and return, the study

was not found any significant relation. This result more or less similar with the result from Bali et al. (2005), the difference lie on the use of portfolio measurement, when Bradrania et al. (2015) use equally weighted and Bali et al. (2005) use value weighted.

One of the latest study about idiosyncratic volatility (IVOL) found that IVOL of US firms are synchronized. This research was done by Herskovic et al. (2016) revealed the commonality on the factor structure of IVOL if there is a synchronization between firms' IVOL and explained for the existence of common idiosyncratic volatility (CIV) between firms. Their study showed that CIV is priced as one of assets pricing factor in US, the lower the exposure on CIV-shocks (negative CIV-beta) the higher the stock return rather than higher CIV-beta. More than evidence on stock return, CIV has relation with household labor income.

Idiosyncratic Volatility in Emerging Markets

Nartea et al. (2011) studied the relation of IVOL and stock return on South East Asian emerging markets, such as Malaysia, Singapore, Thailand, Indonesia, and Philippines. The study verify positive relation between idiosyncratic risk and stock return, using standard deviation of residual on Fama-French regression as idiosyncratic volatility. However Nartea et al. (2013) found new evidence using stock data from China, they found negative relation between idiosyncratic risk and stock return on emerging market. They argued that IVOL in China is periodic-specific coincide with regime shift and structural market reforms.

Similar with Ang et al. (2006, 2009), according to Murhadi (2013) relation of IVOL and stock return in Indonesia was a significant negative relation. He argued that the result give implication that investors tend to focus to a firm with lower risk when they cannot form a diversified portfolio to minimized the effect of idiosyncratic risk. Another evidence was not found the significancy of relationship between idiosyncratic volatility and average stock returns in Indonesia (Yunengsih and Husodo, 2014).

METHODS

Data

Stock price data that used on this study consists of daily and monthly data frequency on firms that is registered on Jakarta Stock Exchange and data of Indonesia stock market index. The risk free rate use SPN (Surat Perbendaharaan Negara) or Treasury of Indonesian Government 3 month rate that has similar characteristics to US T-bill rate. Used data is secondary data with a sample of non-finance firms and still active in Indonesia Stock Exchange. The sample period is from January 2001-August 2016, this sample is taken to find how the exposure on CIV affecting stock returns in a quite long period of time, rather than super long period time that usually used in analysing developed markets.

Research Method

Expected Idiosyncratic Volatility

Idiosyncratic volatility (IVOL) that is estimated on this study is an IVOL that varies over time, according to Fu (2009) expected IVOL varies and volatile over time so it can produce positive relation between IVOL and stock returns. Expected IVOL estimate use EGARCH (p,q) method suggested by Fu (2009).

$(ri-rf)t=\alpha+\beta\ i,\ t(Rm-rf)t+\varepsilon\ i,t$ (3.1)

$\varepsilon\ i,t\sim N(0,\sigma it2)$

$\ln\ \sigma it2=ai+l=1pbi,l\ln\ \sigma it2+k=1qci,k\{\theta(\varepsilon i,t-k\sigma i,t-k)+\gamma[|\varepsilon i,t-k\sigma i,t-k|-(2\pi)1/2]\}$ (3.2)

Idiosyncratic volatility that is estimated using model above is variance of residual from market model regression. Residual $\varepsilon_{i,t}$ is assumed to be normal with the mean of zero and conditional variance $\square^{2}_{\square\square}$. This model has several advantage than GARCH model, that is do not restrict parameter values to avoid negative variance and capture asymmetry effect on conditional volatility (Brooks, 2014). Another parameter that will be measured is market volatility (MV) to consider its effect on firms' stock. This MV will be analysed to see the exposure of firms' stock return on changes in MV.

Common Idiosyncratic Volatility

After obtaining IVOL, CIV (Common Idiosyncratic Volatility) is calculated as average of IVOL across the firms. Then obtaining CIV-beta and MV-beta from regressing excess return on CIV-shocks (changes of CIV per month) and MV-shocks (changes of MV per month) with 60 month rolling window regression.

$(ri-rf)t=\alpha+\beta CIVstCIVst+\beta MVstMVst+\varepsilon\ i,t$ (3.3)

Model (3) explain the effect of CIV-shocks on excess return (Ri-rf)t for stock *i* on period *t*. CIVst is CIV-shocks on period *t*. Meanwhile MVst is MV-shocks on period *t*. Parameter βCIVst is the exposure of firms on changes in CIV or called CIV-beta and βMVst is the exposure of firms on changes in MV or called MV-beta. This betas are used on sorting portfolio each month to find average return on portfolio quintiles.

RESULTS

Idiosyncratic volatility is described as firm level volatility that is considered not important in determining stock return and can be minimized or neutralized by portfolio diversification. In fact, in some countries, specifically in developed markets such as US, idiosyncratic volatility is proved to be matters either with significant negative or positive relations. This study will attempt to prove if exposure on changes in CIV (common idiosyncratic volatility) is matter and can be priced in Indonesia. The table below describe the descriptive statistics of variables used in this study.

Table 1. Descriptive Statistics of Variables

	Xret	CIVS	MVS	CIV	MV
Mean	0.016476	5.77E-05	-5.4E-05	0.160646	0.085517
Std Deviation	0.194321	0.009227	0.011975	0.011454	0.025875
Median	-0.00349	-0.00031	-0.0031	0.158462	0.07664
Max	5.471562	0.023555	0.091287	0.195157	0.208943
Min	-0.72272	-0.02717	-0.0221	0.139108	0.058208
Skewness	5.162771	-0.07263	3.984328	0.742897	2.095406

Source: Research analysis

Descriptive statistics of variables can be seen on table above, the analysis give the picture of mean, standard deviation, maximum and minimum value, and skewness of variables in period of analysis. The mean for monthly stock return in excess of risk free rate return is around 1,7% per month. The independent variable for regression is CIVs (common idiosyncratic volatility-shocks) and MVs (market volatility-shocks), mean for CIVS is the average of monthly changes on CIV is around 0.00577% and the average of monthly changes on MV is around -0.0054% per month. The variables that had been used for analysis have positive skewness, except for CIVs that has negative skewness.

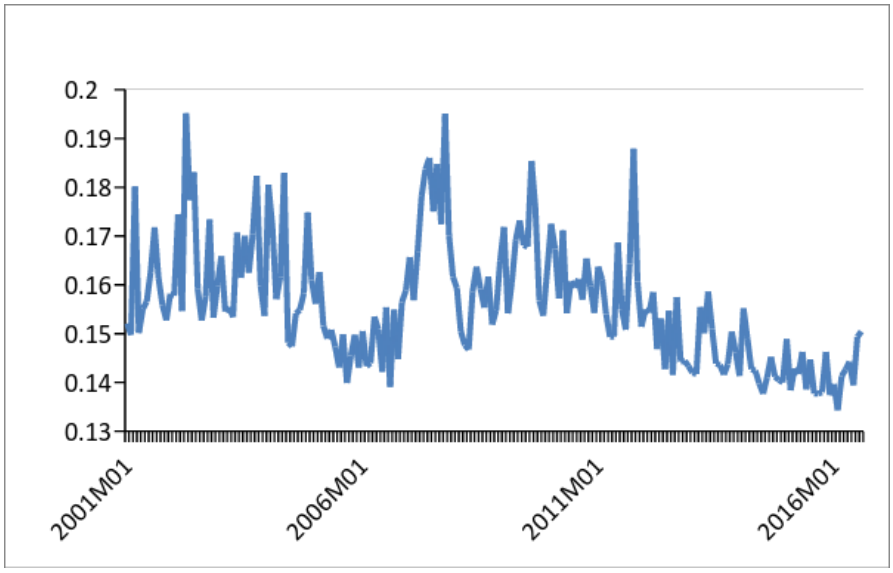

Figure 1. Common Idiosyncratic Volatility

Picture above show how the pattern of common idiosyncratic volatility in Indonesia on 15 years period. Overall the pattern do not show any trend, upward or downward trend, in firm level idiosyncratic volatility moves in Indonesia. The benefits of diversification can be implied by upward trend in idiosyncratic volatility that implies decreasing correlation among stocks as well. Decreasing correlation among stocks means portfolio diversification among stocks will be easier and give more benefits to investors (Campbell et al., 2001). Meanwhile the pattern of common idiosyncratic volatility in Indonesia do not show any increasing IVOL over time, that is show that portfolio diversification in Indonesia do not give many benefits to investors.

The CIV is used to examine the exposure of stock returns on changes of CIV, called CIV-beta. The beta was estimated by regressing return in excess of risk free rates on CIV-shocks and MV-shocks using 60 month rolling window regression to get CIV- and MV-beta each month. The estimated beta then used in sorting stocks into quintiles to form equally weighted portfolio.

Table 2 show the portfolio formed on CIV-beta with different methods of sorting. Panel A is portfolio formed with one way sort on CIV-beta. Meanwhile Panel B is one way sort on CIV-beta controlling of MV-beta, following steps from Herskovic et al. (2016) by collapsing double sorted portfolio on MV-beta and CIV-beta, and Panel C is double sort or two way sort on MV-beta and CIV-beta. This portfolio-based approach is the easiest way to interpret returns on feasible investment strategy, by sorting stocks into portfolio based on variables give a simple picture if the returns is increasing or decreasing on independent variables. The most feasible investment strategy that can be seen is the zero investment strategy that start with long in high CIV-beta and short in low CIV-beta.

Table 2. Portfolios formed on CIV-beta

Panel	CIV1	CIV2	CIV3	CIV4	CIV5	Q5-Q1	t(5-1)
A: One way sort on CIV-beta							
	25.835	22.083	17.401	15.754	18.565	-7.27	-0.1752
B: Sort on CIV-beta controlling for MV-beta							
	21.58	24.85	19.30	13.28	20.67	-0.91	-0.113
C: Double sorting on CIV-beta & MV-beta							
MV1	5.895	3.925	23.06	4.503	9.476	3.581	-0.064
MV2	19.479	17.222	9.87	24.584	25.199	5.721	-0.026
MV3	21.327	10.928	18.246	6.267	6.738	-14.589	-1.491
MV4	15.931	26.472	10.849	14.789	21.518	5.587	0.592
MV5	6.856	9.818	10.886	-4.186	22.87	16.015	0.429
Q5-Q1	0.961	5.893	-12.174	-8.689	13.395	-	-
t(5-1)	0.086	0.538	-1.424	-1.513	0.529	-	-

Source: Research analysis

Portfolio on Panel A with one way sort on CIV-beta show decreasing average returns in CIV-beta. The stocks on lowest CIV-beta (CIV1) give more returns than any stocks in other quintiles, meanwhile the lowest return is seen in the second highest CIV-beta (CIV4). Overall the results can say that the returns is decreasing in CIV-beta, this can be seen at the zero investment strategy (5-1) show the similar results showed in Herskovic et al. (2016), where the return of strategy is negative return which means that the lowest CIV-beta has higher return than highest CIV-beta portfolio. Similar results seen in Panel B, CIV-beta sorted portfolio controlling for MV-beta, even after controlling the exposure on market volatility.

This is similar results from Herskovic et al. (2016) with United States' IVOL, that has return's pattern monotically decreasing in CIV-beta. Fu (2009) suggested that the patterns of return that monotically increasing or decreasing across the IVOL portfolio were completely driven by small stocks with high idiosyncratic volatility. The results on Herskovic et al. (2016) may followed this suggestion, as they did not report robustness results that explained about group of small stocks. Even though similar, the significance on investment strategy do not show any significancy in both of the panels.

In panel C, the excess returns is double sorted on CIV-beta and MV-beta (5 by 5). These portfolios is the same portfolio with the one described for controlling MV-beta. The results is reversed version on two other panels, the zero investment strategy on CIV-beta is earning positive average returns within each MV-beta quintile, except the Q5-Q1 strategy in the third quintile of MV-beta that earned negative average return. The inconsistency of the results between panel on single and double sorting was clarified on the t-stat of the investment strategy that did not show any significancy. This results is different from what Herskovic et al. (2016) found, that there is reverse effect on zero investment (Q5-Q1) CIV-beta strategy and MV-beta strategy where the CIV-beta investment strategy has significant results and the MV-beta strategy was not significant.

Even though the study use expected IVOL to form the CIV, the results still show decreasing pattern (not monotonically) of return across CIV-beta portfolio, except for the double sorting portfolio, even if all of the investment strategy on portfolios were not

significant. This can be caused by return reversal from the previous month that has positive returns especially from small stocks that have high IVOL as argued by Fu (2009).

In case of Indonesia, investor may not see many benefits in diversify portfolio based on its IVOL moreover its exposure against changes in CIV as the there is no significancy on the investment strategy. Yunengsih and Husodo (2014) pointed that idiosyncratic volatility cannot predict stock return in Indonesia even in short or long periods. Even after using the EGARCH method for expected IVOL estimation, the exposure of idiosyncratic volatility did not have any significant effect on average stock returns. This results is in accordance to Bali & Cakici (2008) where found no significant evidence in the relation of return and idiosyncratic volatility. Indicating that CIV factor did not have the ability to explain stock returns associated with CIV-beta sorted portfolio in emerging markets such as Indonesia and not being considered by investors.

CONCLUSION

Even if the CIV is priced in the cross-section of stock returns in US as developed markets, the effect of CIV will not the same if the factor is analysed in emerging market as Indonesia. The results of study found that there is no significancy on CIV-beta (exposure of changes in CIV) investment strategy even after controlling on exposure of market volatility-beta. This result conclude that changes in CIV or CIV-shocks is not priced in the cross-section of stock returns in Indonesia. Investor may not consider any benefits in calculating firm level volatility as the factor that explain stock returns in Indonesia.

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