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Does Idiosyncratic Risk matter in the Vietnamese Stock Market?

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Abstract

The paper examines the behaviour of idiosyncratic volatility in the Vietnamese stock market from 2007-2012. Using daily and monthly data, we find that idiosyncratic volatility cannot predict one-month ahead stock returns in the stock market. Also, there is a positive trend in the average value-weighted idiosyncratic volatility, while the market volatility exhibits negative trend, implying an increasing benefit of the diversification in the Vietnamese stock market. Our findings reveal that investors should not expect to be compensated for bearing idiosyncratic risk when investing in the Vietnamese stock market and cost of capital estimates would be more accurate using the FF3-factor model rather than CAPM. These results have not been documented in the literature on the emerging stock market of Vietnam, benefiting domestic as well as international investors in the stock market.

Keyword: Asset pricing, emerging market finance, idiosyncratic volatility, Vietnam

1-Introduction

Traditionally, idiosyncratic risk, which refers to risk due to firm specific events, had been regarded as unimportant in asset pricing, since it can be costlessly eliminated by holding a fully diversified portfolio. Or in other words, there is no relationship between idiosyncratic volatility (IV), which is proxy for idiosyncratic risk, and expected returns because no compensation exists for bearing idiosyncratic risk.

However recently, a growing number of researches investigate the trend in IV and market volatility, as well as the relationship between IV and cross-sectional stock returns. The importance of trends in IV and market volatility is that an increasing IV overtime together with stable market volatility implies the benefits from diversification, since the correlation among stocks is decreasing. Additionally, investors may bear some idiosyncratic risk in reality because it might not be able to hold fully diversified portfolios due to asymmetric information or transaction costs and such. Therefore, in these cases, idiosyncratic risk should matter, or in other words, there should be a positive relationship between IV and expected returns since investors demand compensation for bearing idiosyncratic risk (Levy, 1978; Merton, 1987; Malkiel and Xu, 2006).

The empirical evidences on these relationships are mixed in the literature. Campbell et al. (2001) documented the evidence of increased idiosyncratic volatility relative to market volatility in the US market during 1962-1997. However, Bekaert et al. (2008) showed that there is no trend in IV in the US as claimed by Campbell et al. (2001), as well as in 23 other developed countries. Additionally, Brandt et al. (2010) argued that the behaviour in idiosyncratic volatility documented by Campbell et al. (2001) is not a time trend but an episodic phenomenon associated with the behaviour of retail investors.

There also are various findings on the relationship between IV and stock returns. Goyal and Santa-Clara (2003) found that aggregate measures of IV can predict one-month ahead excess market returns in the US from 1962-1999. However, both Bali et al. (2005) and Brockman and Yan (2008) further augured that there is actually no relationship between the aggregate IV and expected the market returns in the U.S. stock markets. Obviously, conclusion here is inconsistent.

Ang et al. (2006) evidenced a negative relationship between IV and cross sectional stock returns in the US market over 1963-2000. Brockman and Yan (2006) used the US data from 1926-1962 and found a negative relationship between IV and stock returns. Ang et al. (2009) confirmed their findings of the negative relationship in the US and also in 22 other developed markets. Other studies, instead, provide evidence of a positive relationship between IV and stock returns, such as in Speigel and Wang (2006), Malkiel and Xu (2006), Divatopolous et al. (2008), Fu (2009), Chua et al. (2009) and Nartea et al. (2011).

While most of the literature on IV deals with developed markets, so far not any study has focused on the Vietnamese stock market. This is unfortunate, since the Vietnamese stock market, although still characterized by low capitalization, is one of the world's rapidly developing emerging markets. Beyond, as Loc et al. (2010) further suggested, Vietnamese stock market is one of the few capital markets under the management of the communist, thus we are more interested in discovering the insight into a phenomenon of a typically capitalist institution within a country could present new empirical evidence on the possible co-existence of elements of different ways of managing economy and politics. Moreover, Chen and Fang (2009) also emphasize the importance in investigation whether or not those empirical findings in the capital market in the U.S. are country specified or world-wide phenomenon. Consequently, this study is going to investigate the role of IV in Vietnamese stock markets, which could provide an out-of-sample evidence for both academics and practitioners. The Vietnamese stock market officially came into operation on 28 July 2000 with only five listed companies during the year. Over 12 years since its first launch, the number of listed companies has increased to 605 at the end of 2011. The market capitalization has grown from less than USD 1 billion to nearly USD 20 billion today, with the investor accounts from 2,908 in 2000 to nearly 1.2 million in 2011, among which around 16,000 accounts are of foreign investors and institutions. The stock market has also contributed considerably to the development of Vietnam with its market capitalization accounting for 42 per cent of GDP in 2010 as illustrated in Table 1. However, the market size is still small in comparison with other regional markets, thus implying enormous potential for growth.

(Insert Table 1 around here)

As the Vietnamese stock market continues to open itself to foreign investors, it is worthy to understand factors driving stock price movements in the market. Also, it is suggested that the Vietnamese stock market is negatively correlated with the US market (Nguyen et al., 2011), hence, it is desirable to see if the role of IV in Vietnam is different from that in the US. These all together make it an interesting setting to investigate the behaviour and role of IV in asset pricing in the Vietnamese stock market.

Therefore, this paper's objective is to examine the IV issue in the context of the Vietnamese stock market using the method in Ang et al. (2006, 2009). The paper will address the following three questions. First, is there a trend in the average idiosyncratic volatility in the Vietnamese stock market? Second, can idiosyncratic volatility predict one-month ahead excess market returns? Third, is there any relationship between idiosyncratic volatility and cross sectional stock returns in the Vietnamese stock market? The contribution of our study is two folds. First, to the best of our knowledge, it is the first research which describes the time series behaviour of idiosyncratic volatility and market volatility for the Vietnamese stock market. Second, it contributes to the debate on whether there is a relationship between idiosyncratic volatility and stock returns, especially in the emerging stock markets.

The rest of the paper is organized as follows. Section 2 presents details of our data and methodology. Section 3 reports empirical results, including time trends and cross-sectional analysis of idiosyncratic volatility. Section 4 summarizes and concludes.

2-Data and methods

We used firms listed in the Vietnamese stock market with daily and monthly stock returns, market capitalization, and book-to-market ratio (BM) for individual firms were obtained from DataStream. The risk-free rate which is defined as the interbank offered rate was also obtained from DataStream. Market returns are the value-weighted returns of all firms used in the study. The data set covered the period from August 2007 with 176 firms, to April 2012 with 666 firms. In contract to the sample of Loc et al. (2010), this study is able to provide a more comprehensive detailed analysis for the Vietnamese stock markets, which Loc et al.'s (2010) sample only contains five stocks.

Estimating idiosyncratic volatility

We followed Ang et al., (2006, 2009) where the IV of each firm is computed at the beginning of every month as the standard deviation of the residuals ($\sigma_{\varepsilon i}$) from the Fama-French (1993, 1996) 3-factor model (1), using daily data for the previous 22 trading days.

$$R_{i,t} = \alpha + \beta_{MTK,i,m}\, MKT_t + \beta_{SMB,i,m}\, SMB_t + \beta_{HML,i,m}\, HML_t + \varepsilon_{i,t} \qquad (1)$$

where day t refers to the 22 trading days ending on the last trading day of month m-1.

Therefore, $\sigma_{\varepsilon i}$ is a daily volatility measure that is computed monthly. In this model, systematic risk is accounted for by three betas –β_{MTK}, β_{SMB}, and β_{HML}. The betas are allowed to vary through time as the model is re-estimated every month. $R_{i,t}$, and MKT are excess returns of firm i and the market, respectively, over the risk-free rate. SMB is the size factor defined as the excess return of small firms over big firms, and HML is the value factor defined as the excess return of high book-to-market (BM) firms over low BM firms.

Hence, MB and HML are returns of zero-investment mimicking portfolios for the size and book-to-market effects whose coefficients in (1) are normally regarded as risk-factor loadings. SMB and HML are computed using an adaptation of the method followed by Ang, et al., (2009). Therefore, SMB is the return of the upper half less the return of the lower half of all firms ranked in ascending order according to market capitalization (i.e., share price times the number of shares) while HML is the return of the bottom third less the return of the top third of all firms ranked in ascending order according to BM.

In order to investigate the relationship between IV and one-month ahead raw and risk-adjusted stock return, we create three portfolios at the beginning of every month based on IV. All firms are sorted based on IV and allocated to groups – high IV (HIV), medium IV (MIV) and low IV (LIV) – based on breakpoints for the top 66.67 per cent and the bottom 33.33 per cent. Accordingly, we compute each portfolio's equal- and value-weighted raw returns for the current month, re-forming every month. The risk-adjusted return, which is consistent with Ang et al., (2006, 2009), refers to the FF3-factor model alpha (α coefficient) estimated using the full sample of monthly value- or equal-weighted returns for each portfolio.

We also examine the relationship between idiosyncratic volatility and abnormal returns or Jensen's alpha of the same idiosyncratic volatility-sorted portfolios above. Each firm's Jensen's alpha is computed with respect to the FF3-factor model. We took for each firm i, the fitted beta coefficients from (1) and computed the risk-adjusted return for month m, $R^{ra}_{i,m}$ as follows.

$$R^{ra}_{i,m} = rf_m + \beta_{MTK,i,m} MKT_m + \beta_{SMB,i,m} SMB_m + \beta_{HML,i,m} HML_m$$

Where rf_m is the risk-free rate for month m, MTK_m, SMB_m, and HML_m are excess returns as defined previously, but for month m.

Jensen's alpha for firm i, $\alpha_{i,m}$ is as follows:

$$\alpha_{i,m} = R^{a}_{i,m} - R^{ra}_{i,m}$$

where $R^{a}_{i,m}$ is the actual return of firm i in month m. Hence, Jensen's alpha is the return in excess of the risk-adjusted return.

Further, we also control several variable, including size (market capitalization), value (book to market-BM), momentum , and short-term reversal (REV thereafter), since these have been identified in empirical studies as having an influence on the expected stock returns including size, value, and momentum. Banz (1981) was the first to document the size effect wherein small stocks earn a premium over large stocks. The BM effect was first documented by Rosenberg et al. (1985) who found a return premium to stocks with high book-to-market ratios. Jegadeesh and Titman (1993) found that stocks that perform well (poorly) in the past three to 12 months continued to perform well (poorly) in the succeeding three to 12 months, which is known as the momentum effect. . Moreover, Jegadeesh and Titman (1993) also found that past winner stocks will change to loser stocks in the following month, which is called the short-term reversal effect.

In order to control for these various effects, we follow Ang et al. (2006) to use a double-sorting methodology that results in portfolios with variation in idiosyncratic volatility but similar levels in the control variable. For example, to control for size we first sort stocks on market capitalization. Then within each size grouping we sort again on idiosyncratic volatility. We perform a 3x3 sort, instead of the 5x5 sort used by Ang et al. (2006) because of the smaller number of stocks in our data set, so we end up with nine portfolios for each factor sort. Then, we average within each idiosyncratic volatility category resulting in three portfolios with variation in idiosyncratic volatility but similar levels in the control variable. The size variable at the end of month t is defined as the firm's market capitalization at the end of month t, value is the firm's book -to-market ratio six months prior, i.e. at the end of t-6. Similar to Jegadeesh and Titman (1993), the momentum variable at time t is the stock's 11-month past return lagged one month, i.e. return from month t-12 to month t-2.

Finally, we conduct univariable and multivariable firm-level Fama-MacBeth cross-sectional regressions of stock returns on control variables as additional robustness tests.

3-Empirical results

31-Descriptive statistics and time trend

In Table 1, panel A reports the descriptive statistics for three volatility series, namely MVOL, IV^{EW}, and IV^{VW}. IV^{EW} and IV^{VW} are respectively the equal-weighted and value-weighted average idiosyncratic volatility across all firms, where IV is the standard deviation of residuals from Equation (1).

MVOL is monthly market volatility computed using daily value-weighted market returns. For instance, MVOL as of the end of month m and is the standard deviation of daily value-weighted market returns for the past 30 trading days ending on the last trading day of month m. Therefore, similar to IV, MVOL is a daily volatility measure that is computed monthly.

Mean and median of IV^{EW} are higher than those of IV^{VW} which implies that smaller firms have higher IV, consistent with results in other markets particularly the U.S. However, both series have approximately the same coefficient of variation, thus indicating that they are equally variable. Compared with MVOL, IV^{EW} has a higher mean while IV^{VW} has a similar mean but MVOL has a significantly higher standard deviation. Additionally, MVOL has double -size the coefficient of variation (CV) of either IV^{EW} or IV^{VW} indicating that average IV is less variable than MVOL.

(Insert Table 2 around here)

Panel B shows that IV^{EW} and IV^{VW} are highly correlated as expected with a correlation coefficient of 0.8054. MVOL is moderately correlated with both IV^{EW} and IV^{VW} with a correlation coefficient of 0.3084 and 0.5055, respectively.

Panel C shows the autocorrelation structure of the three volatility series. Serial correlation is moderate in all three series. We also test for the presence of unit roots. The augmented Dickey and Fuller (1979) test results are displayed in Panel D, however, rejects the presence of a unit roots for all three series at 1% level of significance, whether or not a trend is included. Hence our analysis of the volatility series will be in levels instead of first differences.

We also plot IV^{EW}, IV^{VW} and MVOL to find the time trend in IV as displayed in Figure 1. As can be seen, IV^{VW} with the range of 0.01 – 0.02 does not show trend during the examined period, while IV^{EW} exhibits a positive trend. The range of IV^{EW} is 0.01 – 0.03 with the peak of 0.03 around the end of 2007. It, then, gets down to 0.01 in June 2008 and shows no trend afterward after climbing up to nearly 0.03 at the end of 2008. MVOL shows its high fluctuation from 2007 to the end of 2010, peaking at 0.35 in April 2008. It exhibits ups and downs with gradually smaller range afterward and hits its lowest point of around 0.06 in June 2010. It shows no trend afterward to April 2012.

Next, we estimate the deterministic time trend model for each series using the equation;

$$VOL_t = b_0 + b_1.t + VOL_{t-1} + \varepsilon_t \qquad (2)$$

Where VOL represents IV^{EW}, IV^{VW}, and MVOL, and t is time. The estimated time trend b_1 parameter and its t-statistic are reported in Table 2. The standard t-test shows no trend for IV^{VW}, but a statistically significant positive and negative trend in IV^{EW} and MVOL, respectively over the entire study period. However, Vogelsang (1998) suggests the use of t-PS1 which is a size-robust trend statistic that is valid in both I(0) and I(1) cases, i.e. whether or not a unit root exists in the error terms. In addition, Bunzel and Vogelsang (2005) developed the t-dan test which has better power than t-PS1 while retaining its good size properties. The corresponding t-dan test statistics reported in Table 2 confirms the absence of a trend in IV^{VW}, since the t-dan is small; and the presence of a positive trend in IV^{EW} and a negative trend in MVOL over the entire study period. The possible reason for these is that the Vietnamese stock market was sensitive to the US crisis in 2008 where the market was volatile.

(Insert Table 3 around here)

32. Can idiosyncratic volatility and market volatility predict market returns?

In literature, there is evidence of a positive relationship between average stock idiosyncratic volatility and market return and of no relationship between market volatility and market return in Goyal and Santa-Clara (2003). Further, Brockman and Yan (2006) find that neither equal-weighted nor value-weighted idiosyncratic volatility can predict one month ahead market excess returns.

The relationship between IV, market volatility and market returns in the Vietnamese stock market will be tested in this section by using the model:

$$MKTR_{t+1} = \alpha + \beta_{VOL}VOL_t + \varepsilon_t \quad (3)$$

Where $MKTR_{t+1}$ is the market return in excess of the risk free rate and VOL represents IV^{EW}, IV^{VW}, and MVOL. Table 3 shows the results from predicting one-month ahead excess market return. Consistent with Bali et al.(2005) and Brockman and Yan (2006) for the US market, IV^{EW} and IV^{VW} cannot predict excess market returns since the coefficients of $IV^{EW}$and IV^{VW} are insignificant and the R^2s are negative. Table 4 also shows that MVOL cannot predict one-month ahead excess market returns because the coefficient of MVOL is not significant and the R^2 is only 0.0131. This result is consistent with Goyal and Santa-Clara (2003) for the US market. Therefore, it is likely that IV does not seem to matter in the Vietnamese stock market.

(Insert Table 4 around here)

33. The relationship between IV and stock returns in the cross-section.

<u>CAPM versus the FF3-factor model</u>

Before we test the IV effect in the Vietnamese stock market, we are going to first validate the use of the FF3-factor model to estimate IV and Jensen's alpha by comparing the FF3-factor model with the CAPM in terms of their ability to describe the returns in the Vietnamese stock market in this subsection. The Black, Jensen and Scholes (1972)'s time series regression approach to estimate each pricing model for the same three IV-sorted portfolios that were used in the previous section. Chen and Fang (2009) state the importance in comparing the explanatory power between the single factor asset pricing model and the multifactor asset pricing model out of the U.S. stock markets. They conclude that the Fama-French three factor model does a better job in explaining the cross-sectional expected stock returns than the CAPM model in seven Pacific Basin stock markets, namely Japan, Hong Kong, South Korea, Malaysia, Thailand, Indonesia, and Singapore. However, Chen and Fang (2009) find that the momentum has not been priced in these stock markets. Unfortunately, the Vietnamese stock market is not included in their sample. As far as we know, there is no any studies which tests the explanatory power of both CAPM and the FF3-factor model in the Vietnamese stock market. Thus, this study is going to fill in the research gap.

Table 5 shows improvements in the adjusted R^2 for the FF3-factor model compared with the CAPM with higher adjusted R^2s while all the coefficients are statistically significant. These results show that the FF3-factor model is likely to be better than the CAPM in explaining the returns in the Vietnamese stock market, thus validating the use of the FF3-factor model in computing IV and Jensen's alpha. Our results are qualitatively consistent to

Chen and Fang's (2009) research findings, which the FF3-factor model is better in predicting the cross-sectional expected portfolios returns than the CAPM model in the Vietnamese stock market.

(Insert Table 5 around here)

Next, we provide evidence on the relationship between stock returns and IV in Table 5. The table shows the average monthly raw returns of stock portfolios sorted according to IV, the average abnormal returns (Jensen's alpha) with respect to the FF3-factor model, the average size and book-to-market ratio of the three IV-sorted portfolios.

(Insert Table 6 around here)

As can be seen, the values of raw returns reported in Panel A and B are insignificant, except for the value-weighted high IV of -0.0303 at approximately 10% significance level. It is possible that the observed negative relationship is due to size and B/M effects postulated by Fama and French (1993, 1996). In Panel A, the size value of High-Low is statistically significant, but that of B/M is not, thus indicating a possible size effect. To validate this, we compare the alpha of the IV-sorted portfolios and find the difference between the high and low IV portfolio (-0.0201) to be statistically significant, which implies that the FF3-factor model is able to explain the difference in raw returns between the high and low IV portfolios. This also suggests that the difference between raw returns is not due to IV, but instead due to differences in size of the respective portfolios.

Now, we examine the relation between IV and alpha after formally controlling for the same variables in Table 5 using dependent bivariate sorts. At the end of each month over the examined period, stocks are double-sorted 3x3, first by the control factors (size, value, momentum and REV) into three portfolios, and then within each portfolio we sort stocks again by IV measured with respect to the local FF3-factor model. The results are reported in Table 7. Panel A shows the results when we double-sort on size and IV. It is evident from the Panel that the average alpha spread is negative and statistically significant (HIV), indicating that the negative IV effect can be explained by the size effect in the Vietnamese stock market. However, when we control size, the alpha for HIV-LIV is not statistically significant. Therefore, there is no negative IV effect in the Vietnamese stock market.

The rest of the panels in Table 7 similarly show that when we control for B/M, reversal and momentum, the average alpha spread is negative and highly significant, which indicates that these variables cannot explain the relationship between IV and returns in the Vietnamese stock market.

(Insert Table 7 around here)

Firm level cross sectional regressions

Due to the inability to control for multiple effects simultaneously of the dependent bivariate sorts, we conduct an additional robustness test by running firm-level Fama-MacBeth regressions for the data. Firm-level analysis also makes better use of all the available information as portfolio analysis loses information through aggregation. The following model is applied:

$$R_{i,t+1} = \beta_{0,t} + \beta_{1,t} IV_{i,t} + \beta_{2,t} SIZE_{i,t} + \beta_{3,t} B/M_{i,t} + \beta_{4,t} Reversal_{i,t} + \beta_{5,t}\, Momentum_{i,t} + \beta_{6,t}\, Beta_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where $R_{i,t+1}$ is realized stock return in month t+1 with one month lagged values of IV, log of market capitalization (SIZE), book-to-market ratio (B/M), reversal, momentum and beta. Table 8 reports the time-series average of the slope coefficients over the examined period for univariate regressions. The Newey-West (1987) t-statistics are given in parenthesis. The univariate regression shows that all coefficients are statistically insignificant, except the coefficient of B/M. However, the intercept of the B/M regression is not statistically significant. Therefore, we cannot find the evidence of IV effect in the Vietnamese stock market. The result of the bivariate regressions with IV reported in Table 9 shows the same conclusion, since the coefficients of IV are not statistically significant. This further confirms the robustness of our finding of no statistically significant relationship between IV and returns in the Vietnamese stock market.

The finding adds to the evidence from both mature and emerging markets that IV does not matters in explaining cross-sectional stock returns in the Vietnamese stock market. It also enriches the literature of IV in ASEAN countries, though contrary to Nartea et al. (2011) which documented a significant positive relationship between IV and alpha for Malaysia, Singapore, Indonesia, and Thailand. It is inconsistent with the prediction of theories of under diversification, but is consistent with the prediction of CAPM. Also, it implies that there is no preference among Vietnamese investors for high or low IV stocks or no compensation for bearing idiosyncratic volatility risk in the Vietnamese stock market. The possible reason for this could be the ease by which investors in the Vietnamese stock market could hold the market portfolio, as the market portfolio in this study consisted only of shares traded in the domestic market.

(Insert Table 8 around here)

(Insert Table 9 around here)

4. Conclusion

In this paper, we set out to determine if idiosyncratic volatility matters in the emerging stock market of Vietnam, which is small but implies tremendous potential for growth. Our results indicate that idiosyncratic volatility in the Vietnamese stock market is different from that in the U.S market and make it possible to answer our three questions set up in the first section. First, we find that there is a positive trend in the average value-weighted IV, while the market volatility exhibits negative trend. Result implies an increase benefit of the diversification in the

Vietnamese stock market. In another words, investors could be benefited from diversifying their investment portfolios.

Second, we find that idiosyncratic volatility cannot predict one-month ahead stock returns in the Vietnamese stock market which is consistent with recent studies by Bali et al. (2005) and Wei and Zhang (2006) in the US stock market. Instead, the result shows that the FF3-factor model can adequately explain the difference in returns between the high and low idiosyncratic volatility portfolios.

Finally, we find no relationship between idiosyncratic volatility and abnormal returns in the Vietnamese stock market. Taken all into account, our findings imply that investors should not expect to be compensated for bearing idiosyncratic risk when investing in the Vietnamese stock market and cost of capital estimates would be more accurate using the FF3-factor model rather than CAPM. These results have not been documented in the literature on the Vietnamese stock market, thus probably benefiting domestic as well as foreign investors who have invested or will invest in the rapidly growing stock market of Vietnam.

Notes

1. As a further robustness test, we employ an alternative method of computing alpha. We compute the firm's monthly alpha by taking the difference between a firm's actual return for that month (Rai,m) and its risk-adjusted return (Rrai,m). The risk-adjusted return in month m for firm i,Rrai,m is its beta coefficient from (1) multiplied by the corresponding monthly realisations of the MKT, SMB, and HML:

$$Rra_{i,m} = rf_m + \beta_{MKT, i, m} MKT_m + \beta_{SMB, i, m} SMB_m + \beta_{HML, i, m} HML_m \quad (2)$$

Wherer fm is the risk-free rate for month m, MKTm, SMBm, and HMLm are excess returns as defined previously, for month m. We then compute each portfolio's equal- and value-weighted alpha and re-form portfolios every month. The results, available from the authors on request, are qualitatively similar to what we report here, that of a negative relationship between idiosyncratic volatility and alpha; that is robust to controls for size, book-to-market, and momentum.

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Table 1: Vietnam Stock Market Information

Year	Mcap*	Investers Accts	%GDP	Listed co.
2000	986	2,908	0.82	5
2001	1,570	8,780	0.34	10
2002	2,436	13,607	0.48	20
2003	2,370	16,484	0.39	22
2004	4,516	21,600	0.63	26
2005	9,598	29,065	1.21	41
2006	237,276	110,652	22.7	195
2007	492,900	312,139	40	253
2008	225,935	531,428	19.76	342
2009	620,551	822,914	37.71	457
2010	695,186	925,955	42.25	557
2011	616,226	1,188,000	33.6	705

Notes: * in billion VND

Table 2. Descriptive Statistics

Panel A: Summary statistics						
	Mean	Median	Stdev	CV	IV	Min
IV^{EW}	0.0235	0.0245	0.0041	0.1745	0.0299	0.0090
IV^{VW}	0.0160	0.0160	0.0030	0.1875	0.0226	0.0066
MVOL	0.0163	0.0145	0.0073	0.4479	0.0353	0.0066

Panel B: Correlation Table			
	IV^{EW}	IV^{VW}	*MVOL*
IV^{EW}	1.0000		
IV^{VW}	0.8054	1.0000	
MVOL	0.3084	0.5055	1.0000

Panel C: Autocorrelation structure			
	IV^{EW}	IV^{VW}	*MV*
ρ_1	0.584	0.471	0.466
ρ_2	0.310	0.102	0.226
ρ_3	0.244	0.022	0.016
ρ_4	0.091	-0.125	0.014
ρ_6	0.016	0.035	0.273
ρ_{12}	-0.002	-0.064	-0.153

Panel D: Unit root test t-statistics		
	Constant	Constant and Trend
IV^{EW}	-3.6762	-4.1173
IV^{VW}	-4.1918	-4.3030
MVOL	-4.4287	-4.7804

The Augmented Dickey-Fuller test for unit roots are based on regressions with a constant, and regressions with a constant and a trend. The 1 percent critical values for the unit root test are -3.45 with a constant, and -3.99 with constant and a trend.

Table 3. Time Trend of Volatility Series in the Vietnamese Stock Market

	2007:08 – 2012:04		
	Linear Trend (x 10^{-5})	t-stat	t-dan
IV^{EW}	9.28	3.0345	1.9565
IV^{VW}	3.62	1.5254	0.9367
MVOL	-14.3	-2.5630	-2.0580

*The 5% critical value for t-dan is 1.726.

Table 4. Predicting One-Month Ahead Excess Market Return

Intercept	IV^{EW}	IV^{VW}	MVOL	Adjusted R^2	ARCH	BG-LM
-0.0306 (-0.3381)	0.1690 (0.0445)			-0.0185	0.3420	0.0947
0.0113 (0.1330)		-2.3782 (-0.4538)		-0.0146	0.3840	0.0837
0.0179 (0.4829)			-2.7326 (-1.3154)	0.0131	0.4649	0.0516

Notes: 1.Numbers in parenthesis are t-statistics. 2.ARCH: Autoregressive Conditional Heteroscedasticcity test with p-value. 3.B-G LM: Breusch-Godfrey Serial Correlation Lagrange Multiplier test with p-value.

Table 5. CAPM versus the FF-3 Factor Model

Panel A. CAPM: RP(t) – RF(t) = a + b[RM(t) – RF(t)]

	Intercept	b	Adjusted R2	ARCH	BG-LM
High IV	0.0036 (0.3254)	1.1165 (11.5442)	0.7026	0.9913	0.6355
Medium IV	0.0065 (0.8284)	1.1219 (16.4367)	0.8278	0.5930	0.1515
Low IV	0.0021 (0.4118)	1.0306 (22.7963)	0.9026	0.2397	0.0273

Panel B. FF-3 Factor Model: RP(t) – RF(t) = a + b[RM(t) – RF(t)]+ sSMB(t) + hHML(t)

	Intercept	b	s	h	Adjusted R2	ARCH	BG-LM
High IV	-0.0136 (-2.3176)	1.1808 (23.5770)	0.9385 (12.4852)	0.2489 (1.6447)	0.9236	0.8187	0.3503
Medium IV	-0.0048 (-0.7795)	1.1794 (22.4631)	0.4329 (5.4934)	0.5446 (3.4332)	0.9024	0.4479	0.5570
Low IV	-0.0030 (-0.6154)	1.0575 (25.3091)	0.1892 (3.0163)	0.2658 (2.1059)	0.9203	0.0319	0.0996

Table 6. Returns of portfolios sorted by idiosyncratic volatility

	Raw Return		Size	B/M	Jensen's Alpha	
	Mean	Std. Dev			Mean	Std. Error
Panel A: Equal-Weighted						
High IV	-0.0169 (-0.8570)	0.1492	300436.4 (13.5589)	0.9501 (17.9770)	-0.0136 (-2.3176)	0.0059
Medium IV	-0.0142 (-0.7743)	0.1384	846449.7 (15.6606)	0.9108 (19.0458)	-0.0048 (-0.7795)	0.0062
Low IV	-0.0161 (-1.0008)	0.1217	2296074 (19.9272)	0.9005 (19.7525)	-0.0030 (-0.6154)	0.0049
High- Low	-0.0008 (-0.0316)		-1995637 (-17.0081)	0.0496 (0.7112)	-0.0106 (-1.3821)	0.0077
Panel B: Value- Weighted						
High IV	-0.0303 (-1.6424)	0.1395	300436.4 (13.5589)	0.9501 (17.9770)	-0.0172 (-1.8894)	0.0091
Medium IV	-0.0096 (-0.5713)	0.1265	846449.7 (15.6606)	0.9108 (19.0458)	0.0083 (1.4178)	0.0059
Low IV	-0.0155 (-1.0453)	0.1122	2296074 (19.9272)	0.9005 (19.7525)	0.0029 (1.0509)	0.0027
High- Low	-0.0148 (-0.6247)		-1995637 (-17.0081)	0.0496 (0.7112)	-0.0201 (-2.1175)	0.0095

"Size" is market value in millions of Vietnamese Dong;
Numbers in parenthesis are t-statistics.

Table 7. Alpha of double sorted value-weighted portfolios

Panel A. Double sort on size (market capitalisation) and IV

	LIV	*MIV*	*HIV*	*HIV-LIV*
BIG	-0.0004	0.0043	0.0018	0.0022
	(-0.1105)	(0.8378)	(0.2507)	(0.2688)
MED	-0.0061	-0.0065	-0.0186	-0.0125
	(-0.9593)	(-0.9364)	(-2.5017)	(-1.2862)
SMA	-0.0096	-0.0078	-0.0081	0.0015
	(-1.5550)	(-1.2167)	(-1.4709)	(0.1810)
AVE	-0.0054	-0.0033	-0.0083	-0.0029
	(-1.6802)	(-0.9245)	(-2.1173)	(-0.5801)

Panel B. Double sort on value (book to market in month t-6) and IV

HBM	-0.0006	-0.0022	-0.0186	-0.0180
	(-0.0879)	(-0.2410)	(-1.8061)	(-1.4908)
MBM	0.0076	0.0117	-0.0159	-0.0235
	(1.0038)	(1.2693)	(-1.1010)	(-1.4474)
LBM	0.0019	0.0111	-0.0108	-0.0127
	(0.5915)	(1.6086)	(-1.0876)	(-1.2206)
AVE	0.0030	0.0069	-0.0151	-0.0181
	(0.8637)	(1.4107)	(-2.2332)	(-2.3822)

Panel C. Double sort on REV and IV

HSK	0.0235	0.0113	-0.0358	-0.0593
	(3.3402)	(1.0073)	(-2.6564)	(-3.8995)
MSK	-0.0040	-0.0021	-0.0042	-0.0002

	(-0.6273)	(-0.2627)	(-0.4945)	(-0.0190)
LSK	-0.0094	-0.0130	-0.0084	0.0010
	(-1.3742)	(-1.4669)	(-0.8203)	(0.0816)
AVE	0.0034	-0.0013	-0.0161	-0.0195
	(0.8695)	(-0.2323)	(-2.5621)	(-2.6380)

Panel D. Double sort on momentum (11/1/1)and IV

WIN	-0.0070	0.0031	-0.0542	-0.0472
	(-1.3126)	(0.2782)	(-3.8414)	(-3.1261)
MED	0.0100	0.0074	0.0037	-0.0063
	(1.2324)	(0.7533)	(0.2965)	(-0.4206)
LSR	0.0076	0.0183	-0.0148	-0.0224
	(0.6556)	(1.6095)	(-1.4405)	(-1.4440)
AVE	0.0035	0.0096	-0.0218	-0.0253
	(0.7000)	(1.5271)	(-3.0326)	(-2.8832)

At the end of each month over the test period, stocks are double-sorted 3x3, first by the control factor (size, value, momentum, and REV) into three portfolios and then within each portfolio we sort stocks again by idiosyncratic volatility measured using with respect to the local Fama-French three factor model (FF-3) (1). The alpha of each value- and equal-weighted portfolio is presented with t-statistics in parenthesis. Alpha refers to the FF-3model (1) alpha (αcoefficient) using the full sample of monthly value- or equal-weighted returns for each portfolio. To control for a particular factor, we average the alpha within each idiosyncratic volatility category ending up with three portfolios with dispersion in idiosyncratic volatility but containing all values of the factor being controlled. Size is the firm's market capitalisation at the end of month *t;* value is the book-to-market ratio six months prior, ie at the end of *t-6*; momentum at time *t* is the stock's 11-month past return lagged one month; REV is stock's past month return. *LIV*, *MIV* , *HIV*refer to low, medium, and high idiosyncratic volatility portfolio, respectively; *BIG*, big size; *MED*, medium size; *SMA*, small size; *HBM*, *MBM* , *LBM* refer to high, medium, low book-to-market, respectively; *WNR*, winner; *MID*, middle; *LSR*, loser.

Table 8. Fama-Macbeth Regression Results of single variable effect

$$R_{i,t+1} = \beta_{0,t} + \beta_{1,t}IV_{i,t} + \beta_{2,t}SIZE_{i,t} + \beta_{3,t}B/M_{i,t} + \beta_{4,t}Reversal_{i,t} + \beta_{5,t}Momentum_{i,t} + \beta_{6,t}Beta_{i,t}$$

Intercept	IV	SIZE	B/M	Reversal	Momentum	Beta
-0.0129 (-0.69)	-0.2124 (-0.73)					
-0.0193 (-0.96)		4.35E-10 (0.56)				
-0.0285 (-1.54)			0.0118 (2.37)			
-0.0207 (-1.10)				0.0026 (-0.14)		
-0.0227 (-1.22)					-0.0132 (-1.77)	
-0.0200 (-1.24)						0.0025 (0.41)

Table 9. Fama-Macbeth Regression Results of IV effect with multiple variables

$$R_{i,t+1} = \beta_{0,t} + \beta_{1,t}IV_{i,t} + \beta_{2,t}SIZE_{i,t} + \beta_{3,t}B/M_{i,t} + \beta_{4,t}Reversal_{i,t} + \beta_{5,t}Momentum_{i,t} + \beta_{6,t}Beta_{i,t}$$

Intercept	Beta	SIZE	B/M	Reversal	Momentum	IV
-0.0323 (-1.98)	0.0031 (0.51)	6.55E-10 (0.92)	0.0140 (3.16)			
-0.0264 (-1.46)	0.0014 (0.19)	3.45E-10 (0.57)	0.0138 (3.16)			-0.0614 (-0.19)
-0.0287 (-1.63)	0.0010 (0.19)	1.32E-10 (0.25)	0.0135 (3.28)	-0.0072 (-0.35)	-0.0104 (-1.55)	0.0408 (0.11)

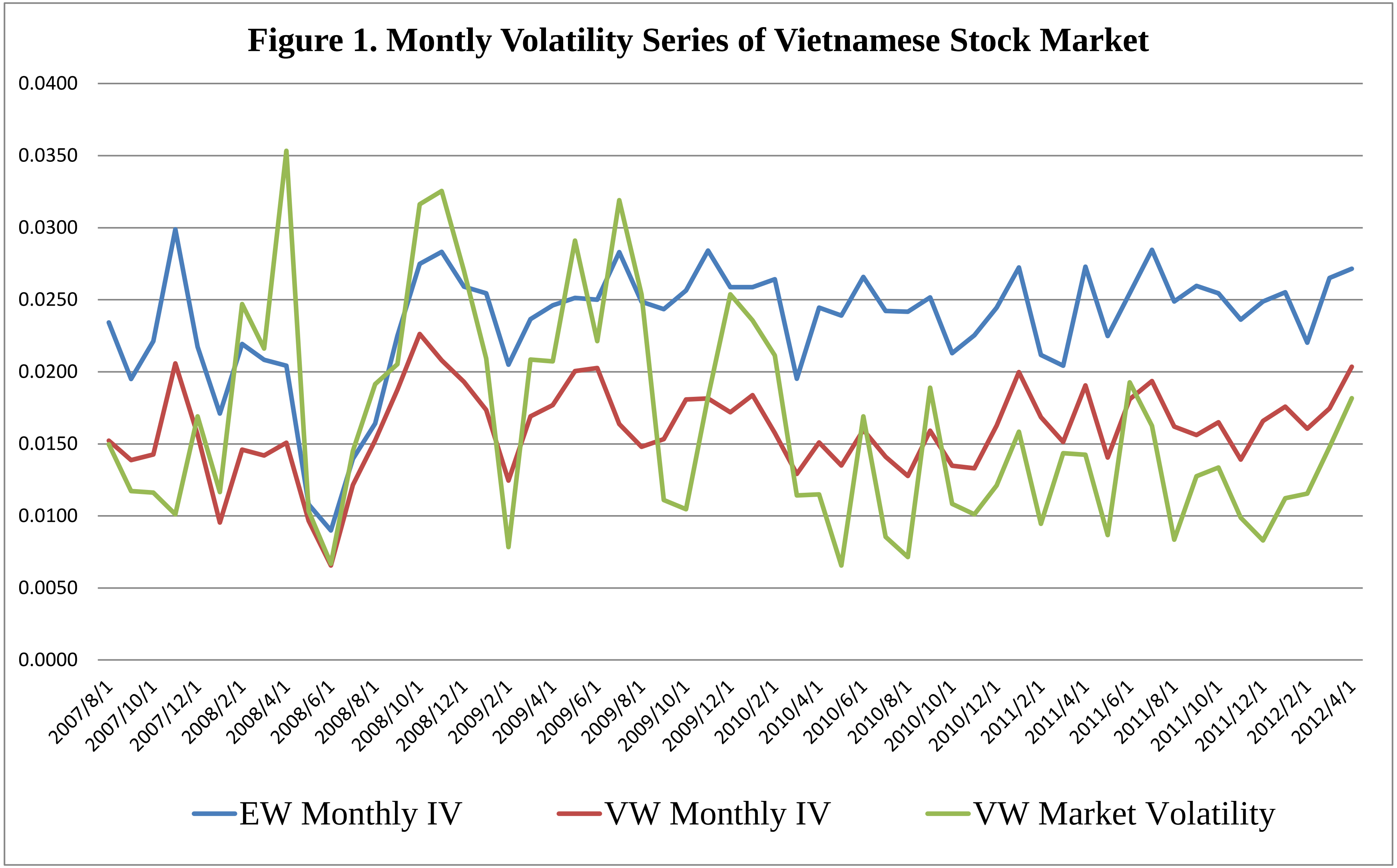
Figure 1. Montly Volatility Series of Vietnamese Stock Market
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2009/2/1
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2010/12/1
2011/2/1
2011/4/1
2011/6/1
2011/8/1
2011/10/1
2011/12/1
2012/2/1
2012/4/1
EW Monthly IV
VW Monthly IV
VW Market Volatility