An Investigation on Vietnamese Real Estate Equity Market's Return and Volatility

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The real estate sector in Vietnam, one of the fast growing economies in the emerging markets, had experienced remarkably boom in 2008 and 2009 and has suffered huge loss since 2010. In this paper, we investigate the financial performance of five major publicly traded real estate equities in Vietnam during this very special time period. We aim at providing researchers and practitioners engaging in portfolio management with insights into the real estate equity market in Vietnam. Specifically, we study how these five major real estate stocks are related to the whole Vietnamese stock market and what are the risk levels in investing these assets in a portfolio. Further, we explore the relationship among these five equities in terms of returns and volatilities. We find that three out of these five real estate equities are slightly riskier and the other two are even safer than the whole Vietnamese stock market to invest in a portfolio. The average returns of these five real estate assets are higher than those of the whole Vietnamese stock market during this period, and these stocks are much more volatile than the whole stock market in their returns. Moreover, we find that these five real estate equities are strongly correlated to each other in volatility but weakly related to each other in returns. However, the remarkable loss in the market value of the real estate sector in Vietnam since 2010 did not increase the volatility levels of these real estate equities' returns.

1. Introduction

Vietnam, as one of the fastest growing markets, has been experiencing significant transition in its economic structure in the past decade; see Balme & Sidel (2007) for an excellent review. Along with its economic transition, Vietnam's real estate market is also undergoing remarkable change in recent years. In 2003, the Vietnamese government enacted the Law on Land 2003. This law casts the most significant reform of legal property rights in Vietnam's history, and paves a road for market-driven real estate pricing in Vietnam; see Kim (2004) for a study of this significant transition in Vietnam. Since then, the real estate market in Vietnam has been experiencing explosive growth driven by both domestic demands on residential and commercial housing and foreign investments. With a market-oriented real estate market being formulated in Vietnam, more and more real estate companies have entered into the equity market and are being traded in the Ho Chi Minh City Stock Exchange (HOSE) and Ha Noi Stock Exchange (HNX), the two primary stock markets in Vietnam. This has created a new alternative for investors to invest in the Vietnam's real estate equities.

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In many circumstances, portfolio managers use international equities to diversify the risk structure of a certain investment portfolio; investors may want to get access to the foreign investment opportunities by trading on the stocks from emerging markets. In the U.S., the subprime crisis originated in the real estate sector in mid 2007 brought great attention to research on this sector's financial characteristics. While the real estate market in the U.S. had experienced in the past three years the most difficult time since the Great Depression, the real estate sector in some emerging market such as Vietnam were extremely booming in 2008 and 2009. Since 2010, however, the real estate market in Vietnam has suffered huge loss in the market values of real estate properties. As such, concerns on whether this emerging market's real estate sector is creating a to-be-burst bubble are growing among researchers and investors who are interested in international real estate equities.

Aiming at providing insights into the fundamental characteristics of the real estate equities in Vietnam, we focus on exploring the financial performance of the five major publicly traded real estate companies in Vietnam since 2009. Specifically, we study how the five major real estate equities' returns are related to those of the whole Vietnamese stock market, the risk levels of these real estate equities, namely their return volatilities, In addition, relationships among these five real estate equities in terms of both return and volatility are investigated. We find that these five real estate stocks in Vietnam exhibit very different risk levels comparing with the whole Vietnamese equity market in terms of generating expected returns. And these stocks' return volatilities measured by the conditional standard deviation from a standard GARCH model have shown quite different patterns since 2009. However, it appears that these real estate stocks' volatility level has not increased while the real estate market in Vietnam experienced huge loss since 2010.

The remainder of this paper is structured as follow. In the following section, the methodology employed in our study is described. In Section 3, data and the statistical summaries are presented. Section 4 illustrates the empirical results and analysis, and Section 5 concludes.

2. Methodology

In our study, we explore the financial characteristics of the five major real estate stocks' returns and volatilities in Vietnam. The whole Vietnamese stock market is treated as the benchmark. We employ the Capital Asset Pricing Model (CAPM) proposed by Jack Treynor (1961, 1962), William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) to estimate the risk coefficient for each of the five individual real estate stocks. The seminal idea leading to the development of the CAPM comes from Harry Markowitz (1959). The CAPM assumes a form of:

$$E(r_t) - r_f = \alpha + \beta[E(r_{M,t}) - r_f] \qquad (1)$$

where r_t is the return of an asset at time t, $r_{M,t}$ the market return at time t, r_f the risk-free rate in the market, and β is the risk coefficient. $E(\cdot)$ represents expectation of a random variable. The $E(r_t) - r_f$ can be treated as the expected risk premium for investing an individual asset, and $E(r_M) - r_f$ is the market risk. Therefore, CAPM captures the relationship between the expected return of an individual asset and the market risk, which is not diversifiable. Model (1) may be rewritten in a linear regression model:

$$r_t = \beta_0 + \beta(r_{M,t} - r_f) + \varepsilon_t \qquad (2)$$

In practice, the risk coefficient β represents the riskiness and co-movement of an individual asset's return relative to that of a whole equity market. When $\beta > 1$, the individual asset is riskier than the whole market to invest; when $\beta = 1$, there is the same risk level in investing an individual asset as in investing the whole market; when $\beta < 1$, the individual asset is safer than the whole market to invest. If the sign of β is positive, then the return of an individual asset moves in the same direction as that of the whole market does; if the sign of β is negative, then the co-movement of the returns between the individual equity and the whole market are opposite.

Regarding the volatility of these five real estate stocks' returns in Vietnam, we employ a standard generalized autoregressive conditional heteroskedasticity (GARCH). This model is proposed by Bollerslev (1986) based on the ARCH model (Eagle, 1982). A GARCH (p, q) model assumes a form of:

$$y_t = \sigma_t \varepsilon_t, t = 1, 2, ..., T$$
$$\sigma_t^2 = \alpha_0 + \alpha_1 y_{t-1}^2 + \cdots + \alpha_p y_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + \cdots + \beta_q \sigma_{t-q}^2 \qquad (3)$$

where y_t is the demeaned return of a financial asset at time t, σ_t is the conditional standard deviation of the returns at time t, ε_t is a random error, and T is the sample size. α_0 is the constant term, $\alpha_i, i = 1, 2, \ldots, p$ are the ARCH coefficients, and $\beta_j, j = 1, 2, \ldots q$ are GARCH coefficients, where p *ARCH* order, and q the GARCH order. In practice, the estimated conditional standard deviation σ_t is treated as the measure of the return volatility.

Return volatility is a commonly used measure of the fluctuation in a return time series. It represents the risk of a financial asset. In portfolio management, practitioners seek to maximize the expected returns while minimizing the risk, or the volatility. Studying the evolution of the volatility of a financial asset may help portfolio managers gauge the risk of an invested asset in a portfolio.

3. Data

In Vietnamese stock market, there are five large publicly traded real estate companies. They are Hoang Anh Gia Lai Joint Stock Company (HAG), Tan Tao Investment Industry Corporation (ITA), Kinh Bac City Development Share Holding Corporation (KBC), Thu Duc Housing Development Corporation (TDH), and Vincom Joint Stock Company (VIC). We use the daily closing prices from January 2, 2009 to February 28, 2011[1]. There are 535 observations in the data set. The daily returns are computed as: $r_t = \dfrac{P_t - P_{t-1}}{P_{t-1}}$, where P_t is the closing price in day t. Currently there are two stock exchanges in Vietnam-- the Ho Chi Minh City Stock Exchange (HOSE) and Ha Noi Stock Exchange (HNX). The former is the largest one. We choose to use the HOSE index (VNIndex) as the whole stock market benchmark. Table 1 lists the statistical summary of the five real estate stocks, and the whole market (HOSE) as well.

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[1] We thank Anh Pham for providing these five stocks' daily trading prices.

Table 1: Statistical Summary of the Daily Returns (01/02/2009 – 02/28/2011)

	HAG	VIC	TDH	KBC	ITA	VNIndex
Mean	0.0014	0.0029	0.0013	0.0006	0.0011	0.0009
Standard Deviation	0.0242	0.0277	0.0287	0.0324	0.0318	0.0178
Minimum	-0.0519	-0.0515	-0.0509	-0.0792	-0.0541	-0.0456
Maximum	0.0505	0.0522	0.0517	0.0722	0.0550	0.0476

As is shown in Table 1, four real estate stocks out of the five outperform the whole market in the daily average returns during this time period. In addition, the standard deviations of these five stocks are all higher than that of the whole market, implying that the real estate sector's returns exhibits more volatile dynamics than the whole market. Moreover, the maximum and minimum returns of these five stocks all exceed those of the whole market, indicating that the real estate market in Vietnam witnesses extremer price fluctuations than it does in the whole stock market. Figure 1 presents the time plots of these six assets' returns. As is shown, these assets experienced significant different fluctuation in returns from 2009 to early 2011. The HAG and KBC returns experienced remarkable fluctuation in 2009, while in 2010 HAG returns appeared to be less volatile than previous year and KBC returns exhibited slightly milder fluctuation than they did in the previous year. Other three real estate stocks maintain relatively the same level of the fluctuations in their returns from 2009 to early 2011. However, the returns in the whole Vietnamese stock market presents much milder fluctuation in this time period, and in 2010, this fluctuation was even less significant than was shown in 2009.

Using the *demeaned* daily returns of these stocks and the VNIndex, we fit the GARCH models with different ARCH order *p* up to 3 and GARCH order *q* up to 3, as defined in Section 2. We find that the log-likelihood values obtained from these GARCH (p, q) models are quite close. Considering parsimony of the GARCH model, we employ the GARCH (1, 1) model to generate the daily volatility, which is the estimated σ_t in Model (3).

We assume that the error term in the Model (3), ε_t, follows a Gaussian distribution with mean 0 and standard deviation 1. Table 2 documents the statistical summary of the daily volatilities of these six assets. It shows that all the five real estate stocks experienced much higher average daily volatility than the whole market. Further, the maximum and minimum daily volatility embedded in these five stocks' returns all exceed those of the whole Vietnam stock market. Both Table 1 and 2 suggest that these five real estate stocks have experienced more significant fluctuations than the whole stock market in terms of returns and volatilities. The implication of these evidences to investors is that investing these real estate stocks may diversify a portfolio's return and risk structures.

Table 2: Statistical Summary of the Daily Volatilities (01/02/2009 – 02/28/2011)

	HAG	VIC	TDH	KBC	ITA	VNIndex
Mean	0.0229	0.0269	0.0280	0.0312	0.0309	0.0171
Standard Deviation	0.0071	0.0074	0.0058	0.0085	0.0070	0.0059
Minimum	0.0120	0.0145	0.0182	0.0170	0.0188	0.0086
Maximum	0.0390	0.0447	0.0406	0.0531	0.0443	0.0326

Figure 2 presents the volatility dynamics of these six assets from 2009 to early 2011. Except ITA and TDH, other four assets including the whole Vietnamese stock market exhibited greater volatility levels in 2009 than in 2010. Specifically the VNIndex experienced much lower volatility than the five real estate stocks.
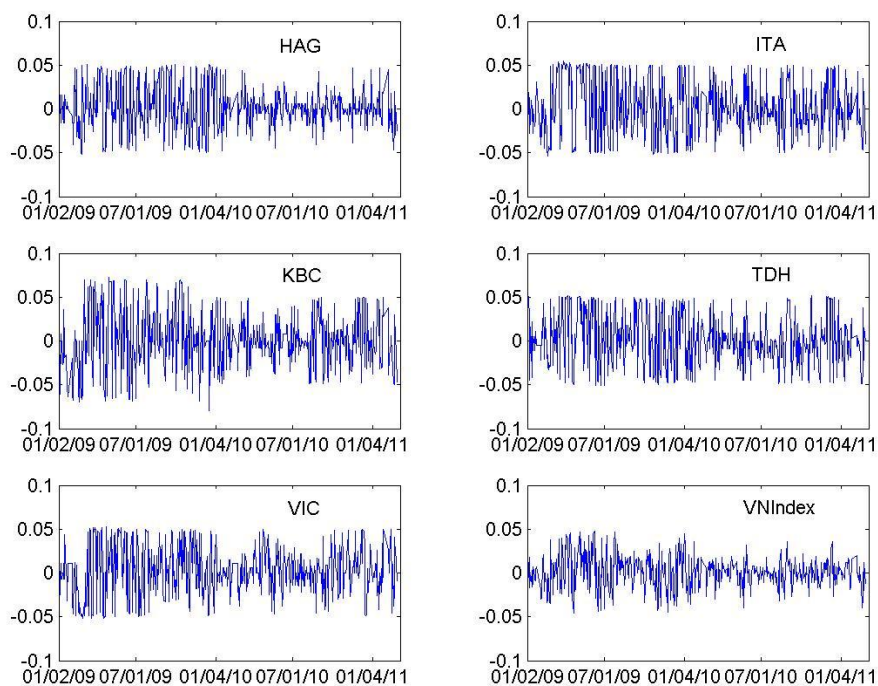
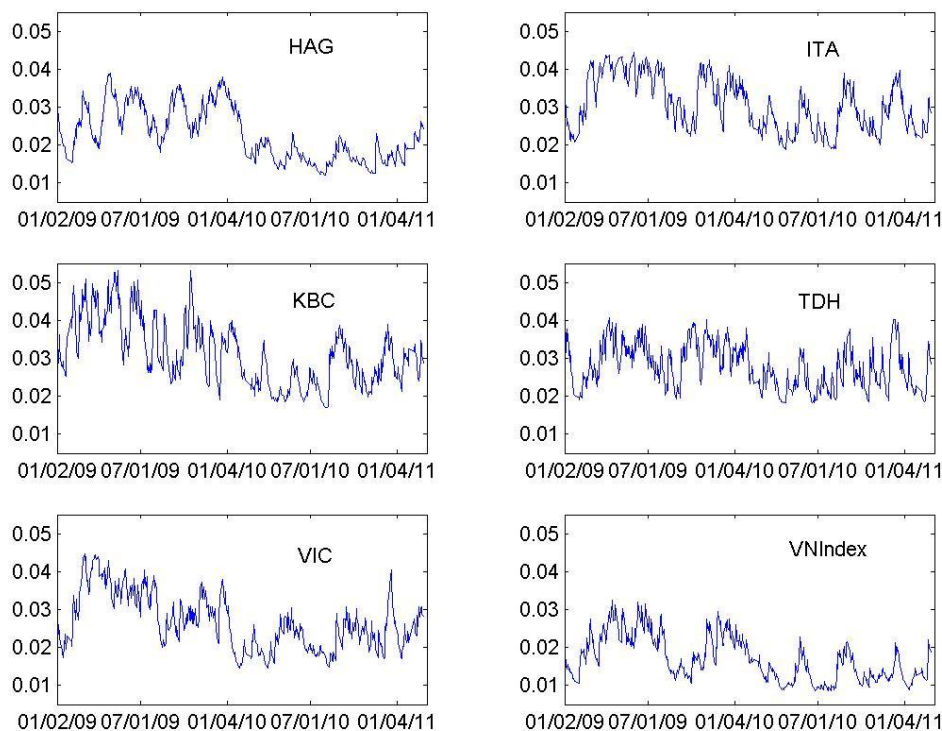Figure 1: Time Plots of the Daily Returns, 01/02/2009 – 02/28/2011

Figure 2: Time Plots of the Daily Volatilities, 01/02/2009 – 02/28/2011

4. Empirical Results and Analysis

From a portfolio management perspective, we study how expected return of investing each of the five real estate stocks in Vietnam in a portfolio would behave relative to the whole Vietnamese stock market. We apply Model (2) to each of the five real estate stocks, where r_t is the returns of the individual stock at time t, and $r_{M,t}$ is the VNIndex's returns at time t. Table 3 lists the estimated coefficients from the Model (3). According to the historical prevailing interest rate from 2009 to early 2011 in Vietnam, we set the daily risk-free rate as $r_f = 0.000384$ in the model. Table 3 presents the estimates of the coefficients. The risk coefficients is the $\hat{\beta}$ in the Table 3. The standard error corresponding to each estimated coefficient is included in the parenthesis below the coefficient. As is shown, the estimated constants for all but one of the five real estate stocks turn out to be insignificant, while all estimated risk coefficients for the five real estate stocks are strongly significant. As is illustrated in Section 2, the risk coefficient gauges the risk level in investing an individual asset relative a whole equity market. In our case, the estimated $\hat{\beta}$'s indicate that all these five real estate stocks' returns move in the same direction as the whole Vietnamese stock market does. However, we find that investing ITA, KBC, and TDH is riskier than investing the whole market index since all these three assets' risk coefficients are greater than 1. On the other hand, investing VIC is safer since the risk coefficient is less than 1. Regarding the HAG, its risk coefficients is quite close to 1, implying that the risk level in investing this stock is marginally the same as investing in the whole Vietnamese stock market. Given the magnitudes of the estimated risk coefficients, the risk level in investing the three riskier-than-the-market real estate stocks is not remarkably high, which is not the situation we have observed in the U.S. real estate sector.

Table 3: Estimated Coefficients

	$\hat{\beta}_0$	$\hat{\beta}$	R^2
ITA	0.0004	1.2864	0.5178
	(0.0010)	(0.0538)	
KBC	0.0001	1.2124	0.4419
	(0.0011)	(0.0590)	
HAG	0.0009	0.9703	0.5088
	(0.0007)	(0.0413)	
VIC	0.0025	0.8729	0.3103
	(0.0011)	(0.0564)	
TDH	0.0007	1.2202	0.5726
	(0.0008)	(0.0457)	

These five companies are the major players in Vietnamese real estate market. Investigation on whether their returns and volatilities are highly related to each other may help practitioners make a better decision in their portfolio management. Table 4 lists the correlation coefficients among these five real estate stocks returns in Vietnam. Table 5 documents the correlation coefficients among their volatilities. It shows that the TDH has significant correlation with HAG and ITA, and the KBC is remarkably related to ITA, either. All other pairs of the stocks are weakly related to each other. However, the Table 5 reveals a quite different pattern: Except the VIC and TDH, all other pairs of the real estate stocks

exhibit strong relations between each other. Our empirical results indicate that in the same real estate market, different publicly traded stocks can have different risks to invest. Moreover, their returns and volatilities can have quite different relational patterns. For example, between VIC and HAG, their daily returns are weakly related while their daily volatilities are highly correlated to each other. And these patterns are observed in many of the other pairs out of the five real estate stocks. From the viewpoint of trading, hedging, and portfolio management, this evidence may suggest some potential investment opportunities, and may impose some challenges to practitioners in balancing the risks and returns for a traded portfolio including these Vietnamese real estate equities.

Table 4: Correlation among the Five Real Estate Stocks' Returns

	HAG	ITA	KBC	TDH	VIC
HAG	1	0.4915	0.4498	0.5273	0.3392
ITA	0.4915	1	0.6303	0.5861	0.4357
KBC	0.4498	0.6303	1	0.4830	0.4168
TDH	0.5273	0.5861	0.4830	1	0.3819
VIC	0.3392	0.4357	0.4168	0.3819	1

Table 5: Correlation among the Five Real Estate Stocks' Volatilities

	HAG	ITA	KBC	TDH	VIC
HAG	1	0.6029	0.5667	0.5401	0.5488
ITA	0.6029	1	0.7464	0.6172	0.7133
KBC	0.5667	0.7464	1	0.5182	0.6391
TDH	0.5401	0.6172	0.5182	1	0.4260
VIC	0.5488	0.7133	0.6391	0.4260	1

5.   Conclusion

Subprime crisis originated from the real estate sector in the U.S. in mid 2007 has caused dramatic economic turmoil in the U.S. and around the world. On the other hand, we have observed that in some emerging markets such as Vietnam the real estate market experienced very booming time in 2008 and 2009, even though the real estate market in Vietnam started to worsen off from 2010. In this paper, we are motivated to investigate the five publicly traded real estate stocks in the Vietnamese stock market from a perspective of portfolio investment using the daily data from 01/02/2009 to 02/28/2011. Specifically we explore the characteristics of the returns and volatilities of these five real estate stocks from 2009 to early 2011, during which the Vietnamese real estate market switched from boom to downturn in the market values of real estate properties. We find that even though three real estate stocks are riskier than the whole Vietnamese equity market to reach the expected returns, the risk level is not remarkably higher than the whole market in yielding the expected returns. Moreover, two real estate stocks turn out to be safer than the whole equity market to invest in a portfolio. We find that majority of the real estate stocks' daily returns are not significantly correlated to each other while their volatilities are. During 2009 and early 2011, all these five stocks' returns moved in the same direction as the whole Vietnamese stock market did. In addition, four real estate stocks yielded higher average returns and all five stocks experienced significantly higher volatilities than the whole market did. Our empirical results suggest that the financial performance of these major real estate companies in the Vietnamese equity market didn't worsen off when the real estate market experienced huge loss in the property values. These findings may provide portfolio practitioners engaging in Vietnamese real estate equities with important insights into the characteristics of the returns

and volatilities. The different relations among these real estate stocks in terms of return and volatility offer practitioners with some trading, hedging, and risk diversification opportunities, but also impose some challenges on balancing the risk and returns for a portfolio that includes these real estate equities.

References

Balme, S., Sidel, M. 2007. *Vietnam's New Order: International Perspectives on the State and Reform in Vietnam.* CERI Series in International Relations and Political Economy. Palgrave Macmillan, N.Y.

Bollerslev, T. 1986. Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics* 31, 307-327.

Engle, R. 1982. Autoregressive Conditional Heteroscedasticity with Estimates of Variance of United Kingdom Inflation. *Econometrica* 50, 987-1008.

Kim, A. 2004. A Market without the 'Right' Property Rights. Ho Chi Minh City, Vietnam'sNewly-Emerged Private Real Estate Market. *Economics of Transition* 12, 275-305.

Lintner, J. 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics* 47, 13–37.

Markowitz, H. 1959. *Portfolio Selection: Efficient Diversification of Investments.* Cowles Foundation Monograph 16. New York: John Wiley & Sons, Inc.

Mossin, J. 1966. Equilibrium in a Capital Asset Market. *Econometrica* 34, 768–783.

Sharpe, W. 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance* 19, 425-442.

Treynor, J. 1961. Market Value, Time, and Risk. *Unpublished manuscript.*

Treynor, J. 1962. Toward a Theory of Market Value of Risky Assets. *Unpublished manuscript*.