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The Inflation-Hedging Characteristics of Vietnamese Securitized Real Estates

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Abstract: *This study investigates the inflation-hedging characteristics of real estate stocks in Vietnam. Empirical findings show that securitized real estates can provide a partial hedge against both ex post and ex ante inflation, but no statistical relation between securitized real estates returns and surprises in inflation is found. Noticeably, the Fisher hypothesis on the one-to-one relationship between real estate stock returns and expected inflation is strongly rejected. This study has implication for investors by adding to the understandings of the inflation-hedging characteristics of Vietnamese securitized real estates.*

Keywords*: property stock index, securitized property, inflation, hedging, Vietnam*

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I. INTRODUCTION

Nowadays, investors are provided more options to invest in real estates sector with the development of a wide range of real estate-linked financial products (Obereiner and Kurzrock, 2012). These securitized real estates include closed and open-end funds, listed real estate companies and REITs (Real Estate Investment Trusts) (Maurer and Sebastian, 2002). Especially, institutional investors prefer to invest in indirect real estates because of the hindrances of direct real estates particularly for illiquidity (Ciochetti, Craft and Shilling, 2002; Lin and Yung, 2006; Maurer and Sebastian, 2002). Three characteristics that makethe indirect real estate investments more appealing than direct real estates are as follows. Firstly, the indirect real estate market is generally more informationally efficient, and has higher liquidity, a greater number of market participants, and smaller transaction costs. Next, traded on organized exchangesthe returns on securitized real estate instruments are transaction-based, which facilitates the calculation of its investment returns in real time. In contrast, this is not the case for direct real estate investment since its estimated returns are mainly based on appraisal data. Particularly, although the appraisal theoretically could be undertaken at any frequency, most real properties are only valued once a year (typically at the end of the year) if there is no transaction during the first three quarters. Hence, the "true" returns for shorter horizons (e.g., quarterly, monthly) cannot be determined. Lastly, to invest in direct real estates a large amount of capital is required, e.g., a large lot size and involves high transaction costs (Hoesli, Lizieri and MacGregor, 2008). This is usually considered as entry barriers for potential real estate investors. However, the indirect real estate markets in general can alleviate these impediments due to the division of a real estate company value into shares lowering the amount of required investment capital. Given this, the real estate stock market facilitates investors (especially private investors) to invest in the real estate sector (Wilson and Zurbruegg, 2003).

The holdings of real estate-linked financial products as a way to invest in real estate market have led to an interest in their inflation-hedging ability, i.e., whether these financial products can protect the wealth of investors against inflation. Due to the hybrid nature of securitized real estates, i.e., it combines characteristics of (direct) real estate and common stocks, how it reacts to inflation is unclear. More specifically, if returns on securitized real estates are predominantly driven by the "real estate market", real estate securities are expected to react positively on inflation (as direct properties are assumed to do) (see e.g., Brueggeman, Chen and Thibodeau (1984); Hartzell, Hekman and Miles (1987); Gyourko and Linneman (1988); and Bond and Seiler (1998)). On the other hand, if securitized real estates behaves more like common stocks, it may show a poor inflation-hedging capacity (as amply document in the literature has been found for stocks) (e.g., Jaffe and Mandelker, 1976; Bodie, 1976; Nelson, 1976; and Fama and Schwert, 1977). Indeed, the empirical studies on the inflation-hedging properties of indirect real estates find mixed evidence andwhether or not the securitized real estates can hedge against inflation remains highly controversial. For example, REITs are found to be perverse inflation hedges (e.g., Murphy and Kleiman (1989); Park, Mullineaux and Chew (1990); Chan, Hendershott and Sanders (1990); Yobaccio, Rubens and Ketcham (1995); and Liu, Hartzell and Hoesli (1997)). Nevertheless, a positive relationship between REIT returns and inflation is documented by Simpson, Ramchander and Webb (2007).

Up to our knowledge, the inflation-hedging ability of real estate stocks has not yet been investigated for Vietnam, althoughit has recently become an increasingly popular investment alternative for investors in Vietnam. Our study therefore aims to fill this gap of the literature. This research there by really has important implications for investors, policymakers and researchers. If the hedging ability of direct and indirect real estates is similar, investors can hold real estates in their portfolios either directly, by purchasing a property, or indirectly, by buying shares of real estate listed companies on the stock exchanges.
The remainder of the paper is structured as follows. Section 2 presents the literature survey. In section 3, methodology and data are shown. The empirical results are discussed in section 4. Finally, we conclude.

II. LITERATURE SURVEY

Investigating the inflation-hedging capability of securitized real estates has been extensively shown in the literature, in which the way to proxy indirect real estates varies from country to country (Liu, Hartzell and Hoesli, 1997). While equity REITs, e.g., should constitute a good proxy in the U.S. (Mengend and Hartzell, 1987), property unit trust may be a good reflection of the indirect real estate market in the U.K., Australia and South Africa. In Switzerland, real estate mutual funds are organized as a good proxy for the underlying real estates whereas open-ended real estate funds are well characterized for embodied real estate investment in Germany. Another example is that the SIIs (Sociétés Immobilières pour le Commerce et I'Industrie) and SICOMIs (Sociétés Immobilières d'Investissement) may be the good proxy for real estate securities in France (Liu, Hartzell and Hoesli, 1997; Maurer and Sebastian, 2002). It can be seen that empirical studies have produced sparse and mixed evidence. For example, Murphy and Kleiman (1989) find for the U.S. (period from 1972 to 1985) that REIT returns do not provide total inflation protection, later confirmed by Maurer and Sebastian (2002). Maurer and Sebastian (2002) analyze the inflation hedging characteristics of real estate securities in France, Germany, Switzerland and the UK over 1980 – 2000, but find no evidence on their inflation-hedging capacity against inflation for all these countries. Furthermore, many studies documented that securitized real estates act as a perverse hedge against both expected and unexpected inflation. Likewise, Park, Mullineaux and Chew (1990) find the same results for monthly U.S. REITs returns(over the period 1972.01-1995.12.). Using real estate mutual funds, Hamelink and Hoesli (1996) find that the Swiss real estate mutual funds provide a perverse hedge against inflation over the period 1978-1992. Hartzell and Hoesli (1997) also find that property trusts returns have a perverse hedge against inflation for Australia, France, Japan, South Africa, Switzerland, the U.K. and the U.S. over the period 1980- 1991. However, many studies show that REITs returns do provide a significant hedge against inflation and they might act as a positive or partial hedge against either actual inflation or (expected and unexpected) componentsof inflation. For example, Gyourko and Linneman (1988) show that the U.S. REITs provide a partial hedge against both the *ex post* inflation and *ex ante* inflation, but a perverse hedge against unexpected inflation over 1973 - 1986. Ganesan and Chiang (1998) find that Hong Kong real estate stocks are at least a partial hedge against expected inflation,but a perverse hedge against unexpected inflation for 1984-1994 period. The results contradict those of Isil and Dogan (2008) showing that Turkish REITs, in general, provide a better hedge against both actual and expected inflation over 1994-2002.
Regarding the inflation-hedging capability of three kinds of indirect real estates (open-end real estate funds, special funds and real estate stocks) in Germany over the period from 1992.04 to 2009.12, Obereiner and Kurzrock (2012) find that none of these indirect real estate investment vehicles provide a hedge against expected or unexpected inflation in the short run. However, they do find that these types of securitized real estates can hedge against inflation in the long run. Stevenson (2001) examines the relationship between real estate securities and inflation (actual, expected and unexpected inflation) for ten international markets over (1976-1999), including the ASX Property Trusts Index (Australia), the Brussels SE Real Estate Index (Belgium), Toronto SE Real Estate Index (Canada), AGEFI Property Index (France), Milan MIB Real Estate Index (Italy), Nikkei Real Estate Index (Japan), Amsterdam Kempen Property Index (Netherland), Singapore All Properties Index (Singapore), FTSE Property Index (UK) and the NAREIT Indices for the U.S). The empirical findings show a minimal evidence of a positive relationship between real estate securities and inflation. In addition, securitized real estates also fails to provide protection against inflation over the long run. Lee, Lee, Lai and Yang (2011) find that real estate stocks are unable to hedge against inflation (actual, expected and unexpected) over the long run for three emerging markets (Malaysia (1990-2009), the Philippines (1996-2009) and Taiwan (1981-2009)). The list of empirical studies is unexhausted and indicates that whether or not securitized real estates can hedge against inflation is still questionable.

III. METHODOLOGY AND DATA

3.1 Methodology

Following previous studies (see, e.g., Nelson (1976); Boudoukh and Richardson (1993); Lintner (1975); Bodie (1976); Fama and Schwert (1977); Gultekin (1983b)), we empirically estimate the *ex post* relationship between nominal securitized real estate returns and inflation in the first step. In the second step, an *ex ante* model is

conducted to investigate the relation between nominal securitized real estates returns and both expected and unexpected inflation rates. It should be noticed that given its stock characteristics, the securitized real estates may be influenced by the general stock market. In such a case, the observed relationship between the securitized real estates and inflation may also reflect the link between stock returns and inflation. Hence, the correction for this problem is necessary to obtain a true inflation hedging properties of securitized real estates. Our estimate strategy goes as follows. We first regress the securitized real estate returns on the general stock market returns – the returns on Hochiminh stock market index (*VNINDEX*). The error terms of the regression, which are free from the effects of the general stock market, are called pure securitized real estate returns. The error terms are then used in all our estimations below.

The regression of securitized real estate returns on the general stock market returns reads

$$R_t = \varphi_1 + \omega_1 VNINDEX_t + e_t, \quad (1)$$

where R_t is the nominal securitized real estate returns, $VNINDEX_t$ is the nominal returns of the stock market (Hochiminh stock exchange) and e_t is the residuals of the regression (pure securitized real estate returns).

We investigate the *ex post* relationship between the nominal pure securitized real estate returns (residuals of the regression (1), e_t) and inflation using the following regression:

$$e_t = \varphi + \omega\pi_t + \epsilon_t, \quad (2)$$

where φ and ω are coefficients and ϵ_t is the error term.

Next, we estimate the following *ex ante* model in the second step:

$$e_t = \alpha + \beta E_{t-1}(\pi_t) + \gamma UE_{t-1}(\pi_t) + n_t, \quad (3)$$

where n_t is the error term, and $UE_{t-1}(\pi_t)$ denotes the unexpected component of inflation given information available at time $t-1$.

Following Fama and Schwert (1977), three cases for the hedging potential of an asset can be checked: asset is *a complete hedge against expected inflation ($\beta = 1.0$),* asset is *a complete hedge against unexpected inflation ($\gamma = 1.0$,)* and asset is considered as *a complete hedge against inflation ($\beta = \gamma = 1.0$).*

In specification (3), the expected and unexpected inflation is separated utilizing an ARIMA model (Box and Jenkins, 1970), commonly employed by other studies (e.g., Gultekin (1983b); Wahlroos and Berglund (1986); Li, et al. (2010)). Since our focus is to examine the short-run influence of inflation on the asset returns, and not the feedback from returns to inflation, all regressions are estimated by OLS (Ordinary Least Squares). We use the Newey-West corrected covariance matrix when computing the test statistics in order to account for heteroskedasticity and residual autocorrelation (Newey and West, 1987).

3.2 Data

Time series data are in monthly and are obtained from various sources. Real estate stock prices index (VS-Sector Index) over the January 2012-December 2016 period are constructed and provided by Vietstock, a Vietnamese data provider.[1] Consumer price index (CPI) for the same period is obtained from General Statististics Office of Vietnam. Time length of this research is dictated by data availability. Stock price index and CPI are transformed into monthly returns and inflation rates, respectively using log changes. Both stock returns and inflation rates are stationary using the ADF test.[2]

IV. EMPIRICAL FINDINGS

4.1 Summary statistics

Using the approach by Box and Jenkins(1970), the autoregressive model AR(1) employed to decompose actual inflation into expected inflation and unexpected inflationis as

$$\text{AR(1): } \pi_t = 0.245 + 0.259\pi_{t-1} + \varepsilon_t$$

Summary statistics for inflation and real estate stock returns are presented in table 1.

Table 1. Summary statistics for indirect real estate returns and inflation rates

	Mean	Min	Max	Std.	*N*
$R_t(\%)$	0.010	-0.052	0.069	0.030	60
π (%)	0.344	-0.440	2.200	0.489	60
$E(\pi)(\%)$	0.368	-0.379	2.930	0.304	60
$UE(\pi)(\%)$	0.300	-0.157	2.854	0.542	60

[1] Industries are classified using NAICS 2007 (North American Industry Classification System)

[2] Stationarity of all variables is checked by both the Augmented Dickey-Fuller unit root test (ADF) (Dickey and Fuller, 1979). Optimal lag length selection for these tests is based on the Akaike Information Criterion (AIC) (Akaike, 1974). Results are available upon request.

From the table, monthly inflation rates have a mean of 0.34% and a standard deviation of 0.49%. For real estate stock returns, its shows the mean of 0.01% with the standard deviation of 0.03%. In general, no outliers in data can be observed, showing the reliability of the estimated results.

4.2 Regression results

Table 2 reports the regression results: panel A indicates regression results of securitized real estate returns on the general stock market returns; panel B show the regression results of pure real estate stock returns on actual inflation rates at the contemporaneous term [equation (2)]. Panel C reports the regression results of pure real estate stock returns on expected and unexpected inflation at the contemporaneous term [equation (3)] as presented in the table for convenience.

Table 2 (panel A) shows the regression results of securitized real estate returns and general stock market returns. As can be seen, the coefficient of general stock market returns is statistically significantly positive at the level of 1%, indicating that general stock market has a strong influence on real estate stocks. More specifically, as stock market returns increase (decrease) in 1%, securitized real estate returns also move the same direction approximately at 1.12%. These results confirm that our estimation strategy is appropriate to isolate the effects of general stock market returns from real estate stock returns, thereby obtaining the real movements of securitized real estate returns.

Table 2. Regression results of indirect real estate returns on actual, expected and unexpected inflation rates.

Panel A: Regression results of real estate stock returns on general market returns

$$R_t = \varphi_0 + \omega_0 VNINDEX_t + e_t$$

	φ_0	ω_0	N	$\bar{R}^2$	F
R_t	-0.005	1.124***	60	0.625	0.00
	(-0.020)	(0.114)			

Panel B: Regression results of pure securitized real estate returns on actual inflation rates

$$e_t = \varphi_1 + \omega_1 \pi_t$$

	φ_1		ω_1	N	$\bar{R}^2$	F
e_t	-0.002	0.009	[-198.00]***	60	0.039	0.00
	(-0.13)		(1.80)*			

Panel C: Regression results of real estate stock returns on expected and unexpected inflation rates

$$e_t = \alpha + \beta E_{t-1}(\pi_t) + \gamma UE_{t-1}(\pi_t)$$

	α		β		γ	N	$\bar{R}^2$	F
e_t	-0.006	0.022	[-75.23]***	0.006	[-142.00]***	60	0.041	0.00
	(-1.14)		(1.78)*		(0.85)			

F-value for testing the null hypothesis that $\beta = \gamma = 1$: 125.535***

Notes: R_t is the returns on property development stock index; $VNINDEX_t$ is the returns on general stock index; e_t is the idiosyncratic returns on real estate stocks; N is the number of observations; π_t is the actual inflation rate at time t. Expected and unexpected inflation rates are decomposed from the actual inflation rates by using Autoregressive (AR) models, where expected inflation rates $[E(\pi_t)]$ are the linear prediction of the AR(1) model and unexpected inflation rates $[UE(\pi_t)]$ are the residuals of the AR (1) model; $\bar{R}^2$ is the adjusted R-squared; F is F-test. The F-values for testing the hypothesis $H_0: \omega_i = 1$ or $H_0: \beta_i = 1$ or $H_0: \gamma_i = 1$ are shown in the brackets next to the coefficients, and the robust t-values for testing the hypothesis $H_0: \varphi_i = 0$ or $H_0: \omega_i = 0$ or $H_0: \alpha_i = 0$ or $H_0: \beta_i = 0$ or $H_0: \gamma_i = 0$ are reported in the parentheses below the coefficients. (***), (**) and (*) indicate significance at the 1%, 5% and 10% levels, respectively.

The regression results of pure securitized real estate returns and *ex post* inflation are displayed in table 2 (panel B). The results show that the coefficient on the actual inflation rates is positive (0.009) and is statistically significantly different from zero at the level of 10%. Furthermore, the coefficient is also statistically significantly different from one at the 1% level (test in brackets), indicating that real estate stocks do not move in one-to-one fashion with*ex post* inflation. Given the coefficient size (0.009), we can conclude that the real estate stocks can only provide a partial hedge against *ex post* inflation.

Table 2 (panel C) reports the regression results of pure securitized real estate returns and both expected and unexpected inflation. From the table, we can observe that the coefficients on both expected and unexpected inflation are positive (although relatively small), however only the coefficient on expected inflation is statistically significant different from zero at the 10% level. These results show that real estate stocks can provide a partial hedge against the expected inflation, but not against unexpected inflation. Moreover, both the regression coefficients on expected and unexpected inflation are statistically distinguished from unity at the 1% significance level, warranting a rejection of the Fisher hypothesis of a one-to-one relationship between securitized real estate returns and the expected inflation rates. Furthermore, a complete hedge against news on inflation of securitized real estate stocks can be rejected.

V. CONCLUSIONS AND IMPLICATIONS

In this paper, empirical findings show that securitized real estates can provide a partial hedge against both the *ex post* and *expected* inflation in Vietnam. Nevertheless, no statistical relationship between securitized real estate returns and surprises in inflation can be found. In addition to these, statistical evidence shows that real estate stocks are unable to provide a complete hedge against inflation (*ex post*, *ex ante* and unexpected inflation), therefore the Fisher hypothesis is strongly rejected. This study has implication for investorsand academics by adding to the understanding of the inflation-hedging characteristics of Vietnamese securitized real estates. In general, investors in Vietnam have been partially protecting their wealth by investing in securitized real estates.

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