

# The Study of Influencing Factors of REITs in the United States and Japan - Application of GJR GARCH Model

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## ABSTRACT

The purpose of this study is to explore the relationship among REITs index, macroeconomic variables, stock market, REITs dividend, and bond in United States and Japan. The empirical results are summarized as follows: The causal feedback relationship does exist between REITs index and REITs dividend in United States and Japan. There is positive relationship between REITs index and industrial production index. REITs couldn't resist inflation. The REITs indices in United States and Japan exist the long term equilibrium relationship with the variables. Subprime mortgage crisis enables structural changes in U.S. REITs index. The result of GARCH effect is that we can for-ecast the volatility of REITs in United States and Japan by previous term conditional variances. There are positive relationships between the REITs in United States and Ja-pan in the same term

Keywords : real estate investment trusts、 vector autoregressive model、 generalized autoregressive conditional hetero-scedasticity

## Table of Contents

中文摘要	iii
英文摘要	iv
誌謝辭	v
內容目錄	vi
表目錄	viii
圖目錄	ix
第一章 緒論	1
第一節 研究背景與動機	1
第二節 研究目的	6
第三節 研究架構	6
第二章 文獻回顧	9
第一節 總體經濟變數對REITs的影響	9
第二節 股市、股利、債券對REITs的影響	10
第三章 研究方法	13
第一節 研究資料敘述	13
第二節 單根檢定	14
第三節 向量自我迴歸模型	17
第四節 共整合檢定	18
第五節 因果關係檢定	19
第六節 衝擊反應函數與預測誤差變異分解	22
第七節 GJR GARCH模型	24
第八節 實證模型之建構	29
第四章 實證結果分析	35
第一節 單根檢定結果	35
第二節 向量自我迴歸模型結果	39
第三節 共整合檢定結果	51
第四節 因果關係檢定結果	52
第五節 衝擊反應函數與預測誤差變異分解結果	54
第六節 結構性改變之檢測結果	61
第七節 GJR GARCH模型結果	61
第五章 結論與建議	68
第一節 結論	68

第二節 建議 . . . . .	70
參考文獻 . . . . .	72

表目錄

表 3-1 樣本資料種類、期間、來源彙整表 . . . . .	14
表 4-1 美國REITs變數的基本敘述統計量 . . . . .	35
表 4-2 日本REITs變數的基本敘述統計量 . . . . .	36
表 4-3 變數原始資料之單根檢定 . . . . .	37
表 4-4 一階差分後的變數之單根檢定 . . . . .	38
表 4-5 美國的VAR模型最適落後期數之選取 . . . . .	39
表 4-6 美國VAR模型之檢定結果 . . . . .	43
表 4-7 日本VAR模型之檢定結果 . . . . .	44
表 4-8 美國 VAR檢定結果之變數關係彙整表 . . . . .	45
表 4-9 日本 VAR檢定結果之變數關係彙整表 . . . . .	47
表 4-10 加入次貸事件的美國VAR模型之檢定結果 . . . . .	49
表 4-11 加入次貸事件的日本VAR模型之檢定結果 . . . . .	50
表 4-12 美國REITs共整合軌跡檢定結果 . . . . .	51
表 4-13 日本REITs共整合軌跡檢定結果 . . . . .	51
表 4-14 美國REITs之Granger因果關係檢定結果 . . . . .	52
表 4-15 日本REITs之Granger因果關係檢定結果 . . . . .	53
表 4-16 美國REITs之衝擊反應分析表 . . . . .	55
表 4-17 日本REITs之衝擊反應分析表 . . . . .	57
表 4-18 美國REITs價格指數之預測誤差變異數分解 . . . . .	59
表 4-19 日本REITs價格指數之預測誤差變異數分解 . . . . .	60
表 4-20 美國REITs價格指數之Chow檢定 . . . . .	61
表 4-21 日本REITs價格指數之Chow檢定 . . . . .	61
表 4-22 ARCH效果檢定 . . . . .	62
表 4-23 美國GJR GARCH模型結果 . . . . .	65

圖目錄

圖 1-1 研究架構圖 . . . . .	8
圖 4-1 美國REITs價格指數的衝擊反應函數 . . . . .	56
圖 4-2 日本REITs價格指數的衝擊反應函數 . . . . .	58

REFERENCES

一、中文部份大橋和?, 紙田純子, 永井輝一(2004), J-REIT????分析 - 2001年9月??2004年3月???週次????分析, 國土交通政策研究第36號。岡正規(2007), 不動?投資市場?動向, ???基礎研究所金融研究部門, NLI Research Institute 2007年7月。二、英文部分Adrangi, B., Chatrath, A., & Raffiee, K. (2004). REIT investments and hedging against inflation. *Journal of Real Estate Portfolio Management*, 10(2), 97-112.Akaike, H. (1969). Fitting autoregressive models for prediction. *Annals of the Institute of Statistical Mathematics*, 21, 243-247.Allen, M. T., Madura, J., & Springer, T. M. (2000). REIT characteristics and the sensitivity of REIT returns. *Journal Real Estate Finance and Economics*, 21, 141-152.Asabere, P., Kleiman, R., & McGowan, C. (1992). The risk-return attributes of international real estate equities. *Journal of Real Estate Research*, 6(2), 143-152.Bahram, A., Chatrath, B., & Raffiee, K. (2004). REIT investments and hedging against inflation. *Journal of Real Estate*

Portfolio Management, 10(2), 97-112. Bollerslev, T. (1986). A generalized autoregressive condition heteroskedasticity. *Journal of Econometrics*, 31, 307-327.

Brailsonford, T. J., & Faff, R. W. (1996). An evaluation of volatility forecasting techniques. *Journal of Banking and Finance*, 20, 419-438.

Bredin, D., O'Reilly, G., & Stevenson, S. (2007). Monetary shocks and REIT returns. *Journal of Real Estate Finance and Economics*, 35(3), 315-331.

Chen, J., & Peiser, R. (1999). The risk and return characteristics of REITs-1993-1997. *Real Estate Finance*, Spring, 61-68.

Chiang, K. C. H., Lee, M. L., & Wisen, C. H. (2004). Another look at the asymmetric REIT-beta puzzle. *Journal of Real Estate Research*, 26(1), 25-42.

Clayton, J., & McKinnon, G. (2000). Measuring and explaining changes in REIT liquidity: Moving beyond the Bid-Ask spread. *Real Estate Economics*, 28, 89-115.

Cotter, J., & Stevenson, S. (2006). Multivariate modeling of daily REIT volatility. *Journal of Real Estate Finance and Economics*, 32(3), 305-325.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49(4), 1057-1072.

Dimson, E., & Marsh, P. (1990). Volatility forecasting without data snooping. *Journal of Banking and Finance*, 14(2), 399-421.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica*, 50, 987-1007.

Engle, R. F. (1984). Wald, likelihood ratio, and lagrange multiplier tests in Econometrics. *Handbook of Econometrics*, 2, 776-826.

Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2), 251-276.

Engle, R. F., & Ng, V. K. (1993). Measuring and testing the impact of news on volatility. *Journal of Finance*, 48, 1749-1778.

Glascok, J. L., Lu, C., & So, R. W. (2000). Further evidence on the integration of REIT, bond, and stock returns. *Journal of Real Estate Finance and Economics*, 20(2), 177-194.

Glascok, J. L., Lu, C., & So, R. W. (2002). REITs returns and inflation: Perverse or reverse causality effects? *Journal of Real Estate Finance and Economics*, 24(3), 301-317.

Glosten, L. R., Jagannathan, R., & Runkle, D. (1993). On the relation between the expected value and the volatility on the nominal excess returns on stocks. *The Journal of Finance*, 48, 1779-1801.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, 2, 111-120.

Gyourko, J., & Keim, D. (1992). What does the stock market tell us about real returns? *Journal of American Real Estate Finance and Urban Economics Association*, 20(3), 457-486.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12, 231-254.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration- with application to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52, 169-210.

Kim, D., & Kon, S. J. (1994). Alternative models for the conditional heteroscedasticity of stock returns. *Journal of Business*, 67(4), 563-598.

Kim, J. W., Leatham, D. J., & Bessler, D. A. (2007). REIT 's dynamics under structural change with unknown break points. *Journal of Housing Economics*, 16, 37-58.

Larson, S. J. (2005). Real estate investment trusts and stock price reversals. *Journal of Real Estate Finance and Economics*, 30(1), 81-88.

Lin, C. Y., & Yung, K. (2006). Equity capital flows and demand for REITs. *Journal of Real Estate Finance and Economics*, 33(3), 275-291.

Ling, D. C., & Ryngaert, M. D. (1997). Valuation uncertainty, institutional involvement, and the underpricing of IPOs: The case of REITs. *Journal of Financial Economics*, 43(3), 433-456.

Ling, D. C., & Naranjo, A. (1997). Economic risk factors and commercial real estate returns. *Journal of Real Estate Finance and Economics*, 14(3), 283-307.

Ling, D. C., & Naranjo, A. (2003). The dynamics of REIT capital flows and returns. *Journal of Real Estate Economics*, 31(3), 405-434.

Ljung, C. M., & Box, G. E. P. (1978). On a measure of lack of fit in time series models. *Biometrika*, 65, 297-303.

Lu, C., & So, R. W. (2001). The relationship between REITs returns and inflation: A vector error correction approach. *Review of Quantitative Finance and Accounting*, 5, 103-115.

MacKinnon, J. G. (1991). Critical values for cointegration tests. Un-published manuscript, University of California at San Diego.

McCue, T. E., & Kling, J. L. (1994). Real estate returns and the macro-economy: Some empirical evidence from real estate investment trust data, 1972-1991. *Journal of Real Estate Research*, 9(3), 277-287.

Mueller, G. R., & Pauley, K. R. (1995). The effect of interest-rate movements on real estate investment trusts. *Journal of Real Estate Research*, 10(3), 319-326.

Mukherjee, T. K., & Naka, A. (1995). Dynamic relations between macroeconomic variables and the Japanese stock market: An application of a vector error correction model. *Journal of Financial Research*, 18(2), 223-237.

Najand, M., Lin, C. Y., & Fitzgerald, E. (2006). The conditional CAPM and time varying risk premium for equity REITs. *Journal of Real Estate Portfolio Management*, 12(2), 167-175.

Nelson, C. R., & Plosser, C. (1982). Trends and random walks on macroeconomic time series. *Journal of Monetary Economics*, 10, 139-162.

Oppenheimer, P., & Grissom, T. V. (1998). Frequency space correlation between REITs and capital market indices. *Journal of Real Estate Research*, 16(3), 291-309.

Payne, J. E. (2003). Shocks to macroeconomic state variables and the risk premium of REITs. *Applied Economics Letters*, 10, 671-677.

Payne, J. E. (2006). The response of sub-sector REIT returns to shocks in fundamental state variables. *Applied Financial Economics Letters*, 2, 71-75.

Sagalyn, L. B. (1990). Real estate risk and the business cycle: Evidence from security markets. *Journal of Real Estate Research*, 5(2), 203-220.

Said, E., & Dickey, D. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, 71(3), 599-607.

Schwartz, G. (1978). Estimating the dimension of a model. *Annals of Statistics*, 6, 461-464.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, 48(1), 11-48.

Vines, T. W., Hsieh, C. H., & Hatem, J. J. (1994). The role of systematic covariance and coskewness in the pricing of real estate: Evidence from equity REITs. *The Journal of Real Estate Research*, 9, 421-429.