

# The Fractal Structure of Real Estate Investment Trust Returns: The Search for Evidence of Market Segmentation and Nonlinear Dependency

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## Abstract

This article presents a further test for market segmentation between the real estate market and the capital markets. We use rescaled range analysis developed in the fractal geometry literature to test for nonlinear trends in the returns series for different asset classes. We make three major conclusions: (1) the stock market displays tendencies consistent with a random walk, (2) portfolios of mortgage and equity REIT returns display tendencies consistent with a random walk and, (3) conditional upon the methods used, segmentation does not exist between different real estate markets and between the real estate and stock markets.

## References

Ambrose, B.W. 1990. Corporate Real Estate's Impact on the Takeover Market. *Journal of Real Estate Finance and Economics* 3(4): 307-22.

[Google Scholar](#)

Badrinath, S.G. and S. Chatterjee. 1988. On Measuring Skewness and Elongation in Common Stock Return Distributions: The Case of the Market Index. *Journal of Business* 61(4): 451-72.

[Web of Science®](#) | [Google Scholar](#)

Brock, W.A. 1986. Distinguishing Random and Deterministic Systems: Abridged Version. *Journal of Economic Theory*: 168-95.

[Web of Science®](#) | [Google Scholar](#)

Burns, W.L. and D.R. Epley. 1982. The Performance of Portfolios of REITs +Stocks. *Journal of Portfolio Management*: 37-42.

[Google Scholar](#)

Chan, K.C., P.H. Hendershott and A.B. Sanders. 1990. Risk and Return on Real Estate: Evidence from Equity REITs. *Journal of the American Real Estate and Urban Economics Association* 18(4): 431-52.

[Web of Science®](#) | [Google Scholar](#)

---

Colwell, P.P. and H.Y. Park. 1990. Seasonality and Size Effects: The Case of Real Estate Related Investment. *Journal of Real Estate Finance and Economics* 3(3): 251-59.

[Google Scholar](#)

---

Darrat, A.F. and J.L. Glascock. 1989. Real Estate Returns, Money and Fiscal Deficits: Is the Real Estate Market Efficient? *Journal of Real Estate Finance and Economics* 2(3): 197-208.

[Google Scholar](#)

---

Draper, D. and M.C. Findlay, III. 1982. Capital Asset Pricing and Real Estate Valuation. *Journal of the American Real Estate and Urban Economics Association* 10(2): 152-83.

[Google Scholar](#)

---

Fama, E. 1965. The Behavior of Stock Prices. *Journal of Business* 38: 34-105.

[Web of Science®](#) | [Google Scholar](#)

---

Fama, E.. 1970. Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance* 25: 383-417.

[Web of Science®](#) | [Google Scholar](#)

---

Fama, E.. 1991. Efficient Capital Markets: II. *Journal of Finance* 46(5): 1575-1617.

[Web of Science®](#) | [Google Scholar](#)

---

Fama, E. and J. MacBeth. 1973. Risk, Return and Equilibrium: Empirical Tests. *Journal of Political Economy* 81(3): 607-36.

[Web of Science®](#) | [Google Scholar](#)

---

Feder, J. 1988. *Fractals*. Plenum Press.

[Google Scholar](#)

---

Galai, D. 1977. Tests of Market Efficiency of the Chicago Board Options Exchange. *Journal of Business* 43(2): 579-96.

[Google Scholar](#)

Geltner, D. 1990. Return Risk and Cash Flow Risk with Long-Term Riskless Leases in Commercial Real Estate. *Journal of the American Real Estate and Urban Economics Association* 18(4): 377-402.

[Web of Science®](#) | [Google Scholar](#)

---

Geltner, D.. 1991. Real Estate and the Diversifiability of Stock Market Noise. Working paper, University of Cincinnati.

[Google Scholar](#)

---

Giliberto, S.M. 1990. Equity Real Estate Investment Trusts and Real Estate Returns. *Journal of Real Estate Research* 5(2): 259-64.

[Google Scholar](#)

---

Goodman, A.C. 1978. Hedonic Prices, Price Indices and Housing Markets. *Journal of Urban Economics* 5: 471-84.

[Web of Science®](#) | [Google Scholar](#)

---

Goodman, A.C. 1981. Housing Submarkets Within Urban Areas: Definitions and Evidence. *Journal of Regional Science* 21(2): 175-85.

[Web of Science®](#) | [Google Scholar](#)

---

Granger, C.W. 1970. A Survey of Empirical Studies on Capital Markets. Elton and Gruber, *International Capital Markets*. North Holland .

[Google Scholar](#)

---

Greene, M.T. and B.D. Fielitz. 1977. Long-Term Dependence In Common Stock Returns. *Journal of Financial Economics* 4: 339-49.

[Web of Science®](#) | [Google Scholar](#)

---

Gyourko, J. and P. Linneman. 1988. Owner-Occupied Homes, Income-Producing Properties, and REITs as Inflation Hedges: Empirical Findings. *Journal of Real Estate Finance and Economics* 1(4): 347-72.

[Google Scholar](#)

---

Hartzell, D.J., D.G. Shulman and C.H. Wurtzebach. 1987. Refining the Analysis of Regional Diversification for Income-Producing Real Estate. *Journal of Real Estate Research* 2(2): 85-95.

[Google Scholar](#)

Hinich, M.J. and D.M. Patterson. 1985. Evidence of Non-Linearity in Daily Stock Returns. *Journal of Business & Economic Statistics* 3(1): 69-77.

[Web of Science®](#) | [Google Scholar](#)

---

Howe, J.S. and J.D. Shilling. 1990. REIT Advisor Performance. *Journal of the American Real Estate and Urban Economics Association* 18(4): 479-500.

[Web of Science®](#) | [Google Scholar](#)

---

Hurst, H.E. 1951. Long Term Storage Capacity of Reservoirs. *Transactions of the American Society of Civil Engineers* 116: 770-99.

[Web of Science®](#) | [Google Scholar](#)

---

Jorion, P. and E. Schwartz. 1986. Integration vs. Segmentation in the Canadian Stock Market. *Journal of Finance* 41: 603-16.

[Web of Science®](#) | [Google Scholar](#)

---

Liu, C.H., T.V. Gnsom and D.J. Hartzell. 1990. The Impact of Market Imperfections on Real Estate Returns and Optimal Investment Portfolios. *Journal of the American Real Estate and Urban Economics Association* 18(4): 453-78.

[Web of Science®](#) | [Google Scholar](#)

---

Liu, C.H., D.J. Hartzell, W. Greig and T.V. Grissom. 1990. The Integration of the Real Estate Market and the Stock Market: Some Preliminary Evidence. *Journal of Real Estate Finance and Economics* 3: 261-82.

[Web of Science®](#) | [Google Scholar](#)

---

Lo, A.W. 1991. Long-Term Memory in Stock Market Prices. MIT Working Paper No. 3014-89-EFA. *Econometrica*: (forthcoming).

[Google Scholar](#)

---

Mandelbrot, B. B. 1970. Statistical Dependence in Prices and Interest Rates. The Second World Congress of the Econometric Society.

[Google Scholar](#)

---

Mandelbrot, B. B. 1977. *Fractals: Form, Chance, and Dimension*. W.H. Freeman.

[Google Scholar](#)

---

Mandelbrot, B. B. 1982. *The Fractal Geometry of Nature*. W.H. Freeman.

[Web of Science®](#) | [Google Scholar](#)

---

Mandelbrot, B. B. and J.R. Wallis. 1969. Some Log-Run Properties Of Geophysical Records. *Water Resources Research* 5(2): 321-340.

[Web of Science®](#) | [Google Scholar](#)

---

Maris, B.A. and F.A. Elayan. 1990. Capital Structure and the Cost of Capital for Untaxed Firms: The Case of REITS. *Journal of the American Real Estate and Urban Economics Association* 18(4): 22-39.

[Google Scholar](#)

---

Martin, J.D. and D.O. Cook. 1991. A Comparison of the Recent Performance of Publicly Traded Real Property Portfolios and Common Stock. *Journal of the American Real Estate and Urban Economics Association* 19(2): 184-212.

[Web of Science®](#) | [Google Scholar](#)

---

McIntosh, W., Y. Liang and D.L. Tompkins. 1991. An Examination of the Small-Firm Effect within the REIT Industry. *Journal of Real Estate Research* 6(1): 9-18.

[Google Scholar](#)

---

Miles, M., R. Cole and D. Guilkey. 1990. A Different Look at Commercial Real Estate Returns. *Journal of the American Real Estate and Urban Economics Association* 18(4): 403-30.

[Web of Science®](#) | [Google Scholar](#)

---

Noreen, E.W. 1989. *Computer Intensive Methods For Testing Hypotheses: An Introduction*. John Wiley & Sons.

[Google Scholar](#)

---

Park, J.Y., D.J. Mullineaux and I.-K. Chew. 1990. *Journal of Real Estate Finance and Economics* 3(1): 91-103.

[Google Scholar](#)

---

Richardson, D.H. and R. Thalheimer. 1982. On the Use of Grouping Methods in the Analysis of Residential Housing Markets. *Regional Science and Urban Economics* 12: 285-304.

[Web of Science®](#) | [Google Scholar](#)

---

Roll, R. 1970. *The Behavior of Interest Rates: An Application of the Efficient Market Model to U.S. Treasury Bills*. Basic Books Inc.

[Google Scholar](#)

Ross, S.A. and R.C. Zisler. 1990. Risk and Return in Real Estate. *Journal of Real Estate Finance and Economics* 4(2): 175–90.

[Google Scholar](#)

---

Savit, R. 1988. When Random Is Not Random: An Introduction to Chaos in Market Prices. *Journal of Futures Markets* 8(3): 271–89.

[Web of Science®](#) | [Google Scholar](#)

---

Savit, R.. 1989. Nonlinearities and Chaotic Effects in Options Prices. *Journal of Futures Markets* 9(6): 507–18.

[Web of Science®](#) | [Google Scholar](#)

---

Scheinkman, J.A. and B. LeBaron. 1989. Nonlinear Dynamics and Stock Returns. *Journal of Business* 62(3): 311–37.

[Web of Science®](#) | [Google Scholar](#)

---

Schnare, A.B. and R.J. Struyk. 1976. Segmentation in Urban Housing Markets. *Journal of Urban Economics* 3: 146–66.

[Web of Science®](#) | [Google Scholar](#)

---

Scott, L.O. 1990. Do Prices Reflect Market Fundamentals in Real Estate Markets? *Journal of Real Estate Finance and Economics* 3(1): 5–24.

[Google Scholar](#)

---

Straszheim, M. 1974. Hedonic Estimation of Housing Market Prices: A Further Comment. *Review of Economics and Statistics* 56: 404–406.

[Web of Science®](#) | [Google Scholar](#)

---

Titman, S. and A. Warga. 1986. Risk and the Performance of Real Estate Investment Trusts: A Multiple Index Approach. *Journal of the American Real Estate and Urban Economics Association* 14(3): 414–31.

[Web of Science®](#) | [Google Scholar](#)

---

Wallis, J.R. and N.C. Matalas. 1970. Small Sample Properties of H and K Estimators of the Hurst Coefficient H. *Water Resources Research* 6: 1583–94.

[Google Scholar](#)



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