

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

Brent W. Ambrose, Esther Ancel, Mark D. Griffiths

First published: March 1992

<https://doi.org/10.1111/1540-6229.00571>



## 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](#)

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#)

Manage Preferences

Accept All

Reject Non-Essential

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](#) 

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#)

Manage Preferences

Accept All

Reject Non-Essential

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](#) 

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#)

Manage Preferences

Accept All

Reject Non-Essential

---

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.

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#) 

[Manage Preferences](#)

[Accept All](#)

[Reject Non-Essential](#)

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](#) 

---

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#) 

[Manage Preferences](#)

[Accept All](#)

[Reject Non-Essential](#)

---

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](#) 

---

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#) 

Manage Preferences

Accept All

Reject Non-Essential

---

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](#) 

## Citing Literature

[Download PDF](#)


### ABOUT WILEY ONLINE LIBRARY

[Privacy Policy](#)

[Terms of Use](#)

[About Cookies](#)

[Manage Cookies](#)

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#) 

[Manage Preferences](#)

[Accept All](#)

[Reject Non-Essential](#)

## OPPORTUNITIES

Subscription Agents  
Advertisers & Corporate Partners

## CONNECT WITH WILEY

The Wiley Network  
Wiley Press Room

Copyright © 1999-2026 John Wiley & Sons, Inc or related companies. All rights reserved, including rights for text and data mining and training of artificial intelligence technologies or similar technologies.

**WILEY**

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising. You may change your settings at any time or accept the default settings. You may close this banner to continue with only essential cookies. [Privacy Policy](#)



**Manage Preferences**

**Accept All**

**Reject Non-Essential**