Don't Risk Your Financial Health Without a Second Opinion

by

Richard A. Graff
Principal
Electrum Partners
400 North Michigan Avenue, Suite 415, Chicago, Illinois 60611
phone: 312-923-8144 / fax: 312-923-8023

and

Michael S. Young
Vice President and Director of Quantitative Research
The RREEF Funds
101 California Street, San Francisco, California 94111
phone: 415-781-3300 / fax: 415-781-2229 / e-mail: MYoung@RREEF.com

published in

Institutional Real Estate Securities
Vol. 2, No. 5, May 1997, pp. 19-22.

Don't Risk Your Financial Health Without a Second Opinion

by
Richard A. Graff and Michael S. Young

It has been said that the greatest threat to good health is not disease; it's relying upon the wrong diagnosis. In the November 1996 issue of this publication (*Institutional Real Estate Securities,* pp. 23, 24, 31), Susan Hudson-Wilson, CEO of Property & Portfolio Research (P&PR), wrote about risk assessment in commercial real estate, buttressed by an array of property-type investment statistics. However, institutional investors would be well advised to consider carefully the investment statistics presented in the article.

Our conclusions are derived from an examination of the text of the article and reported statistics for the P&PR investment model, and include the following:

1. Derivation of the statistics in the article incorporates an assumption that expected returns predicted by the P&PR model do not change over the 20-year period of the simulation. Consequently, faith in these statistics is incompatible with a belief that expected returns vary over the course of a real estate cycle.
2. The relation between expected office returns and the risk-free rate derived by the P&PR model implies that office property is a hedge against the systematic risk component of virtually any other asset, real estate or otherwise. Although certainly possible, this result is so remarkable that further explanation and empirical confirmation from P&PR would be required to establish its credibility.
3. If the relation between expected office returns and the risk-free rate predicted by P&PR is incorrect, then the P&PR model is invalid and all unsupported predictions of the P&PR model are of dubious worth.

Simulated Data

The article states that its investment statistics for each property type are based on *estimated* MSA investment returns, not *actual* real estate investment returns. More precisely, statistics are based on 4,800 MSA performance estimates generated by a P&PR model for each of four property types from 1982 to 2001. In other words, the investment statistics in the array describe the output of an abstract simulation model for real estate investment returns rather than empirical real world investment returns. Implications of these statistics, therefore, will only be as reliable as the model employed to generate the simulated returns.

The Model

How good is the model? The question is currently unanswerable. To the best of our knowledge, P&PR bases its investment recommendations on a quantitative model that has never been exposed to critical analysis by the independent real estate investment analyst and research community. The P&PR model would have a great deal more credibility and research community

support were P&PR to publish the analytical structure of the model, which would allow rigorous theoretical examination by real estate academics and practitioners.

Even without a description of the model structure, however, we believe that we can infer some things about the author's statistical methodology from the article.

For example, the property-type investment statistics (e.g. mean/expected return, investment risk) are based on simulated annual returns over a 20-year period. This implies that the sample statistics can only be regarded as close estimates of true descriptive parameters for annual real estate return distributions if the theoretical annual return distributions do not vary across the 20-year period. Expressed more simply, belief in the descriptive or predictive power of the P&PR statistics appears to be incompatible with belief in real estate cycles.

Since most investors recognize that the investment characteristics of each property type change every few years, there seems to be little point for investors to put their faith in statistics that depend on the assumptions that real estate investment characteristics have not changed since 1982 and will remain unchanged until 2001, or to bet investment dollars on quantitative investment strategies derived from statistics based on such assumptions.

This is not to suggest that Hudson-Wilson believes (or asserts) that real estate investment characteristics are invariant across time. However, the limited amount of annual data generated by the model simulations (240 data points per year for each property type) forced P&PR to lump together all the data for the 20-year period 1982-2001 in order to reduce the sample errors in the statistical estimates to appropriate levels for the derivation of P&PR quantitative investment strategies.

Normal or Nonnormal Data?

The practice of lumping together samples from normal distributions with different means and standard deviations is sufficiently common in statistical applications to have acquired its own label: the “mixture of normals.” This can make samples drawn from several normal distributions appear to be a sample set drawn from a single distribution that is decidedly nonnormal.

In particular, it can generate sample sets that display a significant amount of skewness and kurtosis, as do the sample return distributions described in the article. For this reason, researchers who discover skewness and kurtosis in statistical samples often follow up the discovery with additional tests to discriminate between legitimate indications of nonnormality and sampling error that results from mixing samples from different normal distributions.

At this time, it is unclear to us whether P&PR has conducted this kind of follow-up analysis. At the very least, however, we believe some additional analysis should be conducted in cases where nonnormality measurements play a role in interpretation of the results, as they do in the article's discussion of how real estate investment characteristics vary by property type. Since the evidence suggests a mixture of normals, the skewness and kurtosis statistics presented in the article could be by-products of flawed statistical methodology rather than evidence of real estate investment characteristics, as the author suggests.

P&PR Office Returns and Investment Theory

Accurate statistical estimation can be a two-edged sword.

If we take the P&PR property-type return estimates and accuracies at face value, then the value for expected annual office property return of 6.72% implies that office property has a lower

expected return than risk-free Treasury bills, as was explicitly noted in the article. Omitted from the article, however, was any discussion of the significance of the prediction that office property has a lower expected rate of return than the risk-free rate.

Summarizing from basic investment theory, expected investment return varies directly with investment risk. In this instance, "risk" is not interpreted as meaning fluctuations in investment returns from the asset alone, but rather the contribution of the asset to fluctuations in investment returns from the so-called "market portfolio."

Expressed more intuitively, the addition of an asset to well-diversified portfolios generally reduces portfolio risk more than the addition of the same amount of risk-free asset to the portfolio if and only if the expected return from the asset is lower than the risk-free rate. It follows that, in order for an equity asset to have a lower expected return than the risk-free rate, investment returns from the asset generally must fluctuate inversely to fluctuations in returns from most other assets.

In other words, investment returns from the asset must be unexpectedly high (in general) in years when investment returns from most other assets are unexpectedly low, and inversely. This implies that the addition of office property to any portfolio (real estate or otherwise) reduces systematic investment risk more effectively than the addition of a similar amount of the risk-free asset. In practice, however, virtually all risky assets are assumed to have a higher expected return than the risk-free rate.

The P&PR model prediction that office property has a lower expected return than the risk-free rate is a very significant assertion. From our perspective, that implies either that the model is incorrect in its description of the relation between expected returns for the major property types and the risk-free asset, or that annual office property investment returns generally fluctuate inversely to annual fluctuations in investment returns from most other assets.

If the model is incorrect in its description of the relation between investment returns, then no prudent investment strategies should be based on its predictions.

On the other hand, if the investment returns from office property are negatively correlated with investment returns from most other assets, we encourage P&PR to provide evidence to support what would be considered an exceptional market insight if proven correct.

Additional Red Flags

Our reading of the article also suggests the presence of arithmetic errors. Of the four Sharpe Ratios presented in the data table, for example, three appear to be numerically incorrect based on the mean returns and standard deviations presented in the first two lines of the table, and the fourth appears to have a decimal point placed incorrectly.

In particular, the Sharpe Ratios for apartment buildings and industrial property implied by the means and standard deviations in the first two lines of the table are 0.082 and 0.083 respectively, rather than the values of 0.0042 and 0.0045 presented in the table; and the Sharpe Ratio implied for retail property is 0.12 rather than the value of 0.0012 presented in the table.

The article indicated that the Sharpe Ratio for office property could not be computed since the return expected by P&PR for office property was below the assumed risk-free rate of 7.00%. However, the formula by which the Sharpe Ratio is defined does yield a numerical value: (6.72% – 7.00%) / 8.04% = –0.035.

A negative value for the Sharpe Ratio still would convey meaningful investment information, provided the other data in the table were correct.

The Bottom Line

We welcome any explanation that can help us and other readers understand these concerns. If she is so inclined, we encourage Hudson-Wilson to respond.

Meanwhile, suffice it to say, we believe the research process works best when practitioners make the effort to restrict research to empirically-based investment concepts derived from scientifically rigorous examination of actual real estate returns; write detailed descriptions of assumptions, methods, and results; submit the descriptions to peer-reviewed journals for publication; and move them into the public domain for open discussion and critique. This way, the weak points of ideas are discarded quickly, without adverse affect on real-world investments, and the strong points are made available to institutional and individual investors with the cachet of formal approval from both academic and practitioner investment theorists.

Open debate of the merits of theories and methodologies, combined with open examination of the quality of relevant data is the fastest and most reliable road to progress in understanding for the entire commercial real estate community.

We encourage research practitioners of all persuasions to adhere to this mode of operation, in the hope that insights from their considerable professional experience will accelerate the flow of investment theory advances and illuminate the path to more stable and reliable investment strategies for investors.