Analyzing Real Estate Portfolio Returns

More than alpha and beta . . . there's gamma.

Ronald W. Kaiser

Core real estate, as exemplified by the National Council of Real Estate Investment Fiduciaries National Property Index, traditionally represents the beta or market return to institutional real estate. Enhancing the beta with alpha, in the traditional securities market sense, requires superior insight into asset allocation, asset selection, and market timing. According to historical data from the public securities markets, success in these activities can be ephemeral and not particularly powerful. Leveraging the assets, as has become increasingly popular in the search for higher returns, also leverages the risk—in effect steepening the market return line.

An increasing proportion of new money allocated to institutional real estate managers today is targeted for higher-return potential in employing value-added or opportunistic strategies. To the extent such outperformance can be attributed to superior insight or talent on the part of management either in sector or metropolitan statistical area allocations or in superior property selection, this can properly be attributed to alpha.

But what about all the other garden-variety activities we are accustomed to in real estate? By virtue of being able to *take control of the asset*—something not possible in publicly traded securities, managers routinely invest additional capital or effort in refurbishing, retenanting, redeveloping, creatively financing, or simply changing some or all of a management team. I collectively label such *control activities* as real estate's *gamma*. The portfolio return equation then becomes: R = Beta + Alpha + Gamma.

Ronald W. Kaiser
is a director at Bailard, Inc., in Foster City, CA.
rkaiser@bailard.com

By analyzing the 11-year experience with an actual portfolio, I show how gamma can be much more powerful than alpha in enhancing the beta of real estate, with only a marginal increase in volatility risk, if certain diversification practices are followed. Gamma can better explain why previously mislabeled alpha can be so positive and so persistent in proprietary real estate studies carried out by institutional consultants; see Myer and Byrne [2004] for an overview.

An eventual goal is to identify and track gamma separately from alpha for manager evaluation, selection, and attribution. Even before such analytics are developed, an understanding of the gamma of real estate can serve to expand an investor's perspective on how value is added or lost through the unique asset control characteristics of private equity real estate.

When increased allocations to real estate are pushing up core pricing and reducing the yield on stabilized real estate, it may make much more sense for investment managers to create core properties than to acquire them. In such an environment, it will become especially important for institutional investors to identify gamma managers who know how to harness the power of gamma, rather than stock sector selection alpha managers.

ON IMPROVING THE CREDIBILITY OF REAL ESTATE FINANCE AND THEORY

Much of the publishing activity of the recent decade or so has been aimed at improving the stature and credibility of real estate as a mainstream asset class. A notable summary is offered by Hudson-Wilson, Fabozzi, and Gordon [2003]. Many authors have sought to explain real estate in the language and practices of the public securities marketplace, which is helpful. In comparison to equities, cap rates are increasingly understood to be simply the inverse of the P/E ratio. In comparison to bonds, cap rate yield spreads to fixed-income benchmarks are ever more closely followed.

NCREIF is achieving status as a provider of useful benchmarks, repeat-sale indexes, and data ranging from property-level detail to pooled fund performance. Pagliari, Scherer, and Monopoli [2005] have helped to explain the relationship between private market and public REIT returns. As real estate investment sophistication improves, so does its credibility with institutional and private investors.

There remain all the same nagging doubts about the performance measurement constraints of private equity real estate. The lumpiness of property investments and the non-normal distribution of returns make it hard to derive statistically reliable performance attribution analysis. Further doubts are raised when so many investment managers claim large and persistent alphas versus their benchmark. Even in the highly sophisticated U.K. real estate industry, Lee and Stevenson [2002] find that "on average, real estate funds delivered significant risk-adjusted positive performance" relative to the benchmark over the period studied.

This kind of result reaffirms doubts about the credibility of the asset class's performance measures. Alpha is not abundant and persistent in public securities portfolios.

In the world of public securities, alpha is traditionally conceived as the excess return generated by managers solely from asset selection and market timing. Because the sum of all managers' alphas is zero (all their actions in concert *define* the benchmark index), it is the rare manager that can year after year deliver significant positive alphas. Hahn, Geltner, and Gerardo-Lietz [2005] also indicate performance persistence in real estate opportunity funds, although performance is defined only by IRR rank, with no attempt made to evaluate an alpha.

After I read Winograd [2004] about alphas and betas, Conner and Liang [2003] about value-added activities, and Falzon, Halle, and McLemore [2002] about the much wider spread between top- and bottom-quartile manager performance in private market investing than in public, it occurred to me that perhaps real estate (and, indeed, venture capital) investment theory needs another Greek letter.

AN IMPROVEMENT IN THE PORTFOLIO RETURN EQUATION FOR REAL ESTATE

The conventional portfolio return equation in modern portfolio theory has been simply:

Portfolio Return = Beta (Market Return) +
Alpha (Manager Selection and Timing Contribution)

There is one very important difference between private market investing and public securities investing: Private market investing usually involves *taking control of the asset.* In public securities, the best one can do is to cast very small minority votes for board seats and resolutions. In real estate, the investor can take total control of the asset: hire and fire management and vendors; develop budgets; change the physical structure; change the tenant profile; change the financing package. This ability to control can lead to a change in intrinsic value.

In public securities, all one can do is to evaluate the value changes undertaken by management in place, all

EXHIBIT 1

Classification of Actions Available to Real Estate Investment Advisors

	Beta Acts	Alpha Acts	Gamma Acts
Portfolio-Level	Implement client benchmark. Focus on adequate diversification that mirrors benchmark. Add leverage to portfolio.	Deviations from benchmark. Targeted over/under-weights. Vary targets over the cycle. Vary leverage over the cycle. Market timing of cash versus property.	Creative application of leverage strategies. Create and capitalize enterprise value through a public or private exit. Operating leverage with tenants or vendors.
Property-Level	Buy core at market. Long-term hold strategy.	Seek information advantage. Examples: Post-due diligence adjustments to pricing. Seek mispricing opportunities. Local cycle-timing strategies. Active high-bidder sales strategy.	Develop relationships to encourage owners to sell/joint venture off market. Acquire properties with high vacancy risk. Property Control Activities: —Control management/leasing team. —Add developer partner to team. —Retenanting strategies. —Refurbishment strategies. —Redevelopment or new development strategies.

of which is public knowledge. Investment outperformance then is based on one's ability to perform superior evaluations.

One of the earliest acknowledgments of this major difference between private and public investing comes in Stoesser and Hess [2000] who distinguish between *production value-added* and *investment value-added.*

In real estate, the investor can buy an ordinary property at full market price (no alpha), but still produce superior returns by improving the value of the asset. To date, such value improvements have all been lumped in with alpha. To really understand the performance of a real estate portfolio, we need another Greek letter. I propose we use the next one in the sequence, gamma.

Thus, the portfolio return equation becomes:

Portfolio Return = Beta (Market Return) +
Alpha (Selection, Timing) +
Gamma (Value-Added)

Such value-added activities (resulting from the ability to control the asset) can have such a dominant impact, that Kaiser [2005] observes that style boxes in real estate are classified more by the activities engaged in than by the assets purchased (per public securities style definitions).

To focus the discussion and the analysis that follows, I classify the activities of real estate investment managers into three groups—beta, alpha, and gamma—as shown in Exhibit 1.

Some observers, especially Conner and Liang [2003], have usefully categorized the gamma activities into three categories of value-added activities: physical, financial, and operational. Most observers, such as Stoesser and Hess [2000], then conclude that these activities typically have their greatest impact in the wealth creation phases of the property life cycle—development and redevelopment. On further thinking, however, it becomes apparent that such activities pervade the world of real estate, and are

EXHIBIT 2

Classification of Gamma Activities

Gamma Acts Conventionally Reported in NCREIF		Gamma Acts Usually Included in Value-Added or Opportunistic (Non-NPI Property)
Beta Acts	**Alpha Acts**	
Maintain property's relative market status by: —Maintaining management team. —Routine releasing. —Routine maintenance.	Improve property's relative market status by: —Changing of management team. —Retenanting strategies. —Rehabilitation to maintain competitiveness with new properties.	Substantially alter property's relative market value by: —Adding developer partner to management team. —Retenanting strategies with substantial vacancy risk. —Increase size or change utility of space by redevelopment or new development.
— Operational Phase —		**— Development and Redevelopment Phase —**

embedded in beta numbers (the NCREIF index) and in alpha performance attribution, not just in the world of closed-end value-added and opportunistic funds.

Exhibit 2 offers one possible classification of gamma activities by their relative importance in contributing to the performance numbers in the NCREIF index versus the usually higher-return numbers in the non-NCREIF-reporting property funds.[1]

Obviously, control activities fall along a continuum from ordinary and necessary activities to major redevelopment. Although the NCREIF index is thought of as the market return line, it depends on the cumulative impact of all managers' activities in managing, leasing, and maintaining their properties. A slightly more talented or hard-working manager then could easily create the appearance of some alpha performance simply by making properties perform at a higher level than the market on average, through superior management, retenanting, or rehabilitation. while never going so far as to remove the property from NCREIF-qualifying status (i.e., generally remaining close to fully leased).

A REAL-WORLD ANALYSIS OF BETA, ALPHA, AND GAMMA

To illustrate the application and possible utility of this proposed gamma theory, let us now consider the facts of a real property portfolio. To be useful for this purpose, the portfolio should: 1) Include a range of properties from core to value-added to opportunistic (all phases of the property life cycle); and 2) provide the availability of sufficient property-level data for the analysis. The portfolio selected, while not particularly large, encompasses the full range of gamma activities. Further, it offers a long enough time horizon (11 years) to produce potentially significant results, thereby reducing the problems highlighted in Young and Greig [1993] and Young and Annis [2001].

The study portfolio is the major part of an open-end fund (quarterly share purchase and redemption), excluding the smaller portions in cash and publicly traded REITs from the analysis. The fund has pursued a consistent strategy of value-added acquisitions, as well as a fairly long-term hold policy in order to preserve its REIT status. Properties include the four major property types, with a national geographic coverage. The portfolio was begun in 1990, but did not reach a reasonable minimum level of diversification until it reached ten properties in 1994. Thus, the study period runs from 1994 through 2004.

Exhibit 3 provides some summary statistics.

Over the 1994–2004 period, the mix of property types varied widely. Retail began at 29% of the portfolio, but averaged only 4%-8% in the recent five years. Offices ranged a bit lower than NPI levels, varying between 16% and 28% in no particular pattern. Industrial started at 13%, rose to 47% in 1999, and gradually declined to 27% by the end. Apartments ranged from 20% to 40% in no particular pattern.

A naive conclusion from these statistics would be that the study portfolio used its 30%+/– leverage to outperform the NPI, and also endured a bit higher volatility because of the leverage. The real story proves to be more interesting than that.

METHODOLOGY AND PRELIMINARY CONCLUSIONS—BETA AND ALPHA

One of the issues in this kind of analysis involves reconciling the timing and frequency of property appraisals. Seasonality effects can destroy the reliability of quarterly attribution analysis, as in Graff [1998]. In the NPI, some properties are appraised quarterly, and others only yearly, with a distinct fourth-quarter seasonality. Recent statistics continue to show this trend; 35%-42% of NPI properties (by market value) are reappraised in quarters one through

EXHIBIT 3
Summary Statistics of Study Portfolio

Year	NPI Return	Portfolio Return	No. of Properties	Market Value (Millions)	Props. Sold	Loan-to-Value Percentage
1994	6.38	15.62%	10	$118	0	28%
1995	7.53	15.89	12	158	0	31
1996	10.30	15.14	13	168	1	29
1997	13.91	16.26	14	191	1	32
1998	16.24	21.67	17	223	0	24
1999	11.36	11.04	33	316	1	33
2000	12.24	12.48	35	396	1	31
2001	7.28	11.54	35	411	2	31
2002	6.77	7.47	36	442	1	35
2003	9.00	8.41	37	461	2	39
2004	14.50	19.04	38	618	2	35
Annual	10.45%	13.98%				
Std. Dev.	3.42%	4.33%				

three, and 53% are appraised in the fourth quarter. On average, properties are appraised about 1.7 times per year.

The study portfolio pursued a policy of appraising approximately one-quarter of the portfolio in each quarter, and valued each property in the same quarter each year. Properties in development were carried at accumulated investment cost until sufficient lease-up had occurred to substantiate an appraisal, usually within two years of initial acquisition. As a consequence, in order to reduce the seasonality effect, I consider only annual returns.

Step 1: Evaluating the leverage effect on beta. To fairly compare the unlevered NPI with the study portfolio, the NPI returns are levered by the annual loan-to-value ratio for the study portfolio. NCREIF provides a set of cash flow-based statistics on its website in addition to its traditional accounting-based returns, where income is defined as net operating income; the difference between that figure and the total return represents the appreciation return. The cash flow statistics subtract the reinvested capital from NOI, to arrive at true distributable income to the investor. The difference between this and the total return is called the *capital return* (or appreciation).

I lever this capital return by the LTV ratio, and add it back to the cash flow return, to get a total levered return for the NPI. The cash flow return is not levered, with the simplifying assumption that the debt cost approximates the cash flow, which began in the mid-6% range in the early years, declining to 5.2% by 2004. The result is a levered NPI annual return of 12.14%, with a standard deviation of 4.61%.

Thus, nearly half of the return difference (169 basis points) between the study portfolio and the NPI can be accounted for by the use of leverage. There is a comparable rise in volatility risk. But what about the other 184 bp difference in return?

Step 2: Evaluating the property type and geographic selection effect on alpha. At this step, there are further complications related to small sample size as well as seasonality problems. In this step, a reweighted NPI return series is derived from annual NPI returns from each MSA for the specific property type in the study portfolio, weighted by the study portfolio weights. MSA/property returns are included for only the whole years that a study portfolio property was held.

In a few early years, there were fewer than four NPI properties (the minimum to meet NCREIF masking criteria), so proxies were created. For example, *Maryland office* substituted for *suburban Baltimore* returns in 1994-1996; *Chicago/Milwaukee retail* substituted for *Milwaukee neighborhood retail* for the whole period; and *North Carolina apartments* represented *Raleigh apartments* for 1994-1995. Nonetheless, we believe the results to represent a viable approximation in the search for alpha.

The reweighted NPI produces an unlevered annual return of 10.79% over the 11 years, indicating a possible alpha of 34 bp from choosing an above-average mix of MSA/property-type sectors over this period. This may not be statistically significant.

This is not to say that the managers of the study portfolio intentionally focused on acquiring these particular property types in those particular MSAs. Rather, they were selected as the best opportunities at the time from among the various opportunities presenting themselves. In other words, deal selection was the driving force, not some sort of top-down view that these sectors were the best.

Even though the expected returns of an acquisition are based on an evaluation of local market forces, sector selection was not a focus. It is true, though, that the sale strategy over this same period was at least partly driven by a top-down view as to which sectors represented the best cyclical sale opportunities.

Finally, this particular mix of sectors did produce a

EXHIBIT 4

Study Portfolio Diversification by Economic Region as of December 31, 2004

EMPLOYMENT CODE	1 Traditional North American	2 Older Financial & Cultural	3 Energy	4 High Growth Lifestyle	5 New Age Hi-Tech	6 Regional Center-Distribution	7 Education/ Government
I. Diversified	6%			11%	6%	2%	
II. Farm							
III. Finance/Insurance Real Estate		7%			7%		
IV. Government					7%	16%	7%
V. Manufacturing	4%			2%			
VI. Military				7%			
VII. Mining			6%		8%		
VIII. Service				6%			
IX. Transportation							

lower volatility, with a 2.23% standard deviation. Although this lower risk (along with the 34 bp of selection alpha) could simply be fortuitous, it could also be the result of conscientiously diversifying the MSA mix via the sophisticated economic driver methods of Mueller and Ziering [1992] and the geographic clustering methods of Ziering and Hess [1995].

The study portfolio's diversification policy and status at the end of 2004 are shown in Exhibit 4. It is conceivable that the study portfolio's diversification policies did produce a superior risk control to that of the naive NCREIF portfolio, thereby producing the reduced volatility.[2]

From the levered beta and the sector selection alpha, then, we can isolate the unexplained portion of the total return, as shown in Exhibit 5. The unexplained difference of 150 basis points is fairly high, and must have some significance as it results from a fairly large portfolio over fairly long time periods. While this could be at least partly a result of alpha (stock selection), further analysis suggests a strong contribution by gamma.

EXHIBIT 5

Study Portfolio Beta, Alpha, and Unexplained—11-Year Summary Performance

	Annual Return	
Real Portfolio	13.98%	
NPI	10.45%	= 353 bp total difference
NPI Reweighted to Real Portfolio MSA/Prop. Mix	10.79%	= + 34 bp MSA/prop. sector mix alpha
NPI — Levered	12.14%	= +169 bp in beta
Unexplained Difference	150 bp	

METHODOLOGY AND PRELIMINARY CONCLUSIONS—GAMMA

Throughout the 11 years, the study portfolio focused on value-added acquisitions, which at the time involved two often-intertwined strategies: 1) taking advantage of what was perceived to be situational mispricing of properties (in its purest form, an alpha strategy); and 2) acquiring properties where there were potential profits to be made from development or redevelopment. In reality, these two strategies were often combined in an acquisition.

On average, about 18% of the portfolio was represented by such opportunities each year, with a range of from 0% to 27%. Most of these projects required considerable commitment of capital or management effort to add the potential value to the property. Such value-added returns were typically recorded in the first one or two annual appraisals, after which the property became leased enough that it took on the characteristics of the core properties that constitute the NCREIF index.

In this analysis, two property holding periods are defined: the heavy value-added—or gamma—period, and the stabilized core period. And, again, only whole-year annual data are used (excluding partial years when properties were either acquired or sold) for both the study properties and the corresponding NPI

EXHIBIT 6

Property Returns and Risks Segregated by Level of Gamma Activity 1994–2003

	Value-Added or Opportunistic Property Years	Stabilized Core Property Years
Number of whole years	33	102
Avg. outperformance versus NPI MSA/property sector	+802 bp	+ 62 bp
Standard deviation	20.08	6.55
Median outperformance	+664 bp	+70 bp
Highest outperformance	+7294 bp	+1729 bp
Lowest underperformance	-2850 bp	-2044 bp
Modified standard deviation, (excluding high and low extremes)	14.11	5.97

MSA/property sectors. (At this time, the data are refined enough to consider only the ten years, 1994-2003.)

Over those ten years, there are 33 property-years in the value-added or gamma phase and 102 property-years in the core or beta phase. Only unlevered returns are used, because it is impossible to know the leverage ratio applicable to each property when much of the financing is carried at the portfolio level.

Finally, there is no weighting by market value, in order to see the average beta effect without the distortions introduced by large properties. (This simplification is not unreasonable, as the vast preponderance of properties bunch in the $15-$30 million size range.)

The results are strikingly significant. Gamma years outperform their NPI sector benchmarks by over 800 basis points, while beta or core property years outperform by only 62 bp.

From these statistics, it seems clear that most, if not all, of the unexplained 150 bp of portfolio outperformance came about as a result of the high-gamma activities. (There were eight properties requiring ground-up development, where the portfolio assumed much of the development and all of the lease-up risk. Another dozen properties involved substantial redevelopment effort and vacancy risk of up to 100%.)

According to conventional wisdom and the facts of this study, it seems clear that taking on such high-gamma activities represents a substantial move to the right on the risk curve, with roughly double or triple the volatility. The results are summarized in Exhibit 6.

The data confirm the conventional view that taking on substantial development or leasing risk represents the assumption of higher-volatility outcomes. What is curious is that the portfolio total return does not feel riskier to the investor. This is not because there was some fortuitous offsetting of good years with bad. In fact, the converse was true; the three worst property-years are bunched in the slow-to-recover economy of 2003, a very difficult period to sign new leases. (During this year, gamma activities served to reduce the total portfolio return.)

Instead, there appear to be two other diversification mechanisms at work: the dampening effect of the other core properties in the portfolio, combined with economic cluster differentiation.

In the case of the core properties, one cannot necessarily conclude that the 62 basis points of superior performance are indeed superior, due to the small sample size and non-normal distribution problems noted in Young and Annis [2001]. Or, if they do represent superior performance, we cannot tell how much is due to the selection effect of alpha (picking better properties) and how much to less notable gamma activity that creates value in excess of local market forces. The kind of analysis needed to separate the alpha from the gamma remains for future research.

CONCLUSIONS

From analysis of a real portfolio including a wide range of core to opportunistic properties, it appears that one can, at least crudely, discern the relative contribution of beta, alpha, and gamma strategies. Of the three, alpha appears to be the smallest, which is consistent with many studies in the public securities arena. Beta can be a substantial contributor, particularly when significant leverage is involved. Yet, of them all, gamma may be the greatest (and as yet largely unstudied) contributor to superior returns in private real estate investing.

By virtue of taking control of the asset, and implementing some combination of physical value-added, financial value-added, or operational value-added strategies, investors can achieve returns not normally found in public securities investing.[3]

The gamma factor can serve to explain:

- The frequency and persistence with which many portfolios outperform the NPI.

- That at least a portion of the higher returns delivered by value-added and opportunistic closed-end funds are due to the ongoing efforts of management, not just higher leverage or cherry-picking of opportunities.

Indeed, by understanding that there are value-creating activities occurring at the property level, real estate skeptics can come to understand that the beta and alpha parts of real estate bear some similarity to those found in publicly traded securities. (Note: In publicly traded securities, the gamma activity is carried out by management. Over time, as gamma activities serve to increase a REIT's cash flow, the investor benefits. Yet expected gamma is priced into a security, so the only way for an investor to fully capture that gamma could be to invest before gamma activity becomes known. The purest way for the investor to confidently and fully capture gamma is at the private market level.)

The presence of gamma also means that return attribution work can no longer assume simply that a "manager shows superior property *selection* skills when holding individual property investments that outperform the market" (Liang et al. [1999, p. 23; italics in the original]). There can be some causal activity that adds to a property's otherwise market-related returns. Much of this activity is known only anecdotally, in stories such as about finding a way to add two more shop spaces in the parking area of a strip mall, or about renovating rent-controlled apartments at turnover decontrol. In fact, we don't know how much gamma is already included in NCREIF reported returns.

Parallels with Corporate Securities Investing

In the private market phases of corporate investing, the investor also can take control. In venture capital, the venture capitalist sits on the board of a portfolio company—hiring and firing manages, restructuring the capital base, selling off component assets, seeking mergers—using tools not available to the arm's-length public securities investor. And, in the world of venture capital, high returns are not uncommon, and are comparable to those produced by real estate opportunity funds.

In leveraged buyouts or other forms of taking a company private, there often is a substantial control premium required to be paid in order to acquire enough securities to obtain full control of the underlying company. The acquiring investor then goes on to restructure, to change management, and so on, to add value beyond the cost of the control premium. The value of the gamma that can be produced by controlling a corporate asset and working to change its value appears to be substantial indeed. Jacquet [1998] specifically advocates acquiring "earnings improvement" and "buy-and-build" deals as a way to avoid overreliance on financial engineering to generate returns.

Implications for Future Research and Industry Practice

For those in industry or academia who see the potential of analyzing property returns for their gamma component, there is a rich potential for future work.

- What is the risk-reward ratio for typical development and redevelopment phases of a property life cycle—how much gamma is there in these high returns, in addition to the underlying market trend forces, and at what risk, or volatility of outcomes?
- Is there a base-level gamma in the NCREIF return data that really is just part of the beta—a required minimum activity to maintain a property's competitiveness in the local marketplace and thereby earn the local market rate of return?
- How much more obvious gamma might there be in the NCREIF index data? Can it be inferred from the right-skewness of return distributions?
- What is the potential impact of gamma on the role of real estate in the asset allocation process for mixed-asset portfolios?
- What does the understanding of gamma imply for future versions of style boxes in real estate investment management? (How much gamma can be tolerated and still allow a fund to be classified as core-plus?)
- How much gamma is needed to offset the risk of buying core at today's low cap rates? Should investors *build* core rather than *buy* core?
- What happens when gamma goes negative? Even assuming that collectively all gamma activities are generally accretive to core returns, inevitably gamma activities will sometimes prove to be dilutive. My example took place primarily in an upmarket cycle. How does gamma fare in a sharp down-cycle?
- How can the concept of gamma help improve the credibility of real estate among institutional investors? Can it really explain some of the unbelievability of real estate risk and return?

There could indeed be much to discover about the proposed new equation:

Private Market Returns = Beta + Alpha + Gamma

ENDNOTES

[1]To qualify for inclusion in the NCREIF index, properties must be institutional grade, held in a fiduciary environment, and be generally fully leased. This means the properties are generally in the operating asset stage as defined by Conner and Liang [2003], not in the development and lease-up or the redevelopment and repositioning stages where there would likely be some period of substantial vacancy. In fact, NCREIF-qualified properties that enter a period of substantial redevelopment are often dropped from the index until such time as they are once again substantially leased.

[2]Another contributor to the low volatility number is that the study portfolio held development projects at accumulated cost until the first appraisal, which could be as long as two years. When I remove these zero-return years from the model, it appears that the standard deviation would rise by less than 10 bp.

[3]One interesting potential effort at inserting gamma into public securities is the California Public Employees Retirement System fund's internally managed value fund devoted to corporate governance issues. To the extent they can add value beyond similar benchmarked value funds, this might be labeled gamma.

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