Do Value-added Real Estate Investments Add Value?*

Liang Peng† and Thomas G. Thibodeau‡

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Abstract

Not really. This paper compares the unlevered returns on value added and core investments of private commercial real estate equity in the National Council of Real Estate Investment Fiduciaries (NCREIF) database. We use capital expenditures on building improvements to identify value added investments, and use a difference in differences approach to control for mismatch in holding periods and locations of investments. The results provide no evidence for difference in average returns on value added and core investments, despite higher perceived risk for the former. We also find that value added investments have lower unlevered returns when "value creation" starts in booming real estate markets and when "value creation" costs more, which suggests possible systematic mispricing of the real options embedded in value added investments.

Key words: private commercial real estate equity, investment strategies, value added, core, real options

JEL codes: G11, G12

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† Associate Professor, Finance Division, Leeds School of Business, University of Colorado-Boulder, email: liang.peng@colorado.edu.
‡ Professor, Finance Division, Leeds School of Business, University of Colorado-Boulder, email: tome.thibodeau@colorado.edu.

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I. Introduction

Private commercial real estate equity constitutes a large portion of the total wealth in the United States economy and provides valuable diversification benefits for investors (see, e.g. Brueggeman, Chen and Thihodeau (1984), Hartzell, Hekman and Miles (1986), Geltner (1989), Goetzmann and Ibbotson (1990), Peng (2012), among others). Investors generally follow three main strategies when investing in private commercial real estate equity, which are core, value added, and opportunistic (see, e.g. Peyton (2008)). Core investments are typically properties with high occupancy and stable cash flows over long periods of time and have low investment risk. Value-added investments exhibit moderate risk and often involve ‘‘value creation’’ through improvements to physical conditions, operations, or management of properties. Opportunistic investments have the highest risk and may involve a significant amount of development or redevelopment of properties.

The three investment strategies are conventionally perceived to have distinctive risk and return profiles. However, this is not substantiated by the literature. While several empirical studies analyze the overall performance of real estate mutual funds (see, e.g., Kallberg, Liu and Trzcinka (2000), Gallo, Lockwood and Rutherford (2000), Lin and Yung (2004)), few studies focus on the distinctions in risk and returns across properties targeted by different strategies.

Do value added real estate investments indeed add values by providing sufficiently high returns to compensate for presumably higher risk than core investments? Answers to this question have direct implications for investors. First, the performance of asset managers, including real estate asset managers, should be measured against appropriate benchmarks. Therefore, a reliable measurement of the long-term performance of value added investments is critical for the evaluation of the performance of real estate investors that pursue the value added strategy. Second, accurate measurements of the risk and return profiles of core, value added, and opportunistic investments are crucial for the construction of diversified real estate portfolios. Third, the measurement of the risk and

return profile of value added investments is the foundation of research that aims to understand factors that drive real estate investment performance.

Answers to this question also help shed light on an important research area in financial economics – the pricing of real options. Properties with value added opportunities likely have significant real option values, and the "value-creation" through improvements is essentially the exercise of real options. Therefore, returns to value-added investments provide direct observations into how assets with substantial real options are priced before and after real options are exercised. Analyses on determinants of returns on value added investments may also help shed light on the relationships between the pricing of real options and market conditions.

This paper finds no evidence that value added investments create more value than core investments, in the sense that their unlevered returns do not exceed the unlevered returns on core investments of the same property type in the same location and time. We obtain this result from comparing property level returns on value added investments, which we define as properties that have significant capital expenditures on building improvements during their holding periods, and returns on core investments, which are properties that have no building improvements, in the National Council of Real Estate Fiduciaries (NCREIF) database in the sample period of 1977 to 2012. Further, we find that value added investments have significantly lower returns if building improvements start in periods with higher market appreciation and if the amount of capital expenditures is larger. This seems to suggest that the pricing of real options is affected by market conditions and the magnitude of real option values.

When comparing the returns on value added and core investments, it is important to control possible mismatch between the two types of investments to mitigate possible biases in the results. First, it is important to control the mismatch in property locations. To see the bias due to mismatch in locations, consider the scenario in which all properties in the same regional market, regardless being value added or core, produce exactly the same returns, but properties in different markets generate different returns. If value

added investments in the sample happen to over represent booming markets, and core investments over represent busting markets, comparing returns on the two different types of investments would falsely reject the true hypothesis that they have identical returns.

Second, it is crucial to control for mismatch in holding periods of the properties. To understand the bias due to mismatch in holding periods, assume that value-added and core investments generate exactly the same returns in the same period. If the sample consists of value added investments with holding periods being more often in booming periods than not, and core investments with their holding periods being more often in busting periods than not, a comparison of returns on these two types of investments would certainly provide biased results and falsely reject the true hypothesis that the two types of investments yield the same returns.

It is challenging to directly control property locations and holding periods, as there may not be any core investments in the same city that have the same holding periods for a given value added investment. Therefore, we use the difference in differences approach to mitigate biases due to mismatch in holding periods and locations. Specifically, we first calculate the extra annual return for each value added and core investment by benchmarking their returns to an index. We use two types of indices to calculate extra returns. The first type is the NCREIF property type capital appreciation indices (NPI). Such indices capture the time varying national average value appreciation for apartment, industrial, office, and retail properties. Benchmarking actual holding period returns to such indices would mitigate the bias due to mismatch in holding periods, as the extra annual returns are net of time varying market average performance. To further control for mismatch in locations, we use Core Business Statistic Area (CBSA) property type indices – the second type of indices – to calculate extra annual returns. The CBSA indices capture differences in value appreciation not only across time but also across markets. After calculating extra annual returns using the two types of indices respectively, we compare the extra annual returns on the two groups of investments – the value added group, which we also call the CAPEX group – and the core investment group, which we also call the no-CAPEX group. We use t-tests to investigate the

equality of the means of extra returns, and find no evidence for higher returns on value added investments than core investments.

We use regressions to study possible heterogeneity in returns on value added investments. Specifically, we analyze if extra annual returns on value added investments are related to the timing of the "value creation" and the magnitude of real option values. We find that extra annual returns are negatively related to the NPI capital appreciation in the year prior to, as well as the first quarter in, the first capital expenditure on building improvements. Moreover, the returns are negatively related to the amount of total capital expenditures on building improvements as a percentage of property acquisition cost, which proxies for the magnitude of real option values. The above results seem to suggest that either investor overpaid for value added properties, or they did not exercise real options optimally, in booming markets and for properties with higher real option values.

This paper makes two novel contributions to the literature. First, it provides no evidence that value added investments add more value than core investments, at least in the universe of NCREIF properties. Second, it suggests that investors' pricing of real options is related to market conditions and the magnitude of real option values. This paper is related to recent work by Shilling and Wurtzebach (2012), which provides valuable insights such that the higher *levered* returns on value added investments are primarily driven with market conditions and cheap debt. However, this paper differs from Shilling and Wurtzebach (2012) in both research questions and methods. While Shilling and Wurtzebach (2012) analyze the sources of the *levered* returns of value added and opportunistic investments, we focus on *unlevered* returns and directly compare returns on value added and core investments. Our results also appear to compliment theirs, as our results suggest that, since unlevered returns are similar between core and value added investments, higher levered returns of value added investments can only be achieved by using cheaper debt.

The rest of this paper is organized as follows. Section II describes the data. Section III presents the analysis and presents results. Section IV concludes.

II. Data

We analyze property level returns on value added and core investments in the National Council of Real Estate Investment Fiduciaries (NCREIF) database from the third quarter of 1977 to the second quarter of 2012. NCREIF is a not-for-profit real estate industry association, which collects, processes, and disseminates information on the operation and performance of commercial real estate. Its database comprises about 29,000 institutional-grade properties owned or managed by NCREIF members in a fiduciary setting. This paper studies 26,445 properties in the database that have no obvious data errors and belong to four main property types: apartment, industrial, office, and retail properties.

The NCREIF database contains quarterly valuation and operational information at the property level. Variables that are most relevant for our study include the purchase price, capital expenditures in each quarter of the holding period, and the gross sale price. Purchase and sale prices are necessary for the calculation of investment returns. Capital expenditures are used to identify value added investments. The database has seven capital expenditure variables: (1) lease commissions; (2) tenant improvements; (3) building capital improvements; (4) building capital expansions; (5) acquisition cost not included in the purchase price; (6) other capital improvements; and (7) the total of the above variables. Building capital improvements consists of "tangible improvements to the property that cannot be attributed to tenant space. Includes, for example, roofs, parking lots, elevators, lobbies, HVAC systems, and security systems." Building capital expansions includes "tangible improvements to the property that result in an expansion of the property's leaseable area." It is plausible that building capital improvements and building capital expansions more likely correspond to "value creation" than other types of capital expenditures; therefore, we study the feasibility of using them to identify value added investments.

Table 1 counts properties with different types of observations of capital expenditure on building capital improvements and capital expenditure on building capital expansions. Panel A is for all properties and Panel B is for properties that had been disposed by

2012:Q2. In terms of capital expenditure on building capital expansions, a property falls into one of three categories: (1) having at least one positive (and no negative) number of capital expenditure during the holding period; (2) having 0 (and no negative) for capital expenditure for the entire holding period; and (3) having at least one negative number of capital expenditure during the holding period. In terms of capital expenditure on building capital improvements, each property also falls into the three categories.

The selection of the final sample is influenced by the following considerations. First, a negative value of capital expenditure may, though not necessarily, indicate data errors. Consequently, we exclude properties with negative values in either building capital improvements or building capital expansions from our final sample. Second, while positive capital expenditures on building expansions likely capture "value creation," further investigation into their values suggests a large range of values which is from 1 dollar to many times of the purchase price and a large portion of the values that seem "too small" (<1%) for property purchase prices. This could result from data errors. We prefer to have a smaller but cleaner final sample. Therefore, we decide to use capital expenditures on building improvements instead of capital expenditures on building expansions to identify value added investments. The final sample comprises properties that (1) had been disposed by 2012:Q2; (2) have 0 (and no negative) capital expenditure on building expansions; and (3) have no negative capital expenditure on building improvements. The final sample consists of 3,129 properties with positive capital expenditures on building improvements during their holding periods and 3,651 properties with no capital expenditure on building improvements for their entire holding periods. Both groups have no capital expenditure on building expansions.

We consider the 3,129 properties, which we call the CAPEX group, value added investments and the 3,651 properties, which we call the no-CAPEX group, core investments. This identification strategy has a caveat. If a property was acquired as a value added investment but the investor never did any "value creation" activities before disposing it, it would be categorized as a core investment in our study. While this is possible, we believe the CAPEX group more likely captures value added investments

than core investments and the no-CAPEX group more likely captures core investments than value added investments. If actual value added and core investments have different extra annual return, our difference in differences approach would still be able to use the difference in returns between the two groups to identify differences in returns on actual value added and core investments.

We use two alternative benchmarks to calculate property level extra annual returns. The first benchmark consists of the four (apartment, industrial, office, and retail) national NCREIF capital appreciation indices (NPI), which are widely reported benchmarks for institutional grade real estate investments. The second benchmark we use for the calculation of extra returns is CBSA level capital appreciation indices by property types, which we construct using CBSA level NOI indices and the cap rate indices from Peng (2013). The first benchmark covers longer sample periods and thus allows us to calculate extra annual returns for more investments so that the sample size is larger, but it does not control for mismatch in property locations. The second benchmark controls for both mismatch in holding periods and locations, but covers shorter sample periods so the final sample size is smaller. We use both to improve the robustness of our results.

While NCREIF does provide CBSA level capital appreciation indices, their indices are constructed from value changes of typically very small numbers of properties in each quarter and cover short time periods. Therefore, they do not seem reliable and the short periods would lead a very small sample of extra annual returns. The Peng (2013) cap rate indices are not constructed from value changes in consecutive quarters of the same properties. Instead, Peng (2013) regresses a large panel of property transaction cap rates against a variety of factors, including CBSA fixed effects and macroeconomic variables, to identify relationships between cap rates and these factors, which are used to construct cap rate indices: the cap rate index level for a CBSA in a period equals the "fitted value" from such a regression. Note that even if there is no observation of value changes in a specific quarter, in which case NCREIF CBSA capital appreciation index cannot be calculated, the Peng (2013) approach is still able to predict a cap rate using the estimated impact of relevant factors in that quarter. The Peng (2013) CBSA property type cap rates

we use are based on a regression of transaction cap rates against CBSA fixed effects and a group of macroeconomic variables, as he finds that short term local market conditions and property attributes have little explanatory power for cap rates.

We construct the NOI index for each property type in each CBSA using the following procedure. We first calculate quarterly NOI growth rates of all properties of same type in the CBSA. For each quarter with at least 6 observations of NOI growth rates, we exclude the growth rates that are 2 standard deviations away from the mean, and then obtain the median NOI growth rate of the remaining observations. Using consecutively available median NOI growth rates for quarters ending in 2012:Q2, we construct a NOI index.

For each CBSA and each property type, we generate a capital appreciation index (the price level) by dividing the NOI index with the Peng (2013) cap rate index. Our CBSA capital appreciation indices cover more CBSAs and more periods than NCREIF CBSA capital appreciation indices. Note that the levels of CBSA capital appreciation indices are irrelevant for our research as we use changes in the index level to calculate extra annual returns on value added and core investments.

III. Empirical Results

III.1. Benchmark to NPI

We first use the NPI national property type indices to calculate extra annual returns on properties in the CAPEX group (value added investments) and properties in the no-CAPEX group (core investments). The calculation for each property consists of two steps. First, we calculate a hypothetic sale price of the property assuming all capital invested into the property, including the acquisition cost and building capital improvements if applicable, appreciated with the corresponding NPI property type index. We call this hypothetic sale price the "predicted sale price."

$$Predicted.sale.price = Cost \times \frac{NPI_{sale.period}}{NPI_{buy.period}} + \sum_{t=buy.period}^{sale.period} Capex_t \times \frac{NPI_{sale.period}}{NPI_t} \quad (1)$$

In equation (1), *buy.period* and *sale.period* denote the acquisition and disposition quarters, *Cost* is the purchase price, and $Capex_t$ is the amount of capital expenditure on building improvements in quarter t. Apparently $Capex_t$ is 0 for properties in the no-CAPEX group.

Second, we calculate the extra annual return as the difference between the log annual return based on actual sale price and the log annual return based on predicted sale price, or equivalently, the log of the annualized ratio of actual sale price to predicted sale price:

$$Extra.return = \log\left(\left(\frac{Actual.sale.price}{Predicted.sale.price}\right)^{\frac{4}{sell.period-buy.period}}\right). \quad (2)$$

It is clear that if the actual sale price equals the predicted sale price, the extra annual returns in (2) equals 0, which indicates that all capital invested into the property appreciated at the same rate the index. If the capital appreciated at a higher (lower) rate than the index appreciation rate, the extra annual return in (2) would be positive (negative).

After we calculate extra annual returns for both CAPEX and no-CAPEX groups, we exclude outliers in each group, which are returns that are 2.5 standard deviations away from the means, lower than log(0.8) (returns lower than -20%) or greater than log (1.2) (returns higher than 20%), or in the top or bottom 2.5% of their distributions. Table 2 summarizes the final sample in both group, including 1,193 value added investments and 3,067 core investments. It is worth noting that the average extra annual returns on both value added and core investments are slightly higher than 0. There are a few possible reasons. First, the NPI capital appreciation indices are constructed from virtually the universe of properties in the NCREIF database, while our CAPEX and no-CAPEX groups comprise a subset of the NCREIF database that were sold before 2012:Q2. Perhaps sold properties on average have higher capital appreciation rates. Further, the NPI capital appreciation indices are constructed in such a way that the total capital expenditure in each quarter is considered as additional acquisition cost, which artificially

reduces the appreciation rates. However, note that our difference in differences approach is not affected by issues that equally affect both value added and core investments.

Table 2 indicates that value added investments have slightly higher purchase prices and slightly higher average extra annual returns than core investments, but they have similar duration of holding periods. To further compare the two groups, Figure 1 plots the histogram of extra annual returns on value added investments, and Figure 2 plots the number of value added investments in each quarter of the sample period. Figures 3 and 4 are the same with Figures 1 and 2, but for core investments. Figures 1 and 3 are very similar, which suggests that value added and core investments have similar extra annual returns. Figures 2 and 4, however, indicate that the two types of investments correspond to slightly different sample periods, which highlights the importance of controlling for mismatch in holding periods.

Table 3 reports a one-side t-test on the difference in the mean extra annual returns on value added and core investments. The t-statistic is 1.492, which is marginally significant at the 10% level. Therefore, we are unable to reject the null hypothesis that value added investments have lower extra annual returns than core investments. However, note that we are using the NPI national property indices as the benchmark, which control for mismatch in holding periods but not mismatch in property locations. Therefore, further analyses that control for both types of mismatch are needed.

III.2 Benchmark to CBSA Indices

To control for mismatch in not only holding periods but also locations, we use CBSA capital appreciation indices to calculate extra annual returns on both value added and core investments. The calculation follows the same two-step procedure outlined by equations (1) and (2), but uses the CBSA capital appreciation indices instead of NPI national capital appreciation indices. In Figure 5, we plot the extra returns calculated using the CBSA indices against the extra returns calculated using NPI indices for sample properties for which both types of extra returns can be calculated, and find that the two types of extra returns are highly correlated. This seems reasonable, as the commercial real estate

market is substantially integrated (see, e.g. Peng (2013)) and there seems some but limited variation in capital appreciation rates across CBSAs.

We exclude outliers of the extra annual returns using the same rules we discussed earlier, and then summarize the final sample of properties in the CAPEX and no-CAPEX groups in Table 4. Note that there are 770 value added investments and 939 core investments in Table 4, which constitute a smaller sample than the investments in Table 2. However, extra returns in Table 4 are calculated with both mismatch in holding periods and mismatch in locations being controlled. Therefore, despite the smaller sample size, extra annual returns in Table 4 may provide more accurate results.

Table 4 shows that value added investments have a lower average extra annual return than core investments. Figures 6 and 7 respectively show the histogram of the extra returns on value added investments and the number of value added investments in each quarter of the sample period. Note that Figure 7 suggests that there is no observation of value added investments in earlier periods. This is due to the construction of the Peng (2013) cap rate indices. One major determinant of property cap rates is credit availability, which Peng (2013) measures with the development of the CMBS market. Since the CMBS market was nonexistent in earlier sample periods, cap rate indices cannot be estimated and extra returns cannot be calculated for those periods.

Figures 8 and 9 are the histogram and the number of observations in each quarter for core investments. Note that Figures 6 and 8 are very similar, suggesting that value added and core investments have similar distributions of extra annual returns. We formally test the difference in the average extra return on value added (Figure 6) and on core investments (Figure 8), and report the result in Table 5. The one-side t-test is unable to reject the null hypothesis that value added investments have lower extra annual returns than core investments.

III.3 When and Which Value Added Investment Adds Value

Tables 3 and 5 provide no evidence for greater unlevered returns on value added investments than on core investments. However, it is possible that certain types of value added investments may outperform others, or value added investments may perform better under certain market conditions. To investigate this possibility, we use OLS to test the following three hypotheses regarding the heterogeneity in extra annual returns within value added investments.

Hypothesis 1: The extra annual returns are not related to the real estate market performance when "value creation" activities start. We use two variables to measure the real estate market performance when "value creation" activities start. The first is the annual capital appreciation of the NPI property type index in the year prior to the first positive capital expenditure on building improvements. The second is the annualized capital appreciation of the NPI property type index in the quarter of the first positive capital expenditure on building improvements.

Hypothesis 2: The extra annual returns are not related to the real estate market performance during the holding periods of properties. We measure the real estate market performance using the annualized capital appreciation of the NPI property type index during value added investments' holding periods.

Hypothesis 3: The extra annual returns are not related to the magnitude of the "value creation" activities. We measure the magnitude of "value creation" for each value added investment with the total capital expenditures on building improvements over the property's entire holding period as a percentage of its purchase price.

We test the above hypotheses using regressions of extra annual returns against the two measurements of real estate market performance when "value creation" starts, the market performance during holding periods, and the magnitude of the "value creation" respectively. Table 6 reports results for extra annual returns that are calculated using NPI property type indices. The results provide strong evidence for the existence of heterogeneity in extra annual returns. First, extra annual returns are significantly (at the

5% level) and negatively related to the market performance when "value creation" activities start. If "value creation" indicates the exercises of real options, this result suggests that investors create less value by exercising real options when the market does better, possibly by investing too much or too little. Second, there is no evidence for a relationship between extra annual returns and holding period real estate market performance. This suggests that returns on value added investments are not driven by the market performance. Third, extra annual returns are significantly (at the 1% level) and negatively related to the magnitude of "value creation." If the magnitude of "value creation" proxies for the magnitude of real option values, this result appears to suggest that investors pay too much for properties with greater real option values, and thus have lower ex post unlevered returns.

Table 7 reports results from regressions of extra annual returns that are calculated using CBSA capital appreciation indices. Note that the three results shown in Table 6 are also observed in Table 7, despite the smaller sample size in Table 7. The consistent results in Tables 6 and 7 prove the robustness of our findings.

IV. Conclusions

Investors generally follow three main strategies – core, value added, and opportunistic – when investing in private equity of commercial real estate. The three strategies are conventionally perceived to have different risk and return characteristics; however, few empirical studies provide direct evidence. This paper studies if value added investments create value by comparing the unlevered returns on value added and core investments in the NCREIF database. We use property level capital expenditures on building improvements to identify value added investments.

To mitigate possible biases in the results due to mismatch in holding periods and locations of investments, we use a difference in differences approach for the comparison of returns. We first calculate property level unlevered extra annual returns on value added and core investments by benchmarking their holding period returns against NPI national property type indices, which help control for mismatch in holding periods, and

CBSA property type indices, which help control for mismatch in both holding periods and locations. We then use one-side t-tests to identify possible difference in the average extra annual returns on value added and core investments. The tests provide no evidence for differences in the average extra annual returns on value added and core investments. This suggests that value added investments do not seem to create any extra value.

We further analyze possible heterogeneity in extra annual returns within value added investments. Regressions suggest that value added investments have lower extra returns when "value creation" starts when the real estate market has higher capital appreciation, and for properties that have larger amount of capital expenditure on building improvements. These results seem to indicate that real estate investors may systematically misprice real options embed in value added investments and the extent of mispricing may be related to market conditions and the magnitude of real option values.

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Table 1. CAPEX Observations in NCREIF Database

This table reports the number of properties with and without building expansion capital expenditures (EXP) and building improvement capital expenditures (IMP). Properties in "Positive EXP" have at least 1 positive and no negative building expansion CAPEX. Properties in "0 EXP" have 0 building expansion CAPEX during their entire holding periods. Properties in "Negative EXP" have at least 1 negative building expansion CAPEX. Properties in "Positive IMP" have at least 1 positive and no negative building improvement CAPEX. Properties in "0 EXP" have 0 building improvement CAPEX during their entire holding periods. Properties in "Negative EXP" have at least 1 negative building expansion CAPEX.

Panel A: All Properties				
	Positive EXP	0 EXP	Negative EXP	Total
Positive IMP	615	10,174	213	11,002
0 IMP	141	8,421	78	8,640
Negative IMP	533	5,911	369	6,813
Total	1,289	24,506	660	26,455
Panel B: Sold Properties				
	Positive EXP	0 EXP	Negative EXP	Total
Positive IMP	267	3,129	64	3,460
0 IMP	51	3,651	13	3,715
Negative IMP	201	2,116	88	2,405
Total	519	8,896	165	9,580

Table 2. Test 1: Data Summary

This table summarizes properties in the CAPEX group and the no-CAPEX group, when extra annual returns are calculated using NPI national property type indices.

Panel A. CAPEX Group: 1,193 Properties							
	Mean	Std. Dev.	Minimum	25%	Median	75%	Maximum
Purchase price ($1,000)	22,144	26,768	774	7,692	15,150	26,070	330,078
Total CAPEX ($1,000)	1,623	4,980	16	260	567	1,389	119,333
CAPEX as % of Purchase Price	8%	13%	1%	2%	4%	8%	100%
CAPEX Duration (Quarters)	12	9	1	6	11	17	60
Holding Period Duration	28	19	2	14	23	38	111
Acquisition to CAPEX Duration	15	18	0	2	8	24	93
CAPEX to Disposition Duration	2	3	0	0	1	2	31
Extra Annual Return	0.0113	0.0655	-0.2212	-0.0239	0.0111	0.0467	0.1806
Panel B. No-CAPEX Group: 3,067 Properties							
	Mean	Std. Dev.	Minimum	25%	Median	75%	Maximum
Purchase price ($1,000)	14,329	22,870	195	3,683	8,100	16,653	588,955
Holding Period Duration	30	19	1	15	28	41	108
Extra Annual Return	0.0080	0.0640	-0.1923	-0.0284	0.0088	0.0445	0.1820

Table 3. Test 1: T-test

This table reports the result of a t-test on the differences in extra annual returns between the CAPEX No-CAPEX groups, with the extra annual returns being calculated using NPI national property indices. The null hypothesis is that the mean of the extra annual returns on value added investments is than the mean of the extra annual returns on core investments.

Value Added Mean	Core Mean	T-statistic	P-value
0.011	0.008	1.492	0.068

Table 4. Test 2: Data Summary

This table summarizes properties in the CAPEX group and the no-CAPEX group, when extra annual returns are calculated using CBSA property type price indices.

Panel A. CAPEX Group: 770 Properties							
	Mean	Std. Dev.	Minimum	25%	Median	75%	Maximum
Purchase price ($1,000)	24,007	27,121	774	8,503	17,564	28,912	330,078
Total CAPEX ($1,000)	1,842	5,919	9	299	622	1,485	119,333
CAPEX as % of Purchase Price	8%	14%	1%	2%	4%	8%	100%
CAPEX Duration (Quarters)	12	9	1	6	11	17	53
Holding Period Duration	22	13	2	13	19	28	73
Acquisition to CAPEX Duration	9	11	0	1	5	12	64
CAPEX to Disposition Duration	2	3	0	0	1	2	30
Extra Annual Return	0.0111	0.0671	-0.2081	-0.0255	0.0112	0.0532	0.1816
Panel B. No-CAPEX Group: 939 Properties							
	Mean	Std. Dev.	Minimum	25%	Median	75%	Maximum
Purchase price ($1,000)	16,888	25,525	500	5,338	10,691	20,332	588,955
Holding Period Duration	18	12	1	9	15	25	70
Extra Annual Return	0.0148	0.0745	-0.2209	-0.0274	0.0129	0.0615	0.1823

Table 5. Test 2: T-test

This table reports the result of a t-test on the differences in extra annual returns between the CAPEX No-CAPEX groups, with the extra annual returns being calculated using CBSA property type indices. null hypothesis is that the mean of the extra annual returns on value added investments is less thar mean of the extra annual returns on core investments.

Value Added Mean	Core Mean	T-statistic	P-value
0.0111	0.0148	-1.058	0.855

Table 6. Determinants of Extra Annual Returns of Properties with CAPEX (Benchmarked to NPI Property Type Indices)

This table reports results of regressions of extra annual returns of properties in the CAPEX group against the annual NPI property type return in the year prior to the first positive building improvements CAPEX, the annualized NPI property type return in the first quarter with positive CAPEX, the annualized NPI property type return during the entire holding period, and the total improvement CAPEX as a percentage of the property purchase price. Extra annual returns are calculated using NPI national property type indices. Standard deviations are in parentheses. *** indicates significance at the 1% level. ** and * are for 5% and 10% respectively.

	I	II	III	IV
Intercept	***0.012	***0.014	-0.001	***0.020
	(0.002)	(0.002)	(0.031)	(0.002)
NPI 1 year prior IMP	**-0.081			
	(0.034)			
NPI first IMP quarter		**-0.074		
		(0.030)		
NPI during the holding period			0.012	
			(0.030)	
CAPEX as % of purchase price				***-0.106
				(0.014)
Sample size	1,193	1,193	1,193	1,193
Adjusted R-square	0.00	0.01	0.00	0.03

Table 7. Determinants of Extra Annual Returns of Properties with CAPEX (Benchmarked to CBSA Property Type Indices)

This table reports results of regressions of extra annual returns of properties in the CAPEX group against the annual NPI property type return in the year prior to the first positive building improvements CAPEX, the annualized NPI property type return in the first quarter with positive CAPEX, the annualized NPI property type return during the entire holding period, and the total improvement CAPEX as a percentage of the property purchase price. Extra annual returns are calculated using CBSA property type price indices. Standard deviations are in parentheses. *** indicates significance at the 1% level. ** and * are for 5% and 10% respectively.

	I	II	III	IV
Intercept	***0.015	***0.015	0.004	***0.018
	(0.003)	(0.003)	(0.038)	(0.003)
NPI 1 year prior IMP	**-0.098			
	(0.044)			
NPI first IMP quarter		**-0.088		
		(0.037)		
NPI during the holding period			0.007	
			(0.037)	
CAPEX as % of purchase price				***-0.083
				(0.017)
Sample size	770	770	770	770
Adjusted R-square	0.01	0.01	0.00	0.03

Figure 1. Test 1: Extra Annual Returns (Benchmarked to NPI) of CAPEX Group

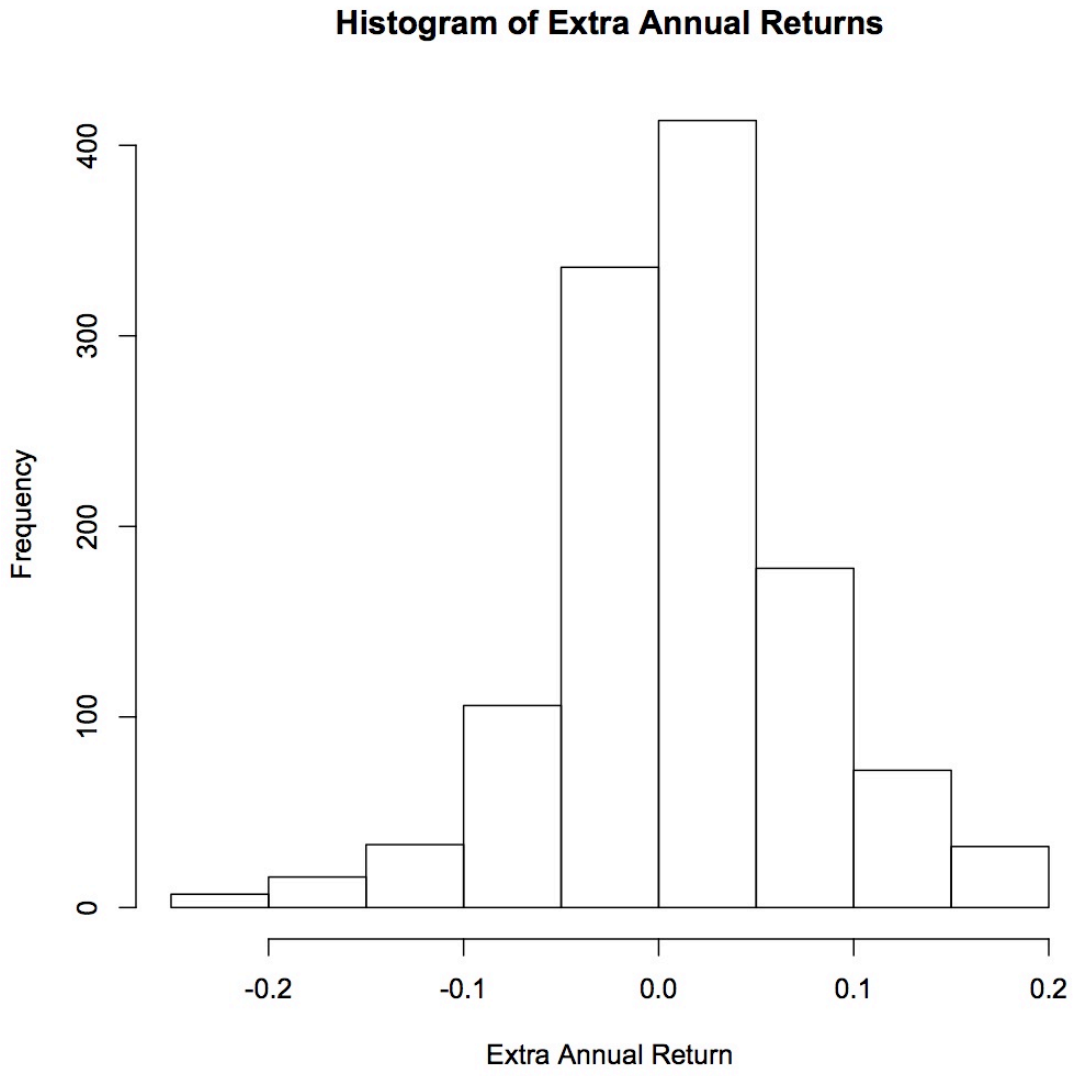

Figure 2. Test 1: Sample Properties in the CAPEX Group

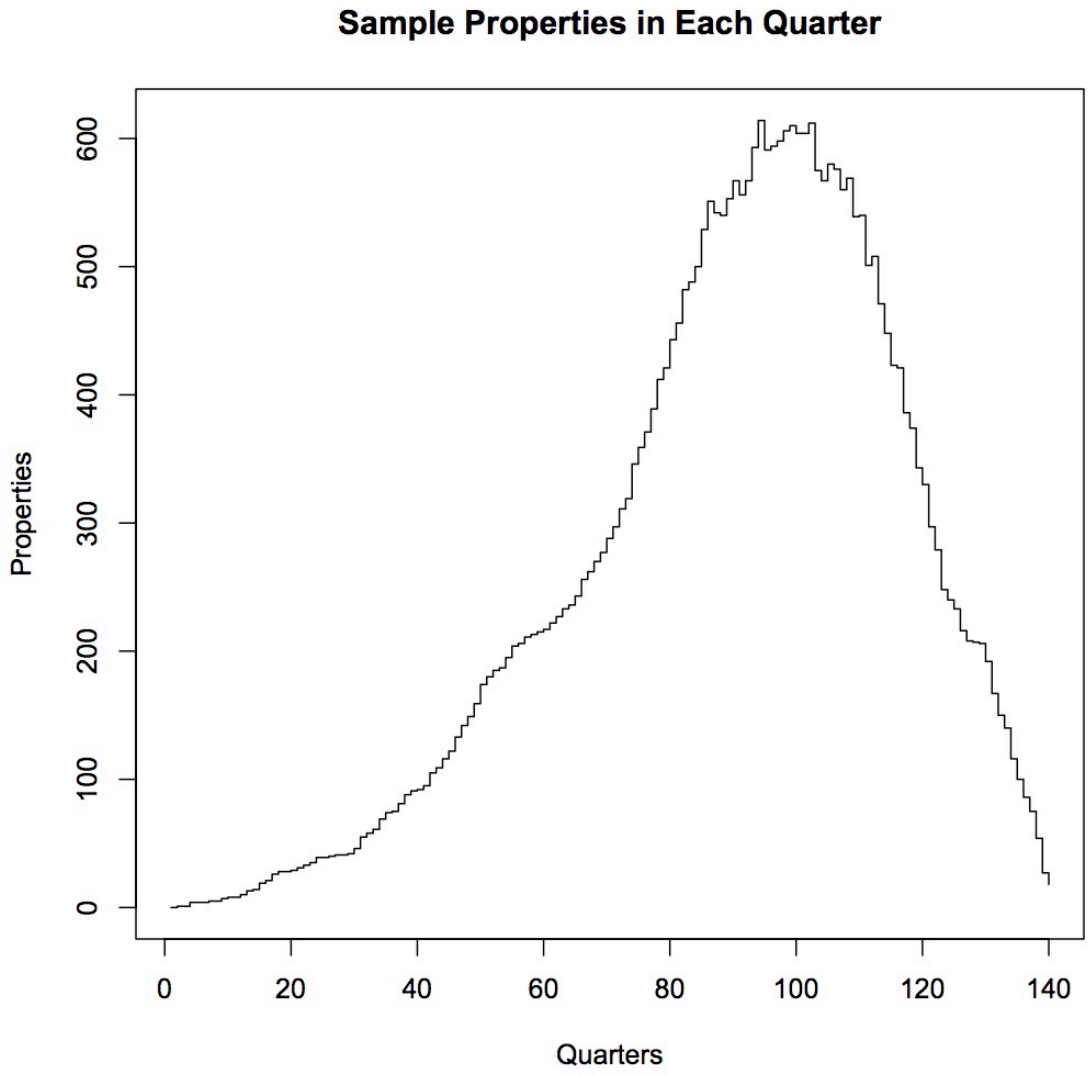

Figure 3. Test 1: Extra Annual Returns (Benchmarked to NPI) of No-CAPEX Group

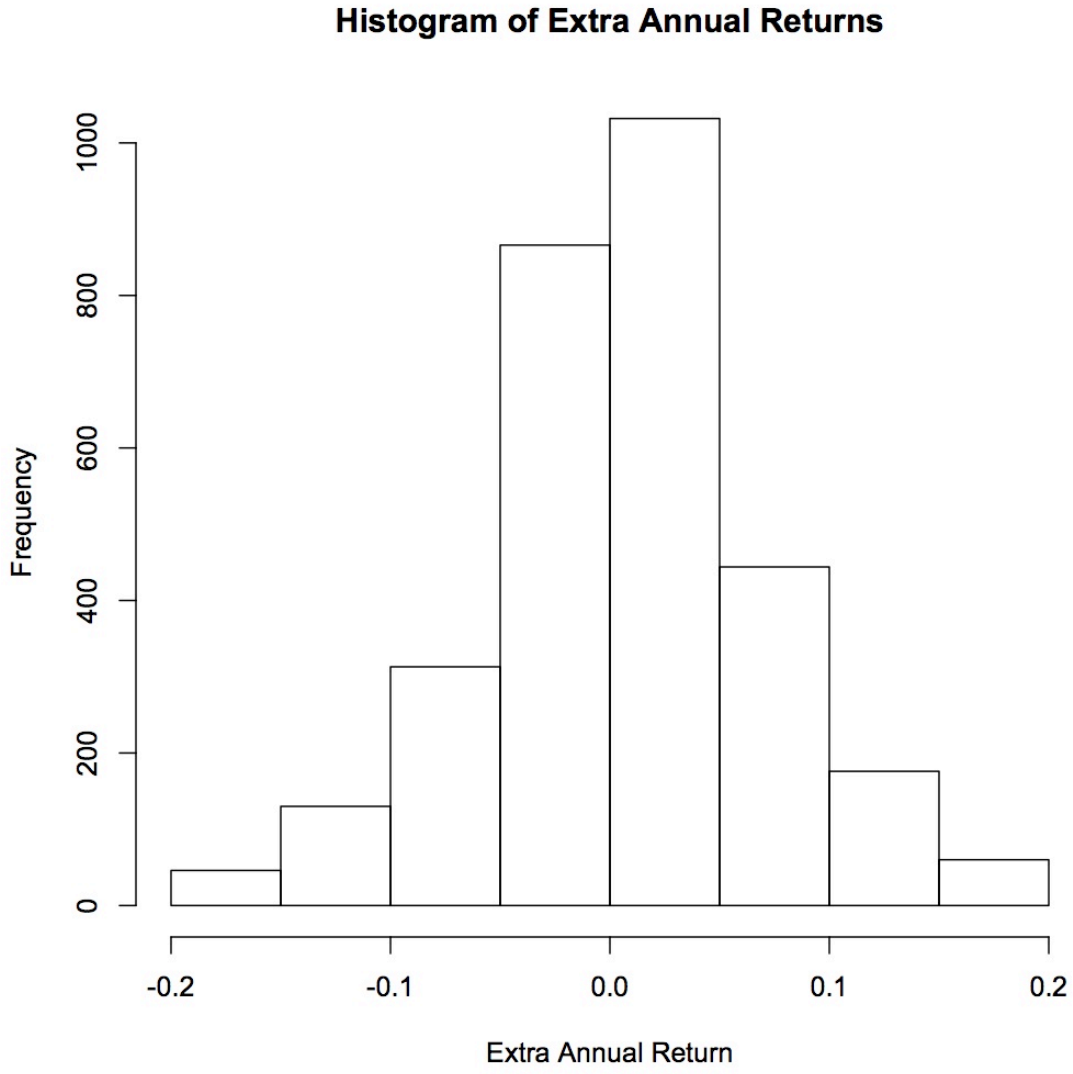

Figure 4. Test 1: Sample Properties in the No-CAPEX Group

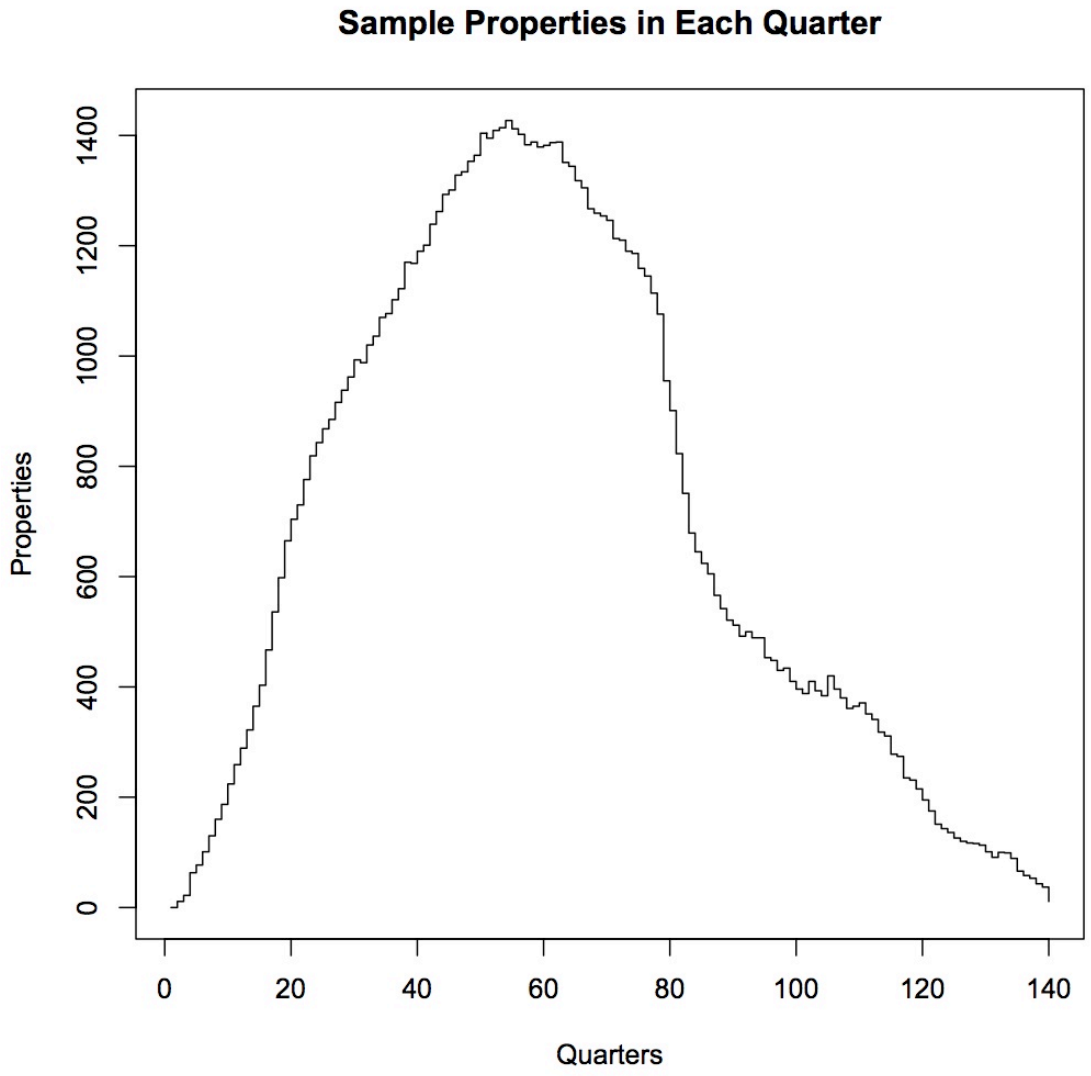

Figure 5. Extra Annual Returns of the CAPEX Group in Tests 1 and 2

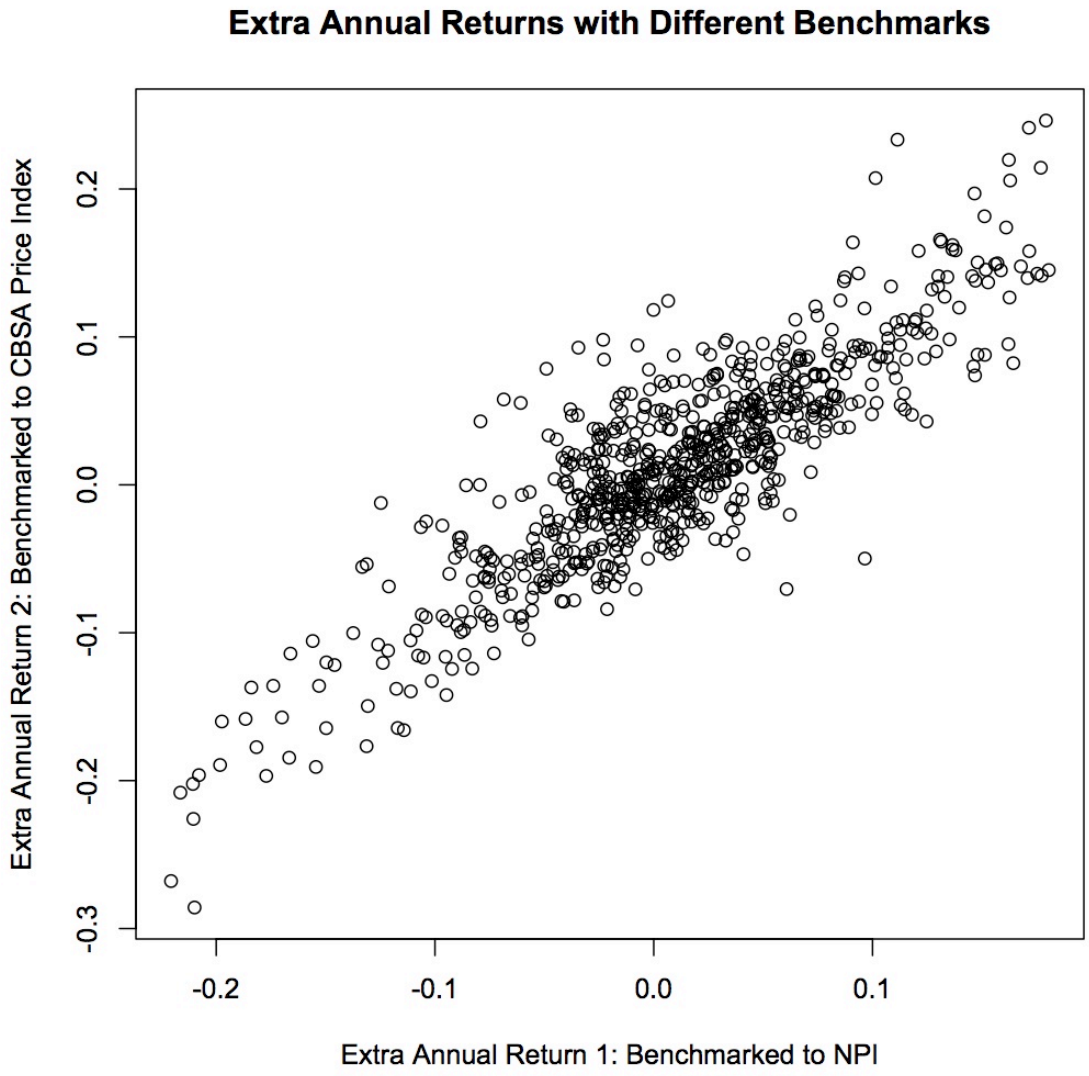

Figure 6. Test 2: Extra Annual Returns (Benchmarked to NPI) of CAPEX Group

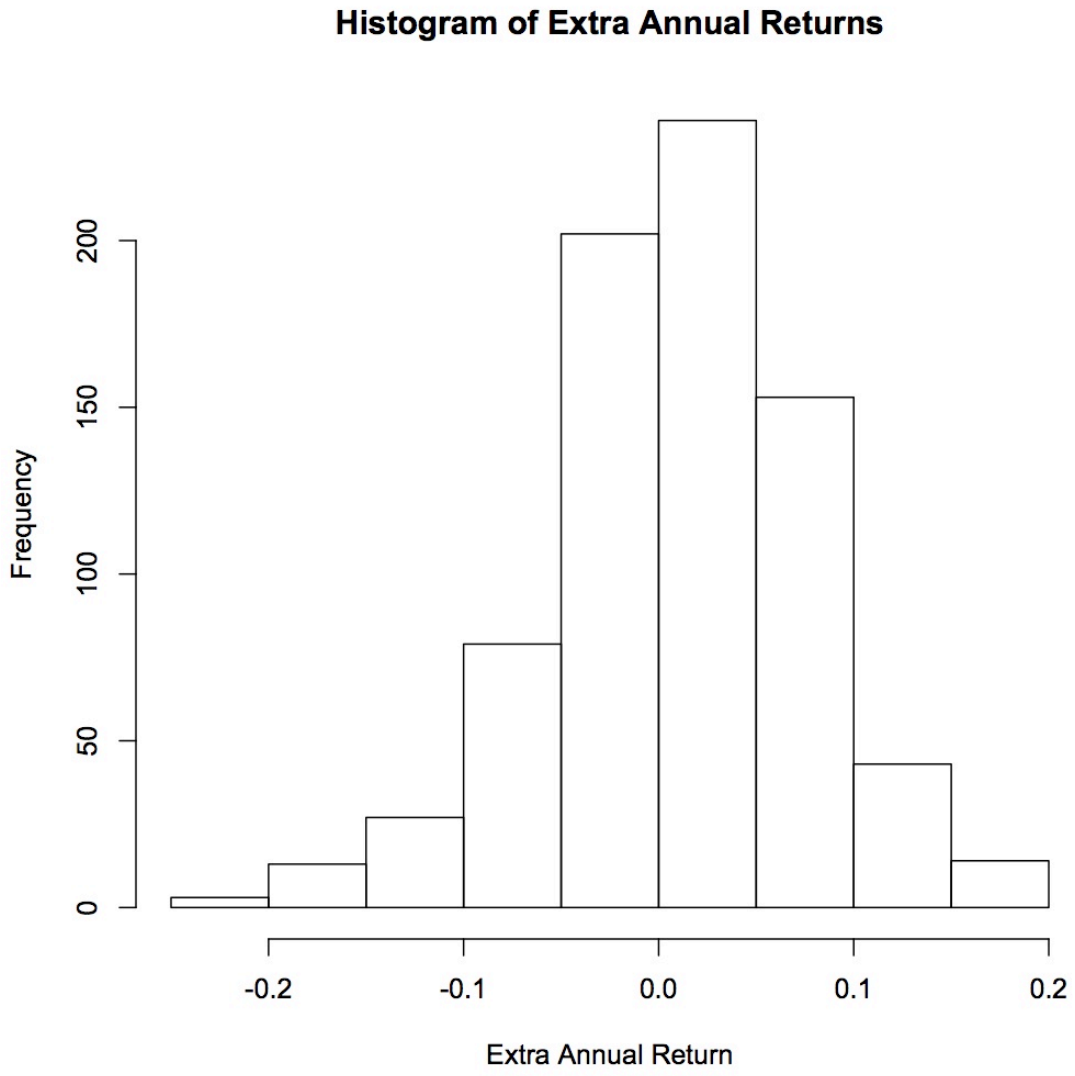

Figure 7. Test 2: Sample Properties in the CAPEX Group

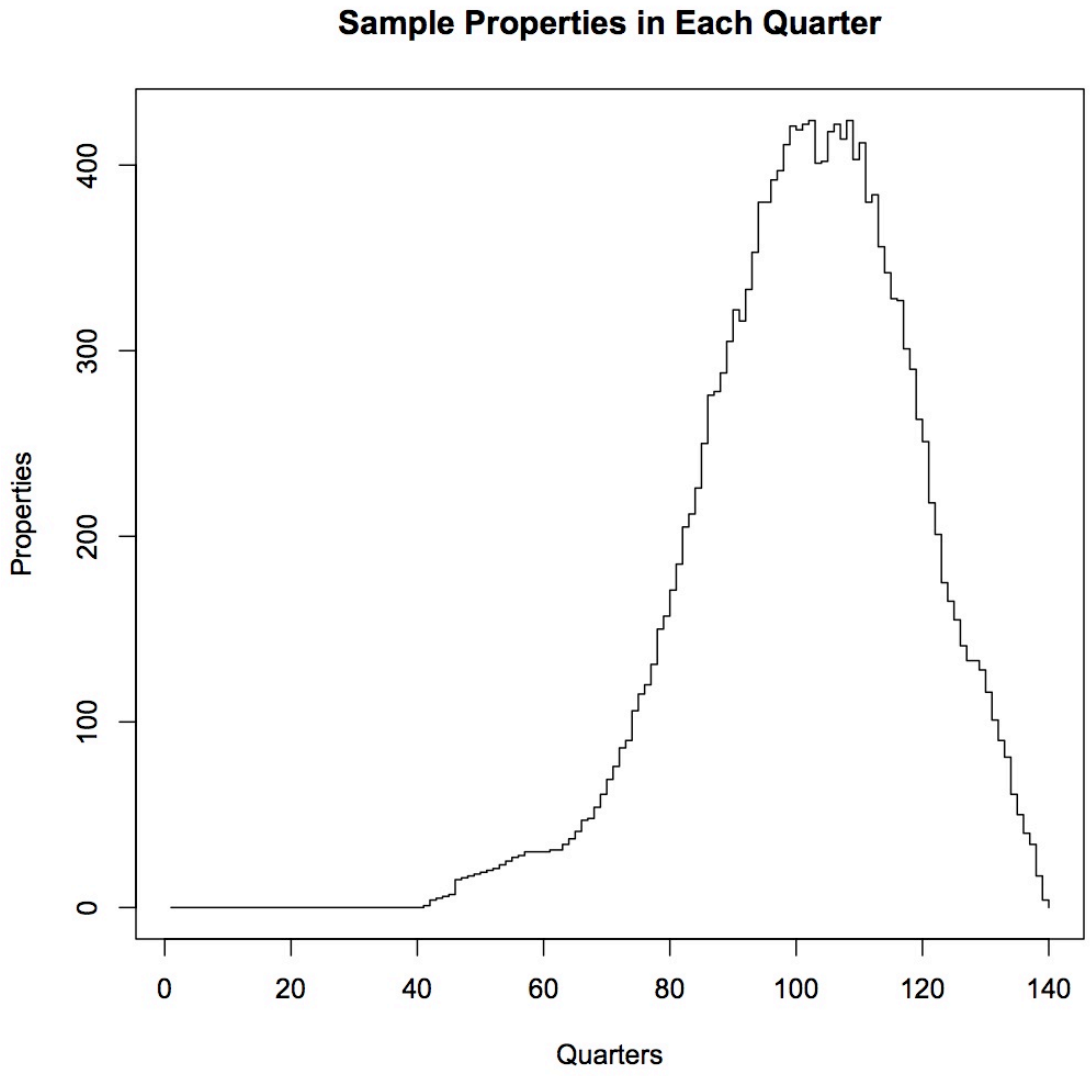

Figure 8. Test 2: Extra Annual Returns (Benchmarked to NPI) of No-CAPEX Group

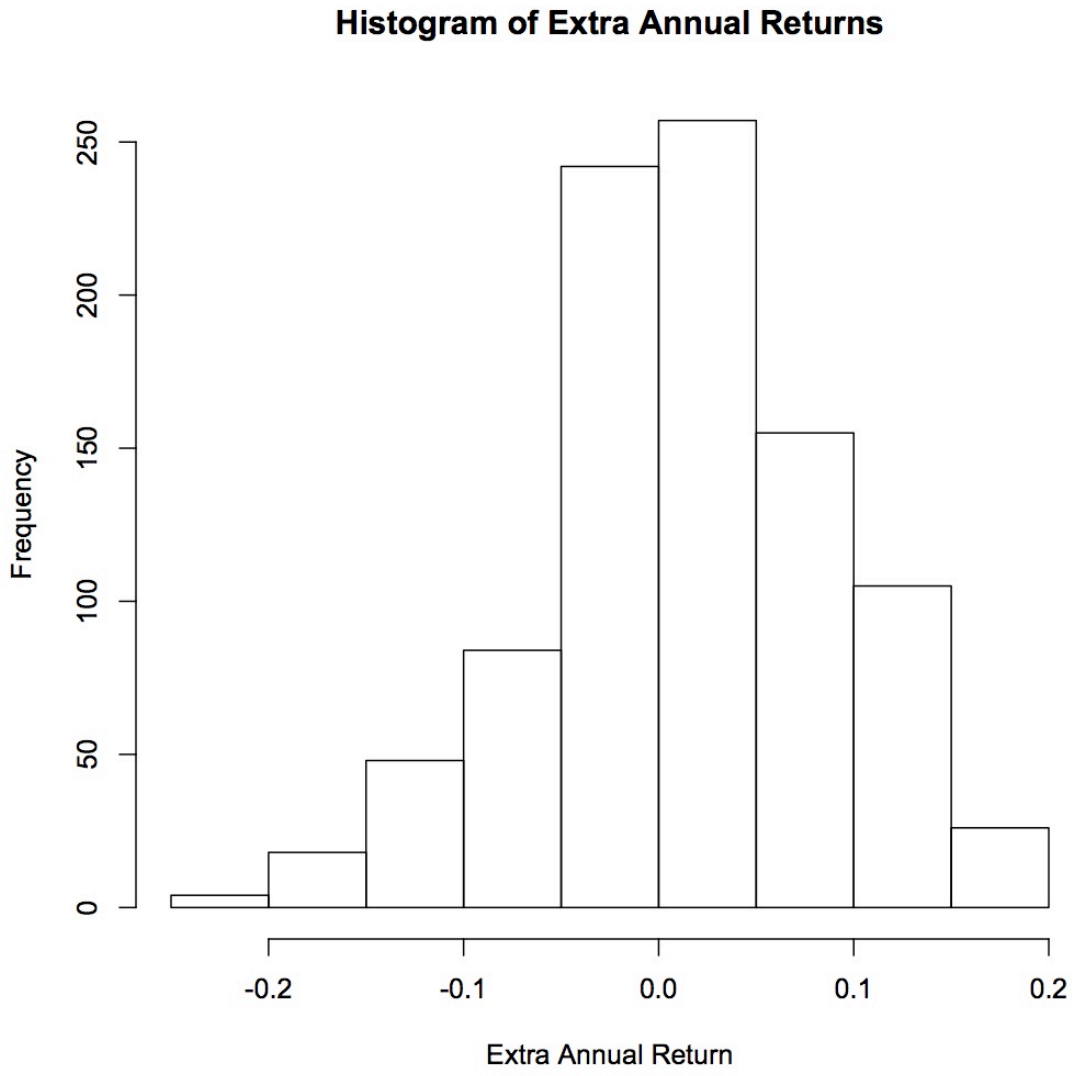

Figure 9. Test 2: Sample Properties in the No-CAPEX Group