Performance and Acquisitions: Evidence from Commercial Real Estate Institutional Investors

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Abstract

I investigate whether real estate institutional investors' short-term portfolio performance affects their acquisitions, and whether properties acquired at time when investors have higher performance have different future returns. Using data from the National Council of Real Estate Investment Fiduciaries, I find strong evidence that managers who have higher portfolio returns in the previous two quarters make significantly more acquisitions, and properties acquired at time when managers have higher recent portfolio returns have significantly lower future returns both before and after adjusting for risk. There is also heterogeneity in these effects across managers, periods, and property types.

Key words: Commercial real estate, performance, acquisitions

JEL classification: G12, R33

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1. Introduction

Does portfolio performance affect institutional investors' acquisitions? Institutional investors are often considered as better-trained, better-equipped, better-informed, more rational, and more sophisticated than retail investors, and their acquisitions ought to be forward-looking instead of backward-looking. In this article, I ask two questions. First, do institutional investors with higher recent portfolio performance differ in their acquisition activities? Second, do properties acquired at time when investors have higher recent performance differ in their ex post investment returns?

Much research has shown that individuals' experience affects their preferences and decisions. The psychology literature argues that personal experiences, especially recent ones, exert a greater influence on personal decisions than statistical information in books or via education (Nisbett and Ross (1980); Weber, B¨ockenholt, Hilton and Wallace (1993); Hertwig, Barron, Weber and Erev (2004)). The economics literature also suggests that individuals' personal experience affects their preferences, belief formation, and risk taking (Guiso, Sapienza and Zingales (2004); Guiso, Sapienza and Zingales (2008); Alesina and Fuchs-Sch¨undeln (2007); Osili and Paulson (2008); Malmendier and Nagel (2011)). The literature of finance provides abundant evidence that retail investors and asset managers' trading may react to their recent portfolio performance (Gervais and Odean (2001); Nicolosi, Peng and Zhu (2009); Daniel and Hirshleifer (2015) among many others).

However, institutional investors are not individuals. They consist of supposedly well trained, well informed, and well-equipped professionals who have extensive investment experience. They play vital roles in the capital market and they are responsible for deploying large amount of capital in the economy. It is an important but not well studied empirical question whether their investments react to their short-term performance, possibly in an irrational way.

In this article, I analyze a proprietary dataset that tracks all acquisitions of members of the National Council of Real Estate Fiduciaries (NCREIF) from 1977 to 2017. NCREIF is a not-for-profit real estate industry association, which collects, processes, and disseminates information on the operation and transactions of commercial real estate. Its members are typically investment companies, pension funds, and life insurance companies.[1] I call each NCREF member a "manager", following its convention.

I first use the manager/quarter panel data to test whether each manager's short-term investment performance, which is measured with her real estate portfolio returns in the previous two quarters, affect the number and dollar amount of properties she acquires. I then analyze whether the short-term performance affects attributes of properties acquired. Furthermore, I use the cross-section of individual properties to test whether a manager's short-term performance at the time when a property is acquired helps predict the property's future return, both before and after adjusting for risk.

It seems particularly interesting to analyze whether real estate institutional investors' short-term performance affects their acquisitions. First, real estate institutional investors' acquisitions should less likely react to short-term performance. This is because real estate is less transparent, complicated in terms of property rights and local regulations, and heterogeneous in risk and returns. Therefore, institutional investors typically conduct thorough due diligence analyses before acquiring properties. Because of this, it seems reasonable to expect them to be forward looking instead of backward looking, and their acquisitions should less likely react to their short-term performance. Second, if short-term performance does affect acquisitions, it may be easier to identify such an effect using real estate transactions. This is because such an effect would more likely affect acquisition prices and thus future investment returns. Real estate is less liquid and impossible to short sell. As Daniel and Hirshleifer (2015) and others argue, pessimists find it harder to trade on their views, and acquisition prices more likely reflect optimists' valuation. As a result, if real estate institutional investors unnecessarily acquire more properties and pay higher prices, data more likely reflect that.

[1] Examples of NCREIF members are Blackrock, Citi group, TIAA, New York Life, Invesco, Heitman/JMB, and Cornerstone real estate advisers.

Using manager/period panel data, I find that managers' acquisitions are strongly related to their short-term performance. Managers with higher real estate portfolio returns in the previous two quarters acquire significantly more properties and spend significantly more money on acquisitions. The effect exists both before and after the 2007-2009 great depression. Across subsamples of managers and time periods, this effect is stronger for (1) managers with the medium cross-time average short-term performance (the middle 1/3 managers), (2) managers who most actively acquire properties (the top 1/3 managers), and (3) time periods when managers had poorest short-term performance (the bottom 1/3 quarters). In terms of attributes of acquired properties, there is no evidence suggesting that managers with higher short-term performance acquire properties with different prices, size, cap rates, or occupancy rates.

All of my estimates above control for lagged acquisitions and current and lagged dispositions, which are related to portfolio rebalancing. They also control each manager's cross-time average acquisitions, and each period's cross-manager average acquisitions. These two control variables are very similar to manager and quarter fixed effects. They respectively control for managers' time-invariant tendency to acquire properties, including acquisitions due to managers' cross-time average short-term performance, and each quarters' acquisitions caused by all managers' average short-term performance in that quarter. In unreported robustness tests, I control for each manager's cross-time average short-term performance and each period's cross-manager short-term performance, and results are similar.

Using property level data, I find that a property's investment return is strongly related to its manager's short-term performance at the time when the property is acquired. Properties acquired at time when managers have higher real estate portfolio returns in the previous two quarters have statistically significantly lower future returns. Using a holding-period factor model, I find no evidence for relationships between properties' risk and managers' short-term performance at the time when properties are acquired. Using the same model, I find that properties acquired at time when managers have higher short-term performance have significantly lower ex post risk-adjusted returns. When a managers' portfolio return in the previous two quarters increases by 100 basis points per annum, the property she acquires has a 1.3 basis points lower risk adjusted return per quarter during its holding period. Across four main property types, the effect is statistically significant for apartment and office properties, but not for industrial and retail properties.

In my property-level analysis for returns before adjusting for risk, I control for fixed effects of managers, quarters, locations, and property types. The holding-period factor model that I use to analyze properties' risk-adjusted returns allows managers, locations, and property types to affect risk-adjusted returns per quarter. In preliminary estimates of the factor model, I also allow properties' factor loadings to be related to managers' short-term performance at the time when properties are acquired. However, tests suggest no evidence for this relationship. Because of this, the holding-period factor model is reduced to quarterly dummy models. I further construct and control for a measure of nonsystematic risk, which is significant in explaining real estate investment returns, and the results are robust.

The two main results of this article: (1) real estate institutional investors with higher short-term performance more actively acquire properties, and (2) properties acquired at time when managers have higher short-term performance have lower future returns before and after adjusting for risk, are novel and seem to suggest that institutional investors may not be perfectly forward-looking when they make investment decisions. This finding contributes to the literature of economics and finance regarding investors' behavior.

The rest of this paper is organized as follows. Next section analyzes the manager/period panel data and tests whether managers' short-term performance affects their acquisitions. The third section uses the cross-section of properties to test whether properties acquired at time when managers have higher short-term performance have lower future returns. The last section concludes.

2. Manager/quarter panel analyses: past performance and acquisitions

2.1. Database and main variables

Analyses in this article use the proprietary dataset of the National Council of Real Estate Investment Fiduciaries (NCREIF). The database contains information on all properties acquired and managed by NCREIF members, which are called managers in this article. The information includes property attributes, such as property type, street address, square footage, etc., as well as time and prices of acquisition and disposition prices, and quarterly financial, operational, and accounting information for each property. This dataset has been used in Pivo and Fisher (2011), Plazzi, Torous and Valkanov (2012), Peng (2016), Gang, Peng and Thibodeau (2017), Sagi (2017), and Peng (2019). This article uses the 2017:Q2 release of the database, which consists of 36,718 properties invested or managed by NCREIF members from the third quarter of 1977 to the second quarter of 2017.

One thing is worth noting regarding the definition of managers. Some NCREIF members merged with each other before Q2 2017. I treat members that had merged into one by Q2 2017 as one single manager thorough the entire sample period. This should not bias my tests, because the null hypotheses are there is no effect for all members, regardless they are merged or combined.

Table 1 reports summary statistics of acquisitions by periods and by managers. Panel A reports the cross-period mean, standard deviation, minimum, median, and maximum of the number of managers who acquired at least one property, the number of properties acquired, the number of net property acquisitions (the number of acquisitions minus the number of dispositions), the dollar amount of acquisitions, and the net dollar amount of acquisitions (dollar amount of acquisitions minus dollar amount of dispositions) in each period. Panel B reports the cross-manager mean, standard deviation, minimum, median, and maximum of the properties, net properties, and dollars and net dollars of acquisitions of each manager. Panel C summarizes the total of managers, properties acquired, net acquisitions, dollar amount of acquisitions and net acquisitions. Note that there are 36,718 properties in the dataset but only 35,860 acquisitions from Q3 1977 to Q2 017, because properties held at the beginning of the sample period were acquired before Q3 1977 and thus are outside of the sample period.

To visualize the data, I plot the time series of the number of managers who made acquisitions in each period in Figure 1. I also plot the time series of the number of properties acquired by all managers in Figure 2. It is clear that there is significant variation across time in both the number of managers who made acquisitions and the number of properties acquired.

2.2. The main model and variables

This section uses the panel data of managers/quarters to test whether managers' past performance affects their acquisitions using the following Tobit model.

$$A_{m,t} = \alpha + \beta P_{m,t} + \rho X_{m,t} + \varepsilon_{m,t} \tag{1}$$

The dependent variable, $A_{m,t}$, measures the acquisitions of manager m in period t. I use two variables to measure manager's acquisitions in each quarter. The first is the number of properties acquired, and the second is the dollar amount of acquisitions. It is apparent that both variables are left censored at 0. $P_{m,t}$ is a variable measuring the manager's past investment performance. $X_{m,t}$ is a variety of manager- and/or time-specific control variables. $\varepsilon_{m,t}$ is the error term.

I use two variables to measure past performance $P_{m,t}$ in different specifications to ensure results' robustness. The first is the annualized average of value-weighted returns of all properties in the past two quarters. To construct this variable, first, I identify all properties held by the manager from the end of quarter $t-3$ to the end of quarter $t-2$, and then calculate the value-weighted average return of them in that quarter. Second, I do the same calculation for properties held from the end of quarter $t-2$ to the end of quarter $t-1$. Finally, I calculate the geometric average of these two value-weighted quarterly average returns, and the annualize it. The second variable is the annualized average of equal-weight returns of all properties in the past two quarters. The calculation is identical except that I calculate equal-weighted returns in the first two steps.

There are a few issues in this procedure that is worth discussing. First, I choose to calculate quarterly returns first and then calculate their geometric average over the two quarters, instead of calculating value-weighted returns of the same properties over the entire two-quarter period. This is because managers may buy or sell properties during the two-quarter period, so the composition of her portfolio may differ in the two quarters. Second, when calculating a value-weighted quarterly return, I exclude properties that were sold in the middle of a quarter. This might cause a bias in the measure of investment returns. However, the bias is likely downwards and biases against finding positive effects of past performance on acquisitions. This is because institutional investors tend to sell winners and hold losers (see, e.g. Geltner and Bokhari (2011)); therefore, the value-weighted average return of held properties is likely lower than actual returns should sold properties be taken into account.

Managers acquire properties for a lot of reasons. First, they might be simply rebalancing their portfolio of properties across regions or property types. Such acquisitions would be accompanied by dispositions in the current and previous quarters. Also, there could be temporal clustering of such acquisitions as it takes time to identify and acquire properties. I control for these acquisitions using lagged acquisitions in the previous two quarters, dispositions in the current as well as previous two quarters. Note that, since such acquisitions could be also driven by past performance, controlling them away seems to bias me against finding positive effects of past performance on net acquisitions.

Market-wide conditions can certainly trigger acquisitions. If, for whatever reasons, investors have lower risk aversion or expect higher cash flow growth and lower risk in the future, they might consider properties being undervalued, so they could more aggressively acquire properties. A conventional way to control for such acquisitions is to use period dummies. However, including period dummies would greatly reduce the degree of freedom, which is particularly challenging for estimation of Tobit models. I choose to use something similar to but slightly weaker than period dummies to control for such acquisitions. In the spirit of Pesaran (2006), I use the average of acquisitions per manager in each quarter to control for market-wide conditions that affect all managers' acquisitions in that quarter. The temporal variation of such variable helps capture temporal variation in market conditions that affect acquisitions. It is also important to note that this control variable seems to bias against finding positive effects of past performance on acquisitions.

This is because if all managers had higher past performance and decide to acquire more properties because of that, the average effect is absorbed by this control variable.

Some managers may always have higher performance and always more aggressively acquire properties. Failing to control for this might lead to spurious relationship between past performance and acquisitions. Ideally, I want to use manager dummies to control away this phenomenon, but this would also greatly reduce the degree of freedom and make it very challenging to estimate Tobit models. Therefore, I use the cross-time average acquisition per quarter for each manager as the control variable.

2.3. Baseline results and counterfactual analyses

Table 2 reports results of four Tobit models. The first two models use the number of acquired properties as the dependent variable, and the value-weighted and equal-weighted past returns to measure past performance respectively. The third and fourth models use the dollar amount of acquisitions as the dependent variable, and also use the value- and equal-weighted past returns to measure past performance. All models include lagged acquisitions in the previous two quarters, dispositions in the current and previous two quarters, the cross-manager average acquisition per manager in the current quarter, and the cross-time average acquisition per quarter for each manager as control variables. All models are estimated with maximum likelihood.

All four models provide strong evidence suggesting that a manager's past performance increases acquisitions. In the first two models, the coefficients of value- and equal-weighted past returns in explaining the number of acquired properties are 16.356 and 17.610 respectively, and they are statistically significant at the 1% level. In terms of magnitude of the coefficients, they mean that when the past performance (in annualized returns) increases by 100 basis points, the number of properties acquired increases by about 0.16 and 0.17 respectively. In the third and fourth models, the coefficients of value- and equal-weighted past returns in explaining the dollar amount of acquisitions are 1.077 and 1.200, both of which are also statistically significant at the 1% level. These numbers suggest that when the past performance (in annualized returns) increases by 100 basis points, a manager spends about $1 million more on acquisitions.

Coefficients of all control variables have expected signs. Lagged acquisitions have positive and statistically significant coefficients, suggesting positive serial correlations of acquisitions. Dispositions in the current and previous two quarters also have positive and statistically significant coefficients, which is consistent with the existence of acquisitions due to portfolio rebalancing. Cross-manager average acquisitions per manager in each quarter has a statistically significant coefficient that is about 2 in all four models. This suggests that there are market-wide conditions that affect all managers' acquisitions. Cross-time average acquisitions per quarter for each manager also has a statistically significant coefficient that is about 1 in all four models. This suggests that there are some managers that do acquire more than others.

I further conduct a counterfactual analysis to confirm the effects found above. Essentially, I replace each $P_{m,t}$ in equation (1) with a random value drawn from the population of all values of $P_{m,t}$ across managers and periods, while keep all other variables unchanged. The purpose is to show that the significant coefficients of $P_{m,t}$ in Table 2 are not due to unknown mechanisms that will generate significant coefficients regardless.

I use the number of acquired properties as the dependent variable, use value-weighted past returns to measure managers' past performance, and repeat the following procedure for 5,000 times. First, I generate a counterfactual dataset by replacing each $P_{m,t}$ with a random vale drawn from its population across managers and periods and keep all other variables unchanged. Second, I estimate the Tobit model in (1) using the counterfactual dataset and record the coefficient of $P_{m,t}$. Figure 3 plots the histogram of the 5,000 coefficients of $P_{m,t}$ from estimating the model using the 5,000 random counterfactual datasets. It is clear that the histogram is approximately centered around 0. A formal t-test cannot reject the null that the mean of the counterfactual coefficients is 0. This suggests that the significant coefficient of $P_{m,t}$ is unlikely due to unknown mechanisms.

2.4. Sub-sample analysis

I then analyze whether the effects of past performance on acquisitions are persistent across time. Particularly, I want to see if they exist before, during, and after the 2007 to 2009 financial crisis (as defined by NBER). To do this, I re-estimate the Tobit models in Table 2 for three sub-periods: before the fourth quarter of 2007, from the fourth quarter of 2007 and the second quarter of 2009, and after the second quarter of 2009. Results are similar when I use different measures of acquisitions and different measures of past performance. Table 3 reports results from using the number of properties acquired as the dependent variable and the value-weighted past return to measure past performance.

It is apparent that past performance significantly affects the number of properties acquired before and after the financial crisis. The coefficients are 14.432 and 15.628 respectively before and after the financial crisis, and statistically at the 1% level. Note that while there is no evidence for such an effect during the financial crisis, this is likely due to the much smaller sample during the financial crisis period.

The effects of past performance on acquisitions may differ across periods with different market conditions and managers with different performance. To allow possible non-linear patterns of such heterogeneity, I conduct a series of sub-sample analyses using the same Tobit model, using the number of properties acquired as the dependent variable and value-weighted past returns to measure past performance. Results are robust when I use dollar amount to measure acquisitions and equal-weighted returns to measure past performance.

Table 4 reports results for four types of sub-sample analyses. First, I rank managers according to their across-time average of past performance and put them into three terciles. Note that the three terciles do not have identical sample size because the panel is not balanced and there are missing values for past performance. I estimate the Tobit model for each tercile and report the coefficient of the value-weighted past returns. Results indicate that the effect of past performance on acquisitions is statistically significant for all terciles. Furthermore, the effect is strongest for the middle tercile. The coefficient of past return is 5.097 for the lowest tercile, 7.621 for the highest tercile, and 20.259 for the middle tercile.

Second, I rank managers according to their average acquisitions per quarter into three terciles and estimate the Tobit model. The coefficients of past returns increase from the lowest tercile to the highest tercile. They are 3.418, 4.023, and 8.776 respectively, all of which are statistically significant at the 1% level. This seems to suggest that managers who more actively acquire properties are those for whom past performance has stronger effect on acquisitions. Note that I am not inferring any causation from this result.

Third, I rank all quarters according to their cross-manager average past returns and put them into three terciles. It is apparent that the lowest (highest) tercile consists of periods when managers on average had worse (best) past performance. The coefficient of past performance is respectively 16.609, 9.272, and 7.287 for the three terciles. It is statistically significant at the 1% level for the worst tercile, at the 5% for the middle tercile, and not significant for the best tercile. These results indicate that the effect of past performance on acquisitions is the strongest in the worst periods, in both statistical and economic sense.

Finally, I rank all quarters according to their cross-manager average acquisitions and put them into three terciles. The lowest (highest) terciles consists of periods when managers on average acquired fewest (most) properties. The coefficient of past performance is 7.832, 10.450, and 9.605 respectively. The first two are statistically significant at the 1% level, and the third is significant at the 10% level. There does not seem to be strong evidence for varying magnitude of the effect of past performance on acquisitions across the terciles.

2.5. Attributes of acquired properties

I now analyze whether managers' past performance affects attributes of the properties they acquire using the following linear model.

$$C_{m,t} = \alpha + \beta P_{m,t} + \rho \bar{C}_t + \gamma \bar{C}_m + \varepsilon_{m,t} \qquad (2)$$

In equation (2), $C_{m,t}$ is a variable describing an attributes of the properties acquired by manager m in quarter t; $P_{m,t}$ is the manager's past investment performance; $\bar{C}_t$ is the cross-manager average of the attribute variable $C_{m,t}$ in quarter t; $\bar{C}_m$ is the cross-time average of the attribute variables $C_{m,t}$ for manager m; $\varepsilon_{m,t}$ is an error term. I use $\bar{C}_t$ and $\bar{C}_m$ instead of quarter dummies and manager dummies to reserve the degree of freedom.

I estimate the model in (2) using four different attributes of acquired properties as the dependent variable. The first is the average of log prices. The second is the average of log gross square feet. The third is the average of transaction cap rates, which are calculated using the net operating income in the four quarters after acquisition divided by the acquisition price. The fifth is the average of each property's occupancy rates over the two-year period following its acquisition.

Table 5 reports results of the four regressions, all of which use value-weighted past returns to measure managers' performance. Table 5 generally provides little evidence for any effects of managers' past performance on attributes of the properties they acquire. The coefficients are -0.064 for average log price, -0.070 for average log gross square feet, -0.003 for the average cap rate, and 0.056 for average occupancy rate. The first three coefficients are not statistically significant, and the last one, for occupancy rate, is weakly significant at the 10% level. Results in Table 5 are robust when I use equal-weighted returns to measure managers' performance.

3. Property level analyses: past performance and future returns

This section uses cross-sectional data of properties to test whether properties acquired at time when their managers' past performance was high had low ex post returns. I first analyze returns without adjusting for risk, and then analyze risk-adjusted returns.

3.1. Returns without adjusting for risk

For raw returns without adjusting for risk, I start with the classic repeat sales regression model (Bailey, Muth and Nourse (1963)) and augment it with an intercept term (see, e.g. Goetzmann and Spiegel (1995) for evidence for the nontemporal component of real estate returns).

$$R_i = \alpha + \sum_{t=buy_i}^{sell_i} R_{i,t} + \varepsilon_{i,t} \tag{2}$$

In equation (2), R_i is the log gross total return of property i over its holding period from the acquisition quarter buy_i to the disposition quarter $sell_i$; $R_{i,t}$ is the log gross total return from the end of period $t-1$ to the end of period t; and $\varepsilon_{i,t}$ is an error term.

I then assume that $R_{i,t}$ can be decomposed into two components. The first is a period-specific constant T_t, which captures the average log gross return across all properties in the sample of period t. This constant is essentially a market index. The second consists of abnormal returns related to the property's attributes, including its manager's past performance at the time of acquisition and fixed effects for its manager $P_{m,t}$, its location (Core-based Statistical Area) L_i, and types (apartment, industrial, office, retail, etc.) E_i.

$$R_i = \alpha + \sum_{t=buy_i}^{sell_i} (T_t + \beta P_{m,t} + \rho M_i + \theta L_i + \gamma E_i) + \varepsilon_{m,t} \tag{3}$$

I define a new variable D_i as the duration of the holding period.

$$D_i = sell_i - buy_i \tag{4}$$

Equation (3) can be simplified to the following.

$$R_i = \alpha + \beta P_{m,t} D_i + \rho M_i D_i + \theta L_i D_i + \gamma E_i D_i + \sum_{t=buy_i}^{sell_i} T_t + \varepsilon_{m,t} \tag{5}$$

The null hypothesis I test is $\beta = 0$, which means the manager's past performance does not lead to an abnormal return per period.

I calculate the log gross return of each property over its holding period as the log of the annualized modified internal rate of return (MIRR) compounded over its holding period. To calculate the MIRRs, I first construct the quarterly cash flow series for each property. The cash flow is the acquisition cost in the acquisition quarter;[2] the NOI minus capital expenditures in each quarter before disposition; and the net sale proceeds plus NOI minus capital expenditures in the disposition quarter. Net proceeds from any partial sales are also added to the cash flow. In addition to constructing the cash flows, I also calculate a

[2] We assume that all acquisitions and dispositions take place at the end of quarters. For a small number of properties, the database shows positive net operating income in the recorded acquisition quarters, possibly because their acquisitions took place in the middle of those quarters. For these properties, we assume the acquisitions took place at the end of the previous quarters.

quarterly time series of average total returns (across all properties in the dataset) for each property type, using appraised values if transaction prices are not observed, which provides both the financing rate and the reinvestment rate for the calculation of MIRRs. Note that results in this paper are robust when I use IRRs to measure returns in the analyses.

To mitigate the possible sample selection issue due to the fact that managers more likely sell winners and hold losers (see, e.g. Gatzlaff and Haurin (1997), Gatzlaff and Haurin (1998), Fisher, Gartzlaff, Geltner and Haurin (2003), Goetzmann and Peng (2006), Korteweg and Sorensen (2010), and Sagi (2017)), I follow Peng (2016) and Peng (2019), and calculate total returns over a five-year holding period since acquisition for unsold properties and include these properties in my analyses. Since these properties hadn't been sold, I use their appraised values (minus estimated selling cost) at the end of year 5 since acquisition as the net sale proceeds.

I then clean the sample. For a property to stay in the final sample, it must have its manager's short-term performance observed at the time of acquisition and its holding period total return must be observed and reasonable.[3] The final sample consists of 8,499 properties. Figure 4 plots the histogram of their MIRRs in the final sample.

Table 6 provides basic summary statistics of three variables: the annualized MIRR, the value-weighted past return, and the equal-weighted past return of the final sample. Panel A reports the mean, standard deviation, minimum, median, and maximum. Panel B report their correlations. Both measures of past performance are negatively correlated with MIRRs, and they are highly correlated with each other.

I estimate the model in (5) using value-weighted and equal-weighted past returns to measure managers' past performance respectively, and report results in Table 7. The results provide very strong evidence that properties acquired at time when managers' past

[3] The *quarterly* total return MIRR must be higher than -10% and lower than 40%. Further, a property's quarterly total return MIRR must be highly correlated with the same property's quarterly capital appreciation MIRR. Specifically, its residual from a linear regression of capital appreciation MIRRs against total return MIRRs needs to be within three standard deviations of the mean of residuals.

performance was higher had significantly lower ex post abnormal returns per period. The coefficient of the interaction term between past performance and duration is -0.013 in both regressions, both of which are statistically significant at the 1% level. This means that when a manager's past performance increases by 100 basis points, the property's ex post return decreases by 1.3 basis points per quarter.

3.2. The model of risk-adjusted returns

I then analyze if risk can explain the lower returns of the properties that were acquired at time when their managers had higher past performance. Following Cochrane (2005), Korteweg and Sorensen (2010), Driessen, Lin and Phalippou (2012), Franzoni, Nowak and Phalippou (2012), and Peng (2016), I derive a holding-period factor model to control for systematic risk, and then augment the model to control for nonsystematic risk. I test whether properties' risk adjusted returns are related to managers' past performance when properties were acquired.

Following the literature, I assume that the log risk premium of a property is determined by the following factor model.

$$R_{i,t} = \alpha_i + \sum_{k=1}^{K} \beta_{i,k} F_{k,t} + \varepsilon_{i,t} \tag{5}$$

In equation (5), $R_{i,t}$ is the difference between the log gross return of property i and the log gross return of the risk-free interest rate (from Fama and French (2018)) in quarter t, α_i is the property's risk adjusted return, $F_{k,t}$ is the kth factor in period t, $\beta_{i,k}$ is the property's loading of $F_{k,t}$, and $\varepsilon_{i,t}$ is an error term. I then aggregate both sides of (5) from the acquisition period to the disposition period and have the following.

$$\sum_{t=buy_i}^{sell_i} R_{i,t} = \alpha_i D_i + \sum_{k=1}^{K} \beta_{i,k} \left(\sum_{t=buy_i}^{sell_i} F_{k,t} \right) + \upsilon_i \tag{6}$$

In equation (6), D_i is the duration of the holding period, and υ_i is the aggregated error term.

To test wither properties acquired at time when managers had higher past performance had lower risk adjusted return α_i, I let α_i be a function of a few variables.

$$\alpha_i = \alpha + \rho_p P_i + \rho_m M_i + \rho_l L_i + \rho_e E_i + \epsilon_i \tag{7}$$

In equation (7), α is the average risk-adjusted return of all properties; P_i is the past performance of the manager at the time when the property was acquired; M_i is a manager fixed effect, which captures the manager's time-invariant ability to generate risk-adjusted returns; L_i is a location (Core-based Statistical Area) fixed effect, and E_i is a property type (apartment, industrial, office, retail, etc.) fixed effect.

Furthermore, I allow factor loadings to be functions of P_i, the manager's past performance when the property was acquired, to take into account the possibility that managers with different past performance might acquire properties with different risk/factor loadings.

$$\beta_{i,k} = \beta_k + \gamma_k P_i + \theta_k \tag{8}$$

In equation (8), β_k is the average factor loading of all properties for the kth factor. Note that I don't have fixed effects of managers, location, and property types in (8). This is because I want to reserve the degree of freedom and I care about whether ρ_p in equation (7) is estimated with biases, not whether γ_k in (8) is estimated with biases. I include P_i in (8) to control for risk that can be related to P_i, not to precisely estimate γ_k. While omitting these fixed effects may bias the estimate of γ_k, as long as it captures at least the part of risk that is correlated with P_i, ρ_p should not be estimated with biases. In other words, γ_k may capture not only risk related to P_i, but also risk related to fixed effects that may be related to P_i, but this does not seem to bias the estimate of ρ_p.

Combining equations (6) to (8), I have the following linear model.

$$\begin{aligned}\sum_{t=buy_i}^{sell_i} R_{i,t} &= \alpha D_i + \rho_p P_i D_i + \rho_m M_i D_i + \rho_l L_i D_i \\ &+ \sum_{k=1}^{K} \beta_k \left(\sum_{t=buy_i}^{sell_i} F_{k,t}\right) \\ &+ \sum_{k=1}^{K} \gamma_k P_i \left(\sum_{t=buy_i}^{sell_i} F_{k,t}\right) + v_i\end{aligned} \tag{9}$$

Note that in equation (9), v_i consists of all error terms in equations (6) to (8).

I then make two additional changes to model. The first is to add a non-temporal intercept term, to account for transaction-related components of returns. The second is a measure of the total non-systematic risk over the entire holding period, N_i, as well as its property-specific loading δ_i. I also allow the loading of the non-systematic risk to be a function of P_i, the manager's past performance when the property was acquired.

$$\delta_i = \delta + \delta_N P_i + \tau_k \tag{10}$$

I do not have fixed effects of managers, location, and property types for the same reason discussed earlier. After these two changes, I have the following.

$$\begin{aligned} \sum_{t=buy_i}^{sell_i} R_{i,t} &= \theta + \alpha D_i + \rho_p P_i D_i + \rho_m M_i D_i + \rho_l L_i D_i \\ &+ \sum_{k=1}^{K} \beta_k \left(\sum_{t=buy_i}^{sell_i} F_{k,t} \right) \\ &+ \sum_{k=1}^{K} \gamma_k P_i \left(\sum_{t=buy_i}^{sell_i} F_{k,t} \right) + \delta N_i + \delta_N P_i N_i + \upsilon_i \end{aligned} \tag{11}$$

Note that in equation (11), υ_i consists of all error terms in equations (9) to (10).

3.3. Estimation results of risk-adjusted returns

I run a preliminary regression based on the model in (11), using stock market factors, bond market factors, and a "real estate factor" that I construct following Peng (2019), which captures the common component of properties' risk premium that is not explained by stock and bond factors. The stock market factors consist of the union of the six factors in Fama and French (2018) and the five factors in Hou, Mo, Xue and Zhang (2018). The bond market factors include the term spread (the difference between the 10-year treasury annual yield and 1-year treasury annual yield) and the credit spread (the difference between the BAA corporate bond annual yield and AAA corporate bond annual yield) and their first order quarterly differences, which are shown by Peng (2016) to help explain real estate returns. The real estate factor is an index of the residuals from a first-stage regression.

Interestingly, the preliminary regression provides no evidence for any statistically significant γ_k. This appears to suggest that properties' factor loadings are not related to managers' past performance. This allows me to dramatically simplify the model by using quarterly fixed effects to replace all factors and their loadings, because they are identical across properties.

$$\sum_{t=buy_i}^{sell_i} R_{i,t} = \theta + \alpha D_i + \rho_p P_i D_i + \rho_m M_i D_i + \rho_l L_i D_i + \sum_{t=buy_i}^{sell_i} Q_t + \delta N_i + \delta_N P_i N_i + \upsilon_i \tag{12}$$

In equation (12), Q_t is the fixed effect for quarter t.

Table 8 reports results of estimation the model in (12). The first two regressions use value-weighted past returns and the third and fourth regressions use equal-weighted past returns to measure managers' past performance. The first and the third regressions do not include the nonsystematic risk N_i. The second (fourth) regression uses the squared residuals from the first (third) regressions as the nonsystematic risk, following Peng (2019).

The results are very strong and indicate that properties acquired at time when their managers had higher past performance have lower risk-adjusted returns ex post. The estimate of ρ_p is -0.013, -0.011, -0.013, and -0.011 in the four regressions respectively. In terms of magnitude, -0.013 means that if past performance (in annualized returns) increases by 100 basis points, the risk adjusted return of the property acquired will decrease by 1.3 basis points per quarter. Assuming a holding period of 10 years (40 quarters), the impact is 52 basis points over the 10-year period.

I then estimate the model in (12) for four main property types separately: apartment, industrial, office, and retail, and report the results in Table 9. I find that ρ_p is statistically significant and negative for apartment and retail properties, but insignificant for industrial and office properties. The estimate of ρ_p is -0.018 for apartment, and -0.028 for office. This provides evidence of heterogeneity across investors of different property types.

Finally, I estimate the model in (12) for properties acquired before, during, and after the 2007 to 2009 financial crisis, and report results in Table 10. There are 6,807 properties acquired before the financial crisis, and 275 and 1,417 properties acquired during and after the crisis. For properties acquired before the financial crisis, ρ_p is -0.021 and statistically significant at the 1% level. However, for properties acquired during and after the financial crisis, ρ_p is weakly positive (at the 10% level) for properties acquired during the financial crisis, and insignificant for those acquired after the financial crisis. This might indicate that investors behave differently in the crisis, but the evidence is not very strong.

4. Conclusions

My results show that real estate institutional investors' acquisitions are related to their short-term portfolio performance. Managers who have higher portfolio returns in the past two quarters acquire significantly more properties and spend significantly more money on acquisitions. I obtain this result after controlling for each manager's current and lagged dispositions, her cross-time average per-period acquisitions, and each period's cross-manager average per-manager acquisitions. This result exists both before and after the 2007-2009 great depression.

Across subsamples of managers and time periods, the effect of short-term performance on acquisitions is stronger for managers with the middle 1/3 cross-time average short-term performance, managers who are the top 1/3 most actively acquiring properties, and time periods when managers had the lowest 1/3 short-term performance. In terms of attributes of acquired properties, managers with different short-term performance seem to acquire properties with similar prices, size, cap rates, and occupancy rates.

I also find that a property's investment return is strongly related to its manager's short-term performance at the time when the property is acquired. Properties acquired at time when managers have higher portfolio returns in the previous two quarters have significantly lower future returns both before and after adjusting for risk. In my property-level analysis for returns before adjusting for risk, I control for fixed effects of managers, quarters, locations, and property types. In the model for risk-adjusted returns, I control for effects of managers, locations, and property types on risk-adjusted returns. I further construct and control for a measure of nonsystematic risk, which is significant in explaining real estate investment returns, and the results are robust.

Note that while the results seem to suggest that real estate institutional investors as institutes may not be perfectly forward-looking when they acquire properties, it may be premature to argue that they are not rational or subject to behavioral biases. Institutional investors are not individuals, and each institute consists of many individuals with different skills, experiences, and risk preferences, and the composition of individuals and the capital under the disposal of different individuals may be related to institutes' short-term investment performance. More research is warranted to understand possible mechanisms that may cause the stylized facts found in this article.

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Table 1. Summary statistics for acquisitions

This table reports summary statistics for acquisitions in the dataset. Panel A reports statistics for the following variables: the number of managers who made acquisitions each quarter (Managers), the number of properties acquired by all managers each quarter (Properties), the number of properties acquired minus the number of properties disposed by all managers each quarter (Net properties), the dollar amount of acquisitions by all managers in billion dollars (Dollars), the dollar amount of acquisitions minus the dollar amount of dispositions by all managers in billion dollars (Net dollars). Panel B reports statistics for the following variables: the number of properties acquired by each manager across all periods (Properties), the number of properties acquired minus the number of properties disposed by each manager across all periods (Net properties), the dollar amount of acquisitions by each manager across all periods in billion dollars (Dollars), the dollar amount of acquisitions minus the dollar amount of dispositions by each manager across all periods in billion dollars (Net dollars). Panel C reports the total of respective variables across both periods and managers.

Panel A. Acquisitions in each period					
	Managers	Properties	Net properties	Dollars	Net dollars
Mean	37	230	125	6.41	3.90
Standard dev.	13	178	127	6.55	4.08
Minimum	8	18	-111	0.03	0.03
Median	39	196	89	3.78	2.37
Maximum	66	1,056	688	31.60	23.83
Panel B. Acquisitions by each manager					
		Properties	Net properties	Dollars	Net dollars
Mean		234	127	6.54	3.97
Standard dev.		501	341	13.76	8.19
Minimum		1	1	0.00	-1.53
Median		61	48	1.43	1.11
Maximum		3,949	3,754	86.82	48.11
Panel C. Total					
	Managers	Properties	Net properties	Dollars	Net dollars
Total	153	35,860	19,458	1,000.44	607.62

Table 2. Acquisitions in Tobit models

This table reports results of fitting the panel (manager and quarter) number of properties acquired (the first and second regressions) or the dollar amount of acquisitions (the third and fourth regressions, in $100 millions) to Tobit models. "Value-weighted past return" is the annualized geometric mean of value-weighted average returns of all properties a manager holds in quarters t-1 and t-2. "Equal-weighted past return" is the annualized geometric mean of equal-weighted average returns of all properties a manager holds in quarters t-1 and t-2. "Acquisition [t-1]" and "Acquisition [t-2]" are the one- and two-quarter lag of the dependent variable. "Disposition [t]", "Disposition [t-1]", and "Disposition [t-2]" are the disposed properties (the first and second regressions) or the disposed dollar amount (the third and fourth regressions) in quarter t, t-1, and t-2. "Quarter acquisition [t]" is the across-manager average number of acquisitions as measured by the dependent variable in quarter t. "Manager acquisition [m]" is the across-time average number of acquisitions as measured by the dependent variable per quarter for manager m. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Acquisition [t] = Properties	Acquisition [t] = Properties	Acquisition [t] = Dollars	Acquisition [t] = Dollars
Value-weighted past return	16.356***		1.077***	
	(1.999)		(0.001)	
Equal-weighted past return		17.610***		1.200***
		(2.127)		(0.005)
Acquisition [t-1]	0.160***	0.160***	0.129***	0.129***
	(0.016)	(0.016)	(0.000)	(0.000)
Acquisition [t-2]	0.207***	0.208***	0.141***	0.141***
	(0.020)	(0.020)	(0.000)	(0.000)
Disposition [t]	0.149***	0.151***	0.232***	0.232***
	(0.025)	(0.025)	(0.001)	(0.001)
Disposition [t-1]	0.027	0.029	0.005***	0.006***
	(0.026)	(0.026)	(0.000)	(0.000)
Disposition [t-2]	0.198***	0.200***	0.058***	0.058***
	(0.026)	(0.026)	(0.000)	(0.000)
Quarter acquisition [t]	1.926***	1.934***	1.976***	1.980***
	(0.142)	(0.142)	(0.140)	(0.000)
Manager acquisition [m]	1.116***	1.112***	0.760***	0.759***
	(0.050)	(0.050)	(0.000)	(0.000)
Sample size	13,238	13,238	13,238	13,238

Table 3. Sub-period analysis of acquisitions in Tobit models

This table reports results of fitting the panel (manager and quarter) number of properties acquired to Tobit models, for periods before, during, and after the December 2007 to June 2009 financial crisis. "Value-weighted past return" is the annualized geometric mean of value-weighted average returns of all properties a manager holds in quarters t-1 and t-2. "Acquisition [t-1]" and "Acquisition [t-2]" are the one- and two-quarter lag of the dependent variable. "Disposition [t]", "Disposition [t-1]", and "Disposition [t-2]" are the disposed properties (the first and second regressions) or the disposed dollar amount (the third and fourth regressions) in quarter t, t-1, and t-2. "Quarter acquisition [t]" is the across-manager average number of acquisitions as measured by the dependent variable in quarter t. "Manager acquisition [m]" is the across-time average number of acquisitions as measured by the dependent variable per quarter for manager m. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Before crisis	During crisis	After crisis
Value-weighted past return	14.432***	5.622	15.628***
	(2.590)	(3.638)	(4.531)
Acquisition [t-1]	0.183***	0.548***	0.103***
	(0.019)	(0.093)	(0.032)
Acquisition [t-2]	0.228***	-0.010	0.123**
	(0.022)	(0.077)	(0.050)
Disposition [t]	0.174***	0.046	0.090*
	(0.031)	(0.094)	(0.049)
Disposition [t-1]	-0.013	0.431	0.073
	(0.031)	(0.143)	(0.052)
Disposition [t-2]	0.232***	0.172	0.117
	(0.032)	(0.136)	(0.049)
Quarter acquisition [t]	1.655***	3.542***	3.618***
	(0.141)	(1.367)	(0.576)
Manager acquisition [m]	0.978***	0.546***	1.666***
	(0.052)	(0.162)	(0.153)
Sample size	9,064	724	3,450

Table 4. Sub-sample analyses of acquisitions in Tobit models

This table reports results of fitting the panel (manager and quarter) number of properties acquired to the same Tobit models in the previous table for sub-samples. "Value-weighted past return" is the annualized geometric mean of value-weighted average returns of all properties a manager holds in quarters t-1 and t-2. Each model consists of the same control variables as shown in the previous table. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Managers by across time average past returns		
	Lower 1/3	Middle 1/3	Higher 1/3
Value-weighted past return	5.097***	20.259***	7.621***
	(1.564)	(3.913)	(2.603)
Control variables	Yes	Yes	Yes
Sample size	2,674	5,898	4,666
	Managers by across time average acquisitions		
	Lower 1/3	Middle 1/3	Higher 1/3
Value-weighted past return	3.418**	4.023***	8.776**
	(1.351)	(0.918)	(4.278)
Control variables	Yes	Yes	Yes
Sample size	1,644	3,618	7,975
	Quarters by across manager average past returns		
	Lower 1/3	Middle 1/3	Higher 1/3
Value-weighted past return	16.609***	9.272**	7.287
	(3.271)	(3.907)	(4.930)
Control variables	Yes	Yes	Yes
Sample size	4,730	4,802	3,706
	Quarters by across manager average acquisitions		
	Lower 1/3	Middle 1/3	Higher 1/3
Value-weighted past return	7.832***	10.450***	9.605*
	(1.014)	(1.897)	(5.177)
Control variables	Yes	Yes	Yes
Sample size	3,148	4,860	5,230

Table 5. Attributes of acquired properties and past performance

This table reports results of regressing the panel (manager and quarter) of four variables describing acquired properties' attributes against past performance and control variables for managers and quarters with acquisitions. All regressions include an intercept term. The four dependent variables in four regressions are the log of average purchase prices, the log of average gross square feet, the average transaction cap rates, and the average occupancy rates over the two-year period following acquisition. Among explanatory variables, "Past return" is the annualized geometric mean of value-weighted average returns of all properties a manager holds in quarters t-1 and t-2. "Quarter mean [t]" is the across-manager average number of respective dependent variable in quarter t. "Manager mean [m]" is the across-time average number of the dependent variable per period for manager m. HAC standard deviations are reported in parentheses. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Log price	Log GSF	Cap rate	Occupancy
Past return	-0.064	-0.070	-0.003	0.056*
	(0.198)	(0.140)	(0.006)	(0.028)
Quarter mean [t]	0.511***	0.698***	0.865***	0.724***
	(0.030)	(0.055)	(0.025)	(0.052)
Manager mean [m]	0.840***	0.922***	0.434***	0.953***
	(0.024)	(0.030)	(0.036)	(0.040)
Sample size	3,870	3,835	2,979	3,026
Adjusted R2	0.38	0.25	0.43	0.24

Table 6. Summary of property level variables

Panel A reports cross-property statistics of the following variables: the modified IRR (annualized return) from acquisition to disposition for sold properties and for the five year since acquisition for unsold properties (using appraised value at the end of year 5 for the calculation), the geometric average of the property manager's value-weighted portfolio returns (annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired, the arithmetic average of the property manager's maximum of returns of all properties under management (annualized returns) in quarters t-1 and t-2. Panel B reports the correlations between pairs of the three variables.

Panel A. Summary statistics (1=100%)			
	IRR	Value-weighted past return	Equal-weighted past return
Mean	0.082	0.104	0.099
Standard deviation	0.089	0.057	0.052
Min	-0.099	-0.282	-0.277
Median	0.074	0.107	0.101
Max	0.400	0.463	0.429

Panel B. Correlations			
	IRR	Value-weighted past return	Equal-weighted past return
IRR	1	-0.095	-0.051
Value-weighted return		1	0.923
Equal-weighted return			1

Table 7. Properties' investment returns and managers' performance before acquisitions

This table reports results from two regressions, all of which include an intercept term. The dependent variable is the log of gross total return for each property from acquisition to disposition for sold properties and for the five year since acquisition for unsold properties (using appraised value at the end of year 5 for the calculation). "Duration" is the number of quarters in the holding period. "Value-weighted past return" is the geometric average of the property manager's value-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Equal-weighted past return" is the geometric average of the property manager's equal-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Quarterly dummies for holding periods" equal 1 if they are within each property's holding period, and 0 otherwise. All three regressions include interaction terms between dummies for managers, CBSAs where each property is located, and types of each property and Duration. White's heteroscedasticity-consistent standard deviations are reported in parentheses. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	I	II
Value-weighted past return * Duration	-0.013***	
	(0.004)	
Equal-weighted past return * Duration		-0.013***
		(0.004)
Quarterly dummies	Yes	Yes
Manager dummies * Duration	Yes	Yes
CBSA dummies * Duration	Yes	Yes
Type dummies * Duration	Yes	Yes
Sample size	8,499	8,499
Adjusted R2	0.50	0.50

Table 8. Properties' risk premium and managers' performance before acquisitions

This table reports results of four holding-period factor regressions, all of which include an intercept term. The dependent variable is the log gross return risk premium over a property's holding period (from acquisition to disposition for sold properties and for the five year since acquisition for unsold properties). "Duration" is the number of quarters in the holding period. "Value-weighted past return" is the geometric average of the property manager's value-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Equal-weighted past return" is the geometric average of the property manager's equal-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Quarterly dummies for holding periods" equal 1 if they are within each property's holding period, and 0 otherwise. All three regressions include interaction terms between dummies for managers, CBSAs where each property is located, and types of each property and Duration. White's heteroscedasticity-consistent standard deviations are reported in parentheses. "Nonsystematic risk" equals the squared residual from a first step regression that contains the same explanatory variables but not "nonsystematic risk" itself. White's heteroscedasticity-consistent standard deviations are reported in parentheses. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	I	II	III	IV
Value-weighted past return * Duration	-0.013***	-0.011***		
	(0.004)	(0.004)		
Equal-weighted past return * Duration			-0.013***	-0.011***
			(0.004)	(0.004)
Nonsystematic risk		0.430***		0.429***
		(0.032)		(0.033)
Duration	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Manager dummies * Duration	Yes	Yes	Yes	Yes
CBSA dummies * Duration	Yes	Yes	Yes	Yes
Type dummies * Duration	Yes	Yes	Yes	Yes
Sample size	8,499	8,499	8,499	8,499
Adjusted R2	0.28	0.33	0.28	0.33

Table 9. Properties' risk premium and managers' performance before acquisitions by property types
This table reports results of holding-period factor regressions, all of which include an intercept term, for four main property types respectively: apartment, industrial, office, and retail. The dependent variable is the log gross return risk premium over a property's holding period (from acquisition to disposition for sold properties and for the five year since acquisition for unsold properties). "Duration" is the number of quarters in the holding period. "Past return" is the geometric average of the property manager's value-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Quarterly dummies for holding periods" equal 1 if they are within each property's holding period, and 0 otherwise. All three regressions include interaction terms between dummies for managers and CBSAs where each property is located and Duration. White's heteroscedasticity-consistent standard deviations are reported in parentheses. "Nonsystematic risk" equals the squared residual from a first step regression that contains the same explanatory variables but not "nonsystematic risk" itself. White's heteroscedasticity-consistent standard deviations are reported in parentheses. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Apartment	Industrial	Office	Retail
Past return * Duration	-0.018**	0.005	-0.028***	-0.012
	(0.007)	(0.006)	(0.008)	(0.008)
Nonsystematic risk	0.564***	0.252***	0.557***	0.558***
	(0.067)	(0.048)	(0.050)	(0.164)
Duration	Yes	Yes	Yes	Yes
Quarterly dummies	Yes	Yes	Yes	Yes
Manager dummies * Duration	Yes	Yes	Yes	Yes
CBSA dummies * Duration	Yes	Yes	Yes	Yes
Sample size	1,927	2,834	1,811	1,089
Adjusted R2	0.47	0.37	0.34	0.44

Table 10. Sub-period analysis of properties' risk premium and managers' performance before acquisitions

This table reports results of three holding-period factor regressions, all of which include an intercept term, for properties acquired before, during, and after the December 2007 to June 2009 financial crisis. The dependent variable is the log gross return risk premium over a property's holding period (from acquisition to disposition for sold properties and for the five year since acquisition for unsold properties). "Duration" is the number of quarters in the holding period. "Past return" is the geometric average of the property manager's value-weighted portfolio returns (log annualized return) in quarters t-1 and t-2 with t being the quarter when the property was acquired. "Quarterly dummies for holding periods" equal 1 if they are within each property's holding period, and 0 otherwise. All three regressions include interaction terms between dummies for managers, CBSAs where each property is located, and types of each property and Duration. White's heteroscedasticity-consistent standard deviations are reported in parentheses. "Nonsystematic risk" equals the squared residual from a first step regression that contains the same explanatory variables but not the "nonsystematic risk" itself. White's heteroscedasticity-consistent standard deviations are reported in parentheses. ***, **, and * indicate significant levels of 1%, 5%, and 10% respectively.

	Before crisis	During crisis	After crisis
Past return * Duration	-0.021***	0.041*	-0.013
	(0.005)	(0.024)	(0.014)
Nonsystematic risk	0.419***	2.030***	0.497***
	(0.038)	(0.492)	(0.074)
Quarterly dummies	Yes	Yes	Yes
Manager dummies * Duration	Yes	Yes	Yes
CBSA dummies * Duration	Yes	Yes	Yes
Property type dummies * Duration	Yes	Yes	Yes
Sample size	6,807	275	1,417
Adjusted R2	0.35	0.56	0.46

Figure 1. Managers who made acquisitions across time

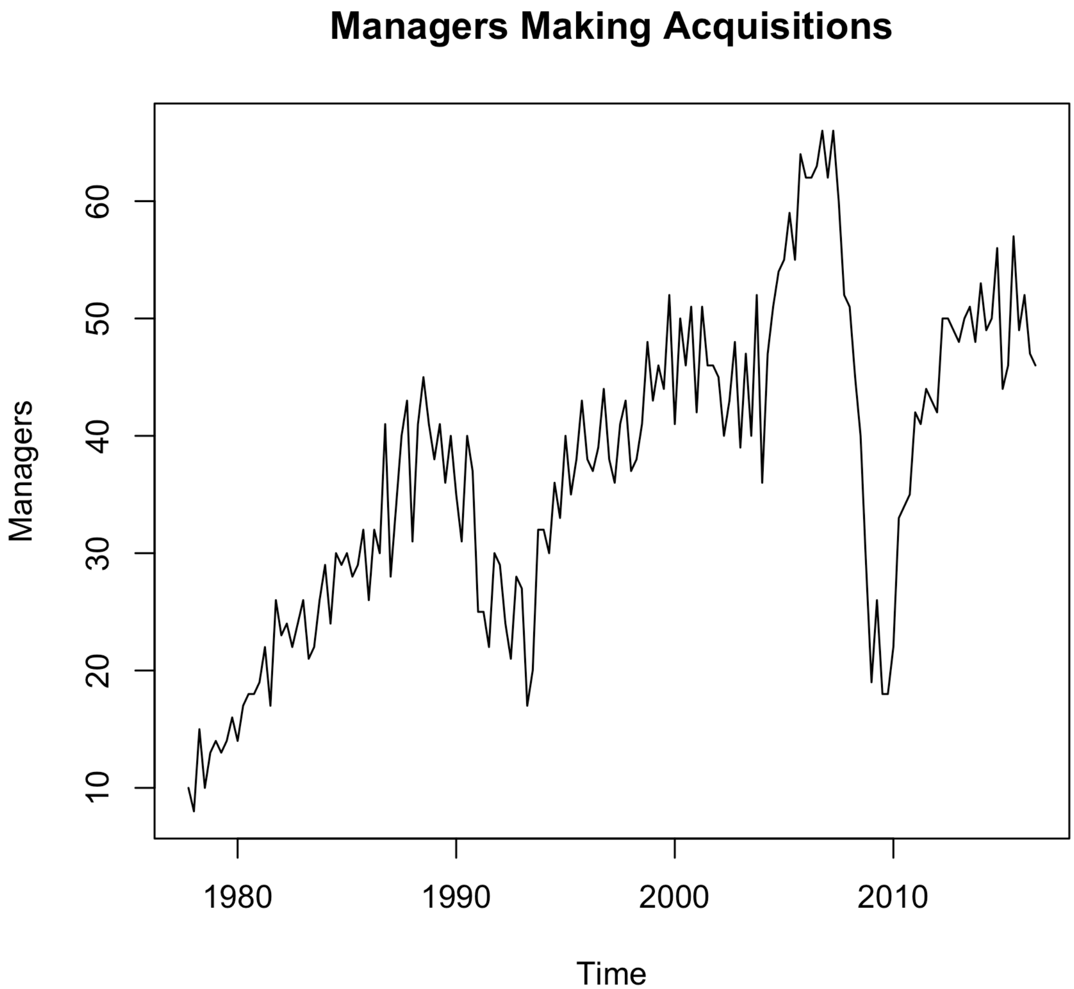

Figure 2. Acquisitions across time

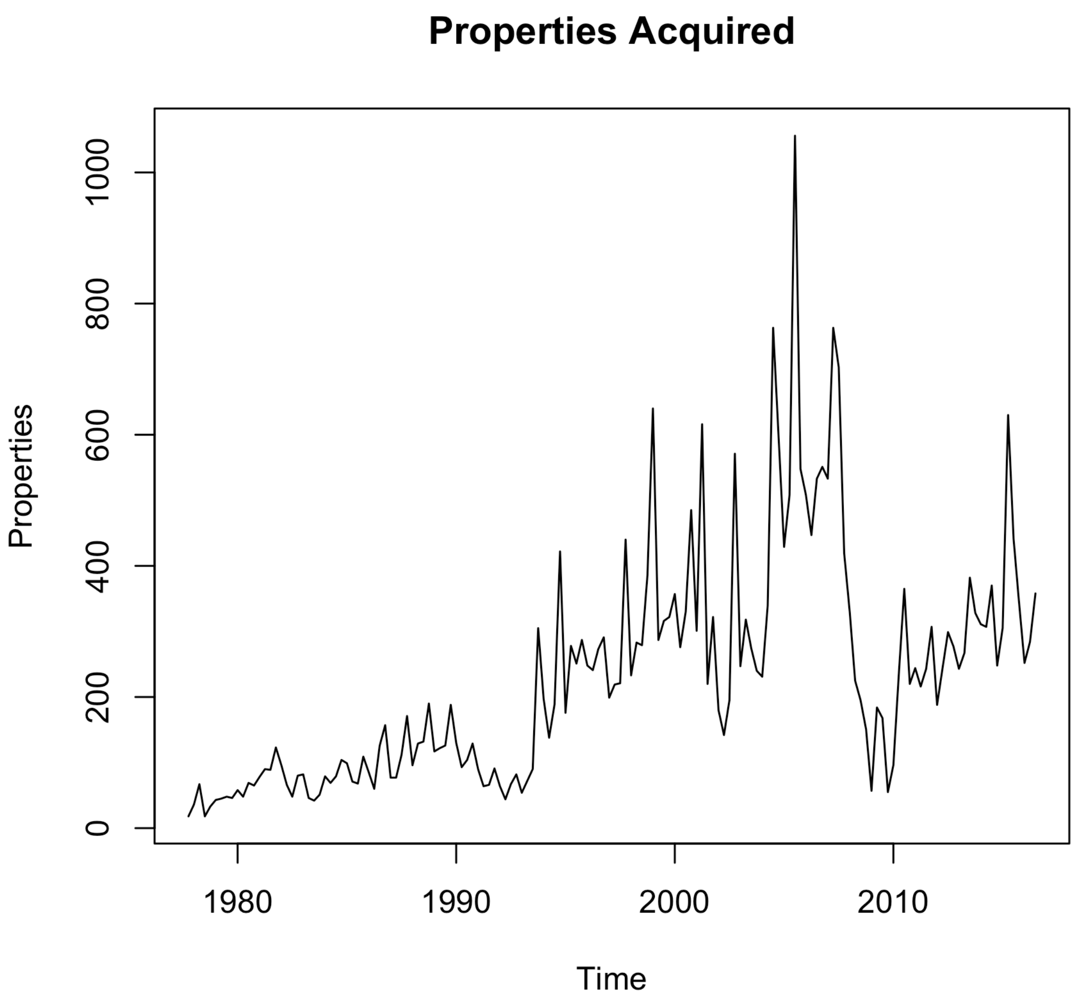

Figure 3. Histogram of coefficients from counterfactual regressions

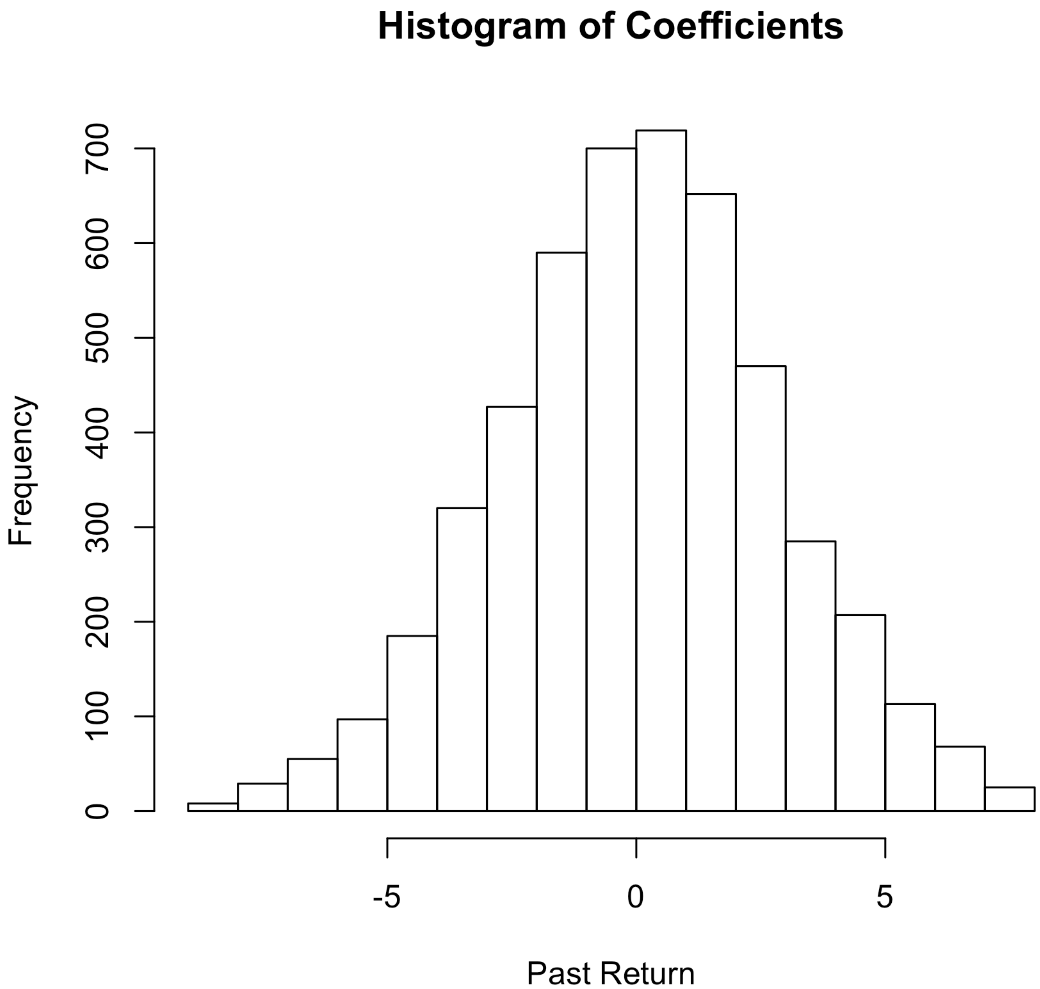

Figure 4. Histogram of holding-period IRRs