Income, Value and Returns in Socially Responsible Office Properties

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Abstract

Responsible property investing (RPI) seeks to address social and environmental issues while also achieving acceptable financial returns. It includes a variety of strategies such as investing in properties that are Energy Star labeled, close to public transit and located in urban redevelopment areas. A critical question for those interested in RPI is how such properties perform financially in comparison to other property investments. This study answers that question by examining a sample of 1,199 office properties with a total market value of over $93 billion from throughout the USA using NCREIF data. We find that with few exceptions, RPI properties over the past 10 years had net operating incomes, market values, price appreciation and total returns that were either higher or the same as conventional properties, with lower cap rates. Based on this evidence, we conclude that RPI can be practiced without diluting returns and can potentially yield higher profits for developers and investors.

Background and Objectives

Investors are increasingly interested in socially responsible investing (SRI) (Hill *et al.* 2007, Schueth 2003), or "directing investment funds in ways that combine investors' financial objectives with their commitment to social concerns such as social justice, economic development, peace, or a healthy environment" (Haigh and Hazelton 2004). A decade ago, Mansley (2000) predicted that property would join the debate on socially responsible investing because it lies at the frontline of many social and environmental concerns. For example, over half the world's greenhouse gas emissions come from operating buildings and the road transport between them (IPCC 2007).

SRI has grown into a global movement (Louche and Lydenberg 2006). More than 600 institutions have signed the Principles for Responsible Investment (Principles for Responsible Investment 2008) and in 2007 SRI investment in the US encompassed nearly 11 percent of the total investment marketplace (Social Investment Forum 2008). If just a tenth of these investments had been committed to real estate, they would have equaled 87 percent of the total market capitalization of the US REIT industry (NAREIT 2009).

In addition to following their personal values, socially responsible investors seek to influence corporate behavior (Schueth 2003). According to Rivoli (2003), this is possible thru shareholder activism, which can influence corporate decisions, and thru investment screening, which can alter equity prices, particularly if certain "unrealistic assumptions" about equity markets having perfect price elasticity are relaxed. Michelson *et al.* (2004), however, reviewed the literature and found inconclusive evidence that SRI has affected corporate behavior. But Heinkel *et al.* (2001) have demonstrated theoretically that SRI won't induce reform until 20% of investors participate, and SRI has yet to reach that market share. Haigh and Hazelton (2004) argue that it only lacks the power *so far* to create significant corporate change.

When corporations focus on improving their social or environmental performance, they are practicing Corporate Social Responsibility (CSR). According to Salzmann *et al*. (2005) theorists have argued the links between corporate financial and social or environmental performance are positive, neutral or negative, while empirical studies on the subject have been largely inconclusive. A recent review of 167 studies found that CSR neither harms nor improves returns, concluding that "companies can do good *and* do well, even if they don't do well *by* doing good" (Margolis and Elfenbein 2008).

The application of SRI to the property sector is referred to as Responsible Property Investing (RPI) (Mansley 2000, McNamara 2000, Newell and Acheampong 2002, Boyd 2005, Lutzkendorf and Lorenz 2005, Pivo 2005, Pivo and McNamara 2005, Pivo 2007, Rapson *et al*. 2007, UNEP FI 2007, Newell 2008). The *Journal of Property Investment and Finance* recently published a special issue on the topic in which the editor argues that property has a role to play in every category of corporate responsibility including environment, workplace, diversity, community, and corporate governance (Roberts 2009).

According to a recent survey, more than 85 percent of US property investment executives would increase their allocation to RPI if it met their risk and return criteria (Pivo 2008a). They were concerned, however about its potential financial performance. How ethically screened investments perform in comparison to conventional ones is a contentious issue (Michelson *et al.* 2004, Bauer *et al.* 2005) and findings are mixed on whether investors will sacrifice financial returns for social responsibility (Rosen *et al.* 2005, Nilsson 2007, Vivyan *et al.* 2007, and Williams 2007). But if RPI does harm values or returns, it will undoubtedly face resistance. This study, therefore, examined the relationship between RPI, market value, and investment returns by comparing the financial performance of RPI and non-RPI office properties throughout the US from 1999-2008.

To complete the study we had to define and identify RPI properties. Fortunately, we could rely on a recent international survey of experts that ranked RPI criteria. It concluded that the most important goals should be “the creation of less automobile-dependent and more energy-efficient cities where worker well-being and urban revitalization are priorities” (Pivo 2008b). Consequently, we focused on 3 specific types of office properties: those close to transit stations, those with the Energy Star label, and those in urban revitalization areas.

Research Hypotheses

RPI features that affect occupancy, rent or operating expenses should affect net operating income (NOI). If transit improve accessibility (Geurs and van Wee 2004), then properties near it should have higher rents and occupancy.[3] If energy efficiency lowers power bills (Kats and Perlman 2006), then Energy Star properties should have lower expenses.[4] And if business in redevelopment areas receives government incentives[5] (Lynch and Zax 2008), then properties there could have higher rents and occupancy. So, our first hypothesis was that properties near transit, energy efficient properties and properties in areas targeted for redevelopment have had a higher average NOI.

Since property values are a function of income flows and capitalization rates, RPI features that affect them should affect values. If we expect RPI properties to have higher NOI, we should also expect higher valuations. And if they are viewed as safer investments, their values should be even higher, assuming capitalization rates are inversely related to risk. Uncertainties about energy costs and regulations may have caused investors to view energy efficient properties and properties near transit as safer investments. But weak demand in regeneration areas may have caused them to be seen as riskier. Alternatively, investors could have accepted lower cap rates for properties in revitalization areas if they saw greater potential for income growth by filling vacant spaces (Sivitanides 1998). So, our second hypothesis

[3] Some cities grant tax abatements to developers who build near transit. Most of the properties near transit in this study, however, were not built as part of formal transit-oriented development projects and ineligible for incentives.
[4] Energy efficient properties may also benefit from incentives offered by government and utilities including tax deductions, utility rebates, low interest loans, and expedited permitting. Utility rebates can directly affect net operating expenses by lowering utility expenditures.
[5] Government incentives can include property tax abatements, sale tax exemptions, income tax deductions, employment credits, no tax on capital gains, increased deductions on equipment, accelerated real property depreciation, and more.

was that properties near transit and energy efficient properties have had lower cap rates and higher values while the results in redevelopment areas have been more ambiguous.

Total investment return is composed of appreciation and income returns. Superior appreciation can occur if incomes grow faster than previously anticipated, or if faster income growth or slower depreciation is expected in the future. Income return is the ratio of income to the property value at a given point in time. It is analogous to the capitalization rate. If an RPI property is expected to produce higher future incomes, it could produce higher appreciation and therefore be purchased at lower income returns in order to achieve the same total returns. That is, properties with more expected growth in income and value will tend to have lower cap rates.

For Energy Star properties and properties near transit, we thought that trends over the past several years may have produced positive effects on appreciation and downward pressure on income returns, resulting in a neutral effect on total returns. Trends in gas and electricity prices (see Exhibit 1) illustrates why this may have been so. It shows the increase in gasoline and electricity prices for the three most recent 5 year periods. In the last two, prices grew much faster than before. If we assume investors had been projecting future costs based on past trends, they would have projected slower increases than actually occurred. A discontinuity in prices could have produced an unexpected shift in demand toward energy efficient and transit-oriented properties, causing their incomes to grow faster than anticipated and producing superior appreciation. Meanwhile, growing concern about the risks of owning energy inefficient and auto dependent properties may have produced downward pressure on cap rates for Energy Star and transit-oriented properties, lowering their income returns. The net result on total returns, however, may well have been neutral. So, our third hypothesis was that energy efficient and transit-oriented properties have generated a higher appreciation return and a lower income return (cap rate) than otherwise similar properties.

Literature Review

The only studies to directly examine the effects of redevelopment programs on non-residential property come from the UK. Erickson and Syms (1986) found that properties in enterprise zones commanded higher rents. Twenty years later McGreal *et al.* (2006) found that returns in urban renewal districts matched returns for conventional properties. Both studies support our hypotheses that properties in redevelopment areas have had higher incomes and similar returns compared to properties outside redevelopment areas.

Exhibit 1 | Trends in Prices and Congestion (mean annual percent change)

	1993-1998	1998-2003	2003-2008
Gasoline, regular grade, nominal price	-.08	9.5	14.6
Electricity, end use commercial sector, nominal price	-1.3	1.6	4.4

Note: Data from the US Department of Energy, Energy Information Administration.

Four studies have found rent and price premiums in energy efficient office buildings (Eichholtz *et al*. 2009, Fuerst and McAllister 2008, Miller *et al*. 2008, Wiley *et al.* 2008). Miller *et al.* (2008) also found lower cap rates. Studies on housing produced similar results: efficiency was capitalized into value (Corgel *et al.* 1982, Longstreth 1986, Laquatra 1986, Dinan and Miranowski 1989). These studies support our expectation that energy efficiency benefits incomes and values. We found no prior work on energy efficiency and investment returns.

Cervero *et al.* (2002) summarized the prior research on transit. They concluded that "numerous studies have demonstrated that being near rail stops raises property values." Some studies have reached contrary conclusions (Bollinger et al. 1998, Gatzlaff and Smith 1993, Nelson 1992). Since Cervero *et al*., three more papers have been published. Ryan (2005) found that access to light rail transit in San Diego was insignificant for office and industrial rents while Duncan (2008) found it was positive for single family home and condominium values. Meanwhile, Hess and Almeida (2007) found that light rail stations in Buffalo increased single family home values. Most of this literature focuses on rents and valuations. Only one study examined appreciation. Clower and Weinstein (2002) found that office property values near Dallas light rail stations increased at more than twice the rate of other properties from 1997 to 2001.

Overall, where prior studies have addressed our concerns, they have mostly supported our hypotheses. They show that properties in redevelopment areas commanded higher rents but did not outperform on returns, that energy efficient properties had higher rents and values, and that in several instances properties near transit were more valuable and appreciated faster than in other locations. Our paper tests the validity of these findings and thereby strengthens our general understanding. But we also break new ground. We report the first findings on office incomes, values and returns in US areas receiving economic development incentives, we offer a first look at investment returns for energy efficient offices, and while ours is not the first study to look at office returns near transit, it is just the second to do so and the first to do it on a national scale. Indeed, a strength of this project is its use of national data. Only the papers cited on energy efficient offices used national data. Most studies looked at one or a few metropolitan areas, restricting their ability to make national generalizations which are useful to developers and investors who operating on a national scale.

Methods and Data

We used this model to test our hypotheses:

$$P_{ij} = f\,(R_j, N_i, E_{ij}, R_i, A_i, Q_i, G_{ij}, u_i) \quad (1)$$

Where, P_{ij} = a vector of variables describing the performance of the *i*th property in year *j*, R_j = a vector of variables describing the RPI features of the *i*th property, N_j = the national office market conditions in year *j*, E_{ij} = a vector of variables describing the economy of the region of the *i*th property in year *j*, R_i = the regional location of the *i*th property, A_i = a vector of variables describing the accessibility conditions for the *i*th property, Q_i = a vector of variables describing the quality of the *i*th property, G_i = a vector of variables describing the cost of government services for the *i*th property in year *j*, and u_i = a stochastic term.

Quarterly data for 1999-2008 were compiled for office properties from data maintained by the National Council of Real Estate Investment Fiduciaries (NCREIF). NCREIF is a source of real estate performance information based on property-level data submitted by its data contributing members, which include institutional investors and investment managers. Properties are added to or removed from the database as members acquire or sell holdings. Our sample consisted of all the office properties in the NCREIF database that had complete addresses and could be geocoded.

That came to 1,199 properties with a total market value of about $98 billion. The addresses were needed in order to obtain information from other data sources (discussed further below). Since properties were added to and deleted from the dataset as they are bought and sold, the number of properties in the sample varied somewhat over time. The number of observations in any particular regression ranged from approximately 6,000 to 7,500 observations, depending on the specific variables used because of missing data for some properties.

Exhibit 2 summarizes the variables used in the study and gives their descriptive statistics.

Exhibit 2 | Variable Definitions, Observations and Descriptive Statistics

Variables	Description	Count	Mean	Std. Dev.	Min	Max
Performance Vector						
NOI_SF_YR	Net Operating Income (dollars) per square foot per year.	13135	14.04	6.22	-46.07	66.46
MV_ SF	Market value (dollars) of the property at the end of the quarter.	11957	229.11	176.16	0.00	2851.68
INCRET_YR	Average income return (cap rate) for the current and prior three quarters.	9765	0.07	0.04	0.93	2.86
APPRET_YR	Average capital return for the current and prior three quarters.	9765	0.04	0.20	-0.19	11.77
TOTRET_YR	Average total return for the current and prior three quarters.	9765	0.12	0.21	0.31	12.36
INCTOTSF_YR	The total rental income (dollars) per square foot over the past year including expense reimbursements	9188	28.63	28.65	0.21	849.73
OCC	Percent property occupancy.	12630	0.89	0.13	0.06	1.00
EXPTOTSF_YR	Total expenses (dollars) per square foot over the past year.	9305	11.58	11.14	0.01	385.10
RPI Features						
ESTAR	Dummy variable for Energy Star labeled.	12542	0.11	0.32	0.00	1.00
REGENCB	Dummy variable for in or near CBD regeneration area.	12542	0.03	0.16	0.00	1.00
REGENSU	Dummy variable for in or near suburban regeneration area.	12542	0.02	0.14	0.00	1.00
TRANSITCB	Dummy variable for within ½ mile of nearest fixed rail transit station in a CBD.	13145	0.14	0.35	0.00	1.00
TRANSITSU	Dummy variable for within ½ mile of nearest fixed rail transit station in a suburb.	13145	0.12	0.33	0.00	1.00
National Market Conditions						
OFFICETOTRET	Quarterly return for all office properties in the NCREIF Office Property Index.	13145	0.02	0.03	-0.09	0.06
Regional Economy						
CEMP123	9 quarter moving average employment growth rate in the CBSA, expressed annually.	9184	0.95	1.70	-6.83	6.87

STA123	9 quarter moving average office building growth rate in the CBSA, expressed annually.	13141	1.97	1.34	0.17	13.25
OCC_CBSA	Mean quarterly percent occupancy for all NCREIF office properties in the CBSA.	47263	0.91	0.06	0.02	1.00
Regional location						
CBSA	Dummy variables for the state.					
Accessibility conditions						
TRAVHOMEWORK	Mean travel time in minutes from home to work by all modes for all workers in the census tract.	12936	24.20	5.50	4.00	46.00
BLK_GP_POPDEN	2007 census block group population density.	13145	6518.62	12023.82	0.00	110566.70
STYPE	Dummy variable for in CBD.	13145	0.19	0.40	0.00	1.00
MSADENS	Population density of the CBSA in persons per acre.	9184	6.82	0.83	4.61	8.81
Property quality						
SQFT	Square feet of the building.	13145	271168.5	364378.4	8022	2.26E+07
FLOORS	Number of floors.	13145	7.52	9.94	0.00	76.00
FLOORS2	Number of floors squared.					
AGE	Age of the property in years.	11899	19.91	17.30	0.00	123.00
Cost of government Services						
EFFPROPTAX	Effective property tax rate in the quarter.	12586	0.02	0.01	0.00	0.23

Financial Performance Variables

Actual accounting data were provided by NCREIF for several performance variables including net operating income, rental income, total expenses and occupancy rate. We had appraised values for the properties that had not sold and transaction prices for properties that had sold -- the same appraisals and transaction prices used to calculate the quarterly NCREIF Property Index. Many studies have shown that appraised values tend to lag transaction prices by a quarter or two in appraisal-based indices. One reason for this is the nature of the appraisal process which relies on historical data such as comparable sales. The second reason is that not all properties are actually revalued every quarter. Some may only be revalued two or three times a year. However, virtually all of the properties are revalued at least once a year. Since the purpose of this study was to examine cross-sectional differences in property values as a result of different RPI characteristics, a delay of a quarter or two in updating the appraised value of a particular property did not significantly impact the relative cross-sectional differences in properties. Said differently, since properties with and without a particular RPI characteristic have the same appraisal lag, the cross-sectional comparisons are on an apples-to-apples basis.

It should be noted that bias associated with appraisal smoothing at the individual property level is different from that at the index level. There are "unsmoothing techniques" that can be applied at the index level to account for the fact that not all properties are revalued every quarter. But this is not appropriate for individual properties. The problem caused by individual properties not being revalued every quarter is that in those quarters the property is not revalued, there will be no change in value and the return is biased toward zero. Furthermore, when there is a revaluation, the return will reflect all the change in value since the last appraisal. Virtually all properties in the index are revalued at least once a year. Thus, we use a four quarter moving average of returns as our dependent variable. This allows us to better capture the trend in returns than using single quarter returns. Each quarter will reflect how values have changed on average over the past four quarters rather than having some quarters with no change in value and others with a too high (or too negative) change in value that reflects more than one quarter. Because quarterly returns will tend to be correlated over time, we used a panel regression with clustering at both the property and year level as a robustness test to be sure the independent variables of interest were still significant and we found they were.

RPI Variables

Energy Star labeling was used to define whether or not a property was energy efficient. Labeling information was collected from the US EPA Energy Star Program. To be labeled, a building must be in the top quartile of energy efficiency when compared to peers (i.e. office buildings with similar operational characteristics including size, weather conditions, number of occupants, number of computers, and hours of operation per week).

Data on the latitude and longitude of all US fixed rail transit stations were obtained from the U.S. Bureau of Transportation Statistics (BTS), National Transportation Atlas Database. This included stations for commuter trains, heavy rail, light rail, and monorail. Supplemental data from Google Earth were used for the New York area. The straight line distance from each property to the nearest rail transit station using GIS software. Properties that were ½ mile or less from a transit station were categorized as transit-oriented properties.[6]

[6] We also used a quarter mile to define properties near transit but found the half mile distance to be a better predictor in the models.

Data used to define urban regeneration properties came from the US Department of Housing and Urban Development (HUD). They were defined as those located in or near an Empowerment Zone, Renewal Community, or Enterprise Community as defined by HUD's online RC/EZ/EC Address Locator.

Controls Variables

As indicated by Equation (1), we used several controls in order to isolate the effects of the RPI features on property performance. National market conditions each year were controlled with the NCREIF office market index. Regional economic conditions were controlled with the yearly growth rate of office buildings in the region as a measure of local supply, the yearly regional employment growth rate as a measure of local demand and office occupancy rates as a measure of supply/demand balance. Since the NCREIF office market index for each year controlled for changes in the national market over time, the regional supply, demand and occupancy variables only captured differences between CBSAs. CBSA dummy variables controlled for static regional conditions not otherwise controlled.

We used four variables to control for intraregional location and accessibility conditions. Regional accessibility at each property location was controlled using the mean travel time to work from homes in the census tract and the population density in the census block group. We might have used traditional gravity-based and distance to CBD measures (Song 1996, Geurs and Wee 2004) but that was infeasible given the large number of properties and regions in our study. Levinson (1998) demonstrates that journey to work time is a good proxy for gravity-based accessibility measures and Heikkila and Peiser (1992) show that accessibility co-varies with urban density at the block group level. A dummy for whether or not properties were in a CBD provided additional control on access to the CBD. Metropolitan level population density was used as a proxy for regional congestion and mobility. We found that population density at the metro scale is correlated with direct congestion measures published by the Texas Transportation Institute (r = .45 - .55) but their measures were unavailable for all regions in our study. Note that this density measure is for the entire metropolitan area and does not measure density in the vicinity of each property. It should not be confused with our measures for accessibility at the property scale, including block group population density.

Size and age were used to control for quality. Building class, another measure of building quality, has been found to be related to rent and values (Glascock *et al.* 1990, Eichholtz *et al.* 2009) but it was unavailable for this study. However, "classifications of offices are far from precise" and typically rely on vintage and location to make class distinctions (Archer and Smith 2003), which we control for using age and the location variables. We also control for stories (FLOORS and FLOORS2), which is most likely related to the “market presence” dimension of building class. We do not directly control for finishes and building systems, which are additional elements of class, but they probably co-vary with the variables we do control. Evidence that age and stories can substitute for class can be found in Eichholtz *et al.* (2009) which presents models estimating office rent and values. In their models, the coefficients for Class A and B dummies are reduced by about half when variables for age and stories are introduced.

Effective tax rate paid by each property was computed from NCREIF tax expenditure and property value data and used to control for the cost of local government services. We did not control for any government or utility incentives provided to RPI properties. As discussed in footnotes 1-3, some RPI properties, depending on their location, can benefit from economic incentives that may increase their income and value. If these were controlled in the analysis, any positive effects of RPI features would likely be diminished. And in the case of the redevelopment properties studied, which by definition are eligible for federal incentives, controls for financial incentives would probably eliminate all significant effects. Consequently, changes to pertinent incentive programs would likely alter the relationships found in this study.

For two of the RPI characteristics (near transit and in or near urban regeneration zones), we used separate dummy variables to indicate whether a property had these characteristics and was in a CBD or suburb. For example, TRANSITCB was 1 if the property was near transit in the CBD and 0 otherwise (meaning that it was not near transit in either a CBD or a suburb or near transit in a suburb). Similarly TRANSITSU was 1 if it was near transit in a suburb and 0 otherwise. There is also a dummy variable, STYPE, indicating whether a property was in a CBD or suburb regardless of whether it had an RPI characteristic or not. If STYPE was 1, the property was in a CBD and if it was 0, it was in a suburb. With this structure of dummy variables, what the STYPE variable captured was the difference that being in a CBD versus a suburb had on Energy Star and non-RPI properties because the relative impact of the transit and urban regeneration RPI variables caused by being in a CBD or suburb was already captured in the dummy variables already included for these characteristic. For example, if the only RPI variables in a regression were TRANSITCB and TRANSITSU, with the market value as the dependent variable, then STYPE captured the difference in market value for the non-transit property in a CBD compared to the non-transit property in the suburb. Meanwhile, the TRANSITCB variable captured the marginal impact on market value of being near transit in a CBD relative to not being near transit in a CBD. Likewise, the TRANSITSU variable captured the marginal impact on market value of being near transit in a suburb versus not being near transit in a suburb. This setup for the dummy variables allowed us to capture the impact of each RPI variable in the CBD relative to those properties that did not have this RPI characteristic in a CBD and similarly in a suburb. As we will see, the impact of some of the RPI characteristics is different in a CBD than in a suburb. Although STYPE could be omitted and a dummy variable added to indicate whether a property did not have one of the RPI characteristics in say a CBD (with not having the RPI characteristic in the suburb being the omitted dummy variable), this would cause dependency problems among the independent variables when there is more than one RPI characteristic because the dummies for each set of RPI variables define whether the property is in a CBD or not.

Exhibit 3 gives the correlations between the independent variables. There was a fairly strong correlation (0.81) between STYPE and TRANSITCB. STYPE and TRANSITCB could be proxies for one another, but the fact that STYPE and TRANSITSU were not highly negatively correlated suggests this was not the case. Nonetheless, their correlation could have caused multicollinearity problems in the regressions, so we checked for large changes in estimated regression coefficients when STYPE and TRANSITSU were added and deleted from the models. None occurred, so we do not think there was a significant problem with having both variables in the models.

Exhibit 3 | Correlation Coefficients for Independent Variables

	ESTAR	REGENCB	REGENSU	TRANSITSU	TRANSITCB	CEMP123	STA123	OFFICETOTRET	AGE	FLOORS	SQFT	EFFPROPTAX	TRAVHOMEWORK	BLK_GP_POPDEN	MSADENS	STYPE	OCC	OCC_CBSA
ESTAR	1																	
REGENCB	-0.01	1																
REGENSU	-0.03	-0.02	1															
TRANSITSU	0.04	-0.06	0.22	1														
TRANSITCB	0.03	0.33	-0.04	-0.15	1													
CEMP123	-0.01	-0.12	-0.05	-0.04	-0.13	1												
STA123	-0.12	-0.05	-0.04	-0.03	-0.17	0.36	1											
OFFICETOTRET	0.09	-0.02	0.01	0.06	0.04	0.24	-0.48	1										
AGE	-0.14	0.22	0.03	0.04	0.4	-0.12	-0.18	0.05	1									
FLOORS	0.33	0.04	0.2	0.2	0.37	-0.14	-0.1	0.01	0.16	1								
SQFT	0.11	-0.04	0.06	0.06	0.13	-0.09	-0.08	0.01	0.07	0.36	1							
EFFPROPTAX	-0.04	0.03	-0.03	-0.11	0.16	-0.2	-0.08	-0.11	0.11	0.09	0.02	1						
TRAVHOMEWORK	-0.04	-0.15	-0.1	-0.07	-0.17	0.01	-0.13	0.03	-0.17	-0.21	-0.04	-0.1	1					
BLK_GP_POPDEN	0.04	0.11	-0.03	0.08	0.46	-0.08	-0.13	0.04	0.22	0.33	0.15	0	-0.06	1				
MSADENS	-0.04	-0.02	-0.02	-0.05	0.34	-0.2	-0.38	0.05	0.32	0.17	0.12	0.03	0.21	0.4	1			
STYPE	0.03	0.35	-0.06	-0.18	0.81	-0.07	-0.08	0.01	0.4	0.46	0.18	0.13	-0.26	0.4	0.2	1		
OCC	0.03	0.03	-0.03	0.01	0.04	0.11	-0.05	0.08	-0.08	0	0.01	-0.12	-0.01	0.05	0.06	0.03	1	
OCC_CBSA	0.02	0	0.04	-0.01	0.04	0.36	-0.07	0.27	-0.04	-0.02	0.01	-0.19	0.11	0.14	0.14	0.01	0.26	1

Results and Discussion

We now turn to the regression analyses. In most cases the controls were significant and had the expected signs. R-squares varied depending on the regression. Our focus, however, was on the significance of the RPI variables and not the predictive power of the models.

Income and Market Value

In the following two models we used log transformed dependent variables to reduce skewness and facilitate interpretability of the coefficients. The models show that over the past 10 years, RPI properties had NOIs and market values per square foot that were equal to or higher than conventional office investments. In no case did the RPI features harm incomes or values.

Net Operating Income (NOI) per Square Foot

As indicated by the coefficients in Exhibit 4, the NOI per square foot for Energy Star properties was 2.7 percent higher than for non Energy Star properties and 8.2 percent higher for CBD regeneration properties compared to other CBD offices. Suburban regeneration and transit properties had NOIs that were similar to non-RPI properties.

Exhibit 4 | OLS Parameter Estimates for logNOI_SF_YR
Number of Observations: 7,627

	Coefficient	Standard Error	*p*-value
Intercept	0.985	0.151	0.000
ESTAR	0.027	0.014	0.045
REGENSU	-0.039	0.036	0.276
REGENCB	0.082	0.027	0.002
TRANSITSU	0.015	0.014	0.284
TRANSITCB	-0.025	0.024	0.300
CEMP123	0.008	0.004	0.027
STA123	0.033	0.006	0.000
OFFICETOTRET	-1.030	0.330	0.002
OCC_CBSA	1.350	0.084	0.000
AGE	-0.001	0.000	0.000
FLOORS	0.004	0.001	0.000
FLOORS2	-0.000	0.000	0.014
SQFT	-3.09e-08	1.01e-08	0.002
EFFPROPTAX	-3.898	0.420	0.000
TRAVHOMEWORK	-0.003	0.001	0.001
BLK_GP_POPDEN	6.96e-07	3.61e-07	0.054
MSADENS	0.000	5.78e-06	0.001
STYPE	0.063	0.021	0.003
CBSA dummies	not shown		
F-Statistic	103.17		0.000
R^2	0.485		
Adj. R^2	0.480		

As already discussed, higher NOI can be from higher rents, higher occupancy or lower expenses. To determine which of these might be driving the higher NOIs, we examined whether ESTAR and REGENCB could explain rents, occupancy and expenses by using them as dependent variables in separate regression models. We found that Energy Star properties had 5.2 percent higher rents than other properties and CBD regeneration properties had 4.8% higher rents than other CBD offices, although the later was statistically insignificant. This Energy Star rent premium is less than the 7.3 to 11.6 percent premium found by others (Wiley *et al.* 2008, Fuerst and McAllister 2008, Eichholtz *et al.* 2008). We found that occupancy was 1.3 percent higher for Energy Star properties and 0.2 percent higher for the

CBD regeneration properties, but the later was again insignificant. Both properties had lower total operating expenses but neither result was statistically significant.

We were surprised not to see a significant difference in total operating expenses for the Energy Star properties. So as a further test, we did a regression for just utility expenses per square foot. Because utility costs can change over time and vary across CBSAs, dummy variables were used for the year and quarter as well as the CBSA. And since utility rates can vary within CBSAs, depending on the service provider, we used income per square foot as a proxy to control for these differences, assuming that areas with higher utility costs could charge higher rents. What we found was that utility expenses were in fact 12.9 percent lower per square foot per year for Energy Star offices. So, in addition to higher rents and occupancy, NOIs for Energy Star properties were also boosted by lower energy bills.

Overall, we found that the kinds of RPI properties studied here had NOIs equal to or better than non RPI properties. Our efforts to explain the higher NOIs had mixed results. For the Energy Star properties, we found significant evidence of higher rents per square foot, higher occupancy and lower utility bills. For the CBD regeneration properties, we also found higher rents, higher occupancy and lower expenses but the findings were not statistically significant, though we suspect they were not accidental since the NOIs were significantly lower.

Market Value per Square Foot

Higher NOIs should produce higher property values, assuming the same level of risk, and that is in fact what we found. This suggests that the effects of RPI features on NOI were being capitalized into market values. We also found cases of higher values without higher NOI, suggesting that higher values were also being driven by lower capitalization rates.

As indicated by the coefficients in Exhibit 5, Energy Star properties were worth 8.5 percent more per square foot than other properties.[7] This compares to value premiums of 5.8% to 19.1% reported in other recent studies (Miller et al. 2008, Fuerst and McAllister 2008, Wiley *et al.* 2008, Eichholtz *et al.* 2008). Our results fall into the lower range of these other findings, but the other studies model exchange prices rather than appraised values and appraised values can lag behind exchange values, as already noted. And if the value of Energy Star properties grew most quickly in the later part of the study period, then a lag of a few quarters could be significant. Other possible explanations for our

[7] We also separated Energy Star properties into CBD and suburban subgroups, with similar results.

lower premium could be that the other studies used different samples and fewer controls. Nonetheless, our results are consistent with the conclusion of every study to date: there has been a significant value premium associated with Energy Star properties.

Market values for regeneration properties were no different from other properties in the suburbs and 6.7 percent higher in the CBDs. Properties near transit were 10.6 percent more valuable per square foot in the suburbs and 9.1 percent more valuable in the CBDs. These are also notable results indicating again that the RPI features in this study appear to range from neutral to quite positive for property values.

The RPI properties that had higher NOIs (Energy Star and CBD Regeneration) also had higher market values, as expected; however for Energy Star properties the value premium was more than triple the NOI premium. In addition, both types of transit properties had higher values without higher NOIs. But value is a function of both NOI and capitalization rate, and as we show in the next section, the value premiums that cannot be explained by higher NOIs can be explained by lower cap rates.

Exhibit 5 | OLS Parameter Estimates for logMV_SF
Number of Observations: 7,647

	Coefficient	Standard Error	*p*-value
Intercept	3.952	0.153	0.000
ESTAR	0.085	0.014	0.000
REGENSU	-0.033	0.037	0.375
REGENCB	0.067	0.027	0.014
TRANSITSU	0.106	0.014	0.000
TRANSITCB	0.091	0.024	0.000
CEMP123	0.024	0.004	0.000
STA123	0.002	0.006	0.773
OFFICETOTRET	6.608	0.334	0.000
OCC_CBSA	0.760	0.086	0.000
AGE	-0.006	0.000	0.000
FLOORS	0.011	0.001	0.000
FLOORS2	-0.000	0.000	0.010
SQFT	-1.76e-07	1.03e-08	0.000
EFFPROPTAX	-8.636	0.427	0.000
TRAVHOMEWORK	-0.018	0.001	0.000
BLK_GP_POPDEN	1.32e-06	3.66e-07	0.000
MSADENS	0.000	5.86e-06	0.000
STYPE	0.077	0.022	0.000
CBSA dummies	not shown		
F-Statistic	162.84		0.000
R^2	0.597		
Adj. R^2	0.594		

Investment Returns

The next three models examine the affect of RPI features on investment returns. The log of 1 + return was used as the dependent variable because returns could be negative. Many of the controls were dropped because they were not significantly related to returns. Overall, we found that RPI features did not affect total returns. However, when disaggregated into income and appreciation returns, we found lower income returns for most of the RPI property types, suggesting that owners are willing to buy these properties at a lower capitalization rate.

Income Returns

As indicated in Exhibit 6, Energy Star lowered income returns by 0.5 percent (rounded from 52 basis points). There are three possible explanations for these results. First, owners might have been anticipating higher income growth, faster appreciation or slower depreciation. Second, owners might have been anticipating slower growth in operating expenses. And third, owners might have viewed these properties as less exposed to risks from energy shocks and regulations. It is remarkable that Miller *et al.* (2004), working with a different sample, found that taken together, LEED certified and Energy Star labeled buildings had cap rates that were 55 basis points lower than other properties, which is nearly identical to our results.

Exhibit 6 | OLS Parameter Estimates for logINCRET_YR
Number of Observations: 6,039

	Coefficient	Standard Error	*p*-value
Intercept	0.972	0.162	0.000
ESTAR	-0.005	0.001	0.000
REGENSU	-0.003	0.003	0.390
REGENCB	0.005	0.003	0.091
TRANSITSU	-0.004	0.001	0.001
TRANSITCB	-0.015	0.002	0.000
CEMP123	-0.003	0.000	0.000
STA123	0.002	0.001	0.028
OFFICETOTRET	-0.281	0.045	0.000
OCCUPANCY	0.099	0.003	0.000
OCC_CBSA	-0.017	0.010	0.101
MSADENS	-0.000	0.000	0.000
STYPE	0.004	0.002	0.082
CBSA dummies	not shown		
F-Statistic	33.72		0.000
R^2	0.301		
Adj. R^2	0.292		

We also found that proximity to transit reduced income returns by 0.4 percent in the suburbs and 1.5 percent in the CBDs. In this case concerns about gas prices, carbon taxes, traffic congestion, and accessibility issues, along with forecasted growth in demand toward transit properties (Center for Transit Oriented Development 2004), may have been shaping what investors were willing to pay for less auto-dependent properties.

The lower capitalization rates for certain types of RPI properties help explain the higher market values which could not be fully explained by higher NOIs. In particular, while a 8.5 percent higher market value per square foot in Energy Star properties could not be explained by just 2.7 percent higher NOI, it could be explained by a combination of higher NOI and lower cap rates.[8] We also found that transit properties had higher market values without higher NOIs. Here again, the gap could be explained by lower cap rates. And the reverse was also true: when we found that the 6.7 percent higher market value in CBD regeneration properties was *less* than the 8.2 percent increase in NOI, we found a *higher* cap rate to explain the difference. So, in general it appears that certain types of RPI properties have been associated with lower income returns and cap rates and that these, in combination with other significant effects on NOI, have driven higher market values for RPI properties.

Capital Appreciation Returns

Exhibit 7 gives the regression results for appreciation return. In most cases appreciation for RPI properties was similar to other properties. In two cases, however, RPI features did seem to affect appreciation. For suburban transit stations, the impact was positive; they appreciated 1.2 percent more quickly per year than other suburban properties. This could indicate that owners and buyers were increasing the value of these properties faster than for other properties in response to faster than expected income growth. They may also have been adjusting cap rates downward in expectation of better future income growth, slower depreciation, or lower risk. Given our previous findings that suburban transit properties did not have higher incomes but did have lower cap rates, the second explanation seems more plausible. For suburban regeneration properties, appreciation returns were slightly negative, though the results were only significant at the .10 level. Owners may have expected these properties to generate better incomes than they actually did, so their values could have been adjusting downward in response to the disappointing incomes. They

[8] Using the mean NOI per square foot and mean cap rate (i.e. income return) from Exhibit 2, we computed a mean market value per square foot of about $201. When we then adjusted NOI upward by 2.7% and the cap rate downward by 0.05%, we computed a mean market value of $222 per square foot, which equals a market value premium of about 10%.

did have lower NOI (see Exhibit 4), but the results were not statistically significant. There could also have been growing concerns about future performance.

Exhibit 7 | OLS Parameter Estimates for logAPPRET_YR
Number of Observations: 6,038

	Coefficient	Standard Error	*p*-value
Intercept	-0.360	0.200	0.000
ESTAR	0.000	0.006	0.979
REGENSU	-0.024	0.014	0.073
REGENCB	-0.009	0.012	0.459
TRANSITSU	0.012	0.006	0.030
TRANSITCB	0.011	0.011	0.295
CEMP123	0.016	0.002	0.000
STA123	-0.041	0.003	0.000
OFFICETOTRET	1.164	0.200	0.000
OCCUPANCY	0.142	0.012	0.000
OCC_CBSA	0.168	0.045	0.000
MSADENS	0.000	0.000	0.000
STYPE	0.013	0.009	0.164
CBSA dummies	not shown		
F-Statistic	30.92		0.000
R^2	0.283		
Adj. R^2	0.274		

Total Returns

Exhibit 8 gives the regression results for the log of annual total returns. Total returns includes appreciation (or depreciation), realized capital gain (or loss) and income. It captures the net result of RPI features on appreciation and income returns. Generally, we found that RPI features did not significantly change total returns.

The coefficient for Energy Star was negative, for example, but not significantly so. Lower income returns seem to have been offset just enough by higher appreciation returns to produce an insignificant net outcome for total returns. This does not mean, however, that developers of new Energy Star properties or energy efficiency retrofit projects did not earn a greater than market return. Since Energy Star properties have a higher market value, properties that are built or refurbished to achieve the Energy Star label could well produce superior returns for their developers and investors. Developers could have made normal or above normal profits so long as the added value exceeded any additional cost of making the project Energy Star qualified. If the market value for Energy Star properties had not been above the norm, we could not say this. Unfortunately, we know little about the cost of such projects. However, according to Goldman *et al.* (2005), the typical energy efficiency retrofit project in the private sector (which may or may not be sufficient to achieve Energy Star status) costs about $1.39 per square foot, or just 0.6% of the mean market value of the properties in our study. They also find a median simple payback, based on energy bill savings alone, of 2.1 to 3.9 years. These payback rates were computed without considering any benefits to market values. Meanwhile, a recent review of several studies found that new green buildings, which often qualify for the Energy Star label, can be built with a 1 to 2 percent cost premium and often with no premium at all (Morris 2007). All these costs are well below the 8.5% value premium we found with Energy Star properties suggesting that developers may indeed be able to capture most of the energy efficiency premium by developing or refurbishing properties to achieve the energy star label..

Exhibit 8 | OLS Parameter Estimates for logTOTRET_YR
Number of Observations: 6,039

	Coefficient	Standard Error	*p*-value
Intercept	-2.054	0.712	0.004
ESTAR	-0.005	0.006	0.380
REGENSU	-0.025	0.013	0.060
REGENCB	-0.005	0.012	0.713
TRANSITSU	0.007	0.006	0.236
TRANSITCB	-0.004	0.012	0.713
CEMP123	0.013	0.002	0.000
STA123	-0.034	0.003	0.000
OFFICETOTRET	0.879	0.198	0.000
OCCUPANCY	0.237	0.012	0.000
OCC_CBSA	0.147	0.044	0.001
MSADENS	0.000	0.000	0.078
STYPE	0.016	0.009	0.156
CBSA dummies	not shown		
F-Statistic	28.46		0.000
R^2	0.267		
Adj. R^2	0.25 7		

The same can be said for the suburban and CBD transit properties and for the CBD regeneration properties. In those cases, newly developed properties could earn market or above market returns because they are valued at 8 to 10 percent higher per square foot, so long as any added development cost do not exhaust these premiums. There could be higher land, site preparation and permitting expenses near transit stations, but government programs could also be in place to offset these added expenses. Generally, developers report positive views about developing near transit (Cervero 2004). However, investors who purchase any of these properties from the developers who create them, and who pay the higher prices reported here, should not expect to see above market total returns, based on the record of the past 10 years. Nor should they expect a penalty. RPI can be employed as an investment strategy without harming returns, but if there's an advantage to be gained, it appears that it's mostly likely to be gained by developers if they can produce these properties without extra costs that exhaust the premiums. More research into the costs of developing RPI properties would appear to be a fruitful area for future investigations.

The one exception to our finding that RPI features were neutral or positive for total returns was the suburban regeneration properties. They produced slightly lower total returns, although the findings are only significant at the 0.06 level. This result was probably due to the lower appreciation, which was also barely significant. It is possible, however, that once prices have been fully adjusted to reflect realistic risk and income expectations, future investors will be able to develop and acquire these properties without a loss in future returns. Nonetheless, this demonstrates that RPI is not a risk free strategy. Investors should be careful not to pay more than is justified by expected risks and returns, unless of course they view any dilution of returns as being worth the positive social and environmental externalities that RPI properties can produce.

Summary and Discussion of Hypotheses

Exhibit 9 summarizes our findings in terms of the percent change in financial outcomes associated with each type of RPI property. In no case did RPI status diminish income or value to a statistically significant level. In fact, for four of the five property types, RPI status was associated with higher incomes and/or higher values. Of course these premiums do not necessarily increase returns for investors because higher incomes lead to higher values which generally offset benefits to returns. They do, on the other hand, suggest that the market is capitalizing at least some of the social and environmental benefits of these types of responsible property investments. They also suggest that there is an opportunity for developers to achieve profits equal to or better than those produced by non-RPI properties, as long as any additional costs do not exhaust the value added by developing RPI properties.

With respect to investment returns, our findings show that for the same four property types that exhibited higher incomes and/or values, the total returns for investors were not significantly different than those for other types of property. This suggests that investors could have held a portfolio of RPI properties over the past 10 years without diluting their returns. For suburban regeneration properties, however, we did find lower total returns, probably because they appreciated more slowly than other suburban properties in response to disappointing incomes.

Expectations about these projects may have exceeded real outcomes and additional incentives may be needed to help them compete on equal footing with other suburban locations. They may not be needed however, if in the future the prices paid for these properties are more in line with the incomes being produced.

Exhibit 9 | Percent Effect of RPI Status on Financial Performance Measures

Property Type	NOI per Square Ft	Market Value per Square Foot	Income Return per Year (Cap Rate)	Appreciation Return per Year	Total Return per Year
Energy Star	2.7**	8.5****	-0.5****	0.0	-0.5
Suburban Regeneration	-3.9	-3.3	-0.3	-0.2*	-2.5*
CBD Regeneration	8.2***	6.7**	0.5*	-0.0	-0.5
Suburban Transit	1.5	10.6****	-0.4****	0.1**	0.7
CBD Transit	-2.5	9.1****	-1.5****	0.0	-0.4

** = sig. at .10 level, ** = sig. at .05 level, *** = sig. at .01 level, **** = sig. at .001 level*

We now reconsider our hypotheses in light of the findings.

Our first hypothesis, that all the RPI properties have had higher NOIs, was confirmed for Energy Star and CBD regeneration properties. But we found no significant difference for the rest of the property types. Incomes produced by the other types were not diluted by their RPI status, but neither did they appear to have benefited from significant comparative advantages. For suburban regeneration properties, any subsidies, planned facilities, potential agglomeration economies and other advantages may not have been sufficient to offset pre-existing disadvantages. For suburban transit properties, the relative ease of still commuting by car from suburban home sites and the relatively undeveloped suburban transit networks may have prevented them from gaining any real accessibility advantages, so far. And for CBD transit properties, access to good regional bus service (which we did not measure), downtown housing and other amenities may have offset any significant advantages for the CBD transit properties in comparison to other CBD offices.

Our second hypothesis, that properties near transit and energy efficient properties have had higher values was confirmed. In all these cases, it appears that lower cap rates played a significant role in producing the higher values, so the insignificantly higher incomes were not a limit on their ability to achieve higher market values. Our expectation that the results would be ambiguous for the regeneration properties was also confirmed by our finding that regeneration properties in the CBDs had higher values but not in the suburbs. This may indicate that overall regeneration policies and projects are having more success in the CBDs.

Finally, our third hypothesis, that we'd see higher appreciation and lower income returns for energy efficient and transit properties, was partly confirmed. We did see lower incomes returns but only suburban transit had higher appreciation returns. This suggests that the benefits of energy efficiency and CBD transit were already priced into markets before the study period. Only in the case of suburban transit did additional benefits seem to be "discovered" during the study period, producing a faster than normal rate of appreciation. Our expectation that regeneration areas would perform as other properties was borne out for CBD properties but in the suburbs there was underperformance, as already indicated. Again, it seems likely that optimism may have been too high and that suburban regeneration may require more patience and/or incentives to fully achieve its potential.

Conclusion

Our objective was to learn how RPI properties have done over the past 10 years in comparison to otherwise similar peers in terms of income, value and returns. Our view was that if RPI does harm values or returns, it will face resistance in the marketplace. What we found was that in nearly every case we studied, investors have not had to accept lower returns in order to engage in RPI. The one exception was suburban regeneration, however, now that prices have adjusted downward, these investments may perform adequately in the future and even outperform if the redevelopment projects they're a part of achieve a critical mass and begin generating significant agglomeration economies. In all other cases, we see no reason for investors to avoid the types of RPI properties studied here. Even suburban regeneration properties could be good investments as long as the prices paid reflect more cautious optimism about the future in these areas. In general, RPI has been a sound investment strategy.

For developers, the opportunities may be even more positive. If RPI properties are 7 to 11 percent more valuable, then it may be possible to achieve higher development profits as long as costs do not exhaust value premiums.

This question about development costs, however, is one important issue that needs further study. Other topics that seem ripe for future research include the financial performance of other types of RPI properties, such as apartments and retail near transit, and the financial effects of other RPI features, such as walkability or the conservation of natural features.

As noted in the introduction, a recent review of studies on social responsibility and business outcomes found that social responsibility neither harms nor improves returns (Margolis and Elfenbein 2008). The authors conclude that “companies can do good *and* do well, even if they don’t do well *by* doing good.” Our study findings that in most cases RPI neither harms nor improves total returns, suggests the same conclusion. For developers, however, the opportunities may be better than that, but a more definitive answer to that question must await further investigation.

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