Rental Premiums for Eco-Retrofits:

An Analysis of LEED for Existing Buildings

By

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An Undergraduate Honors Research Project Presented

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To

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ABSTRACT

This paper examines how obtaining Leadership in Energy and Environmental Design (LEED) affects the rent that market participants are willing to pay for commercial space. While recent studies have verified the existence of a rental premium for LEED certification in general, this paper provides a more precise analysis by focusing solely on one particular LEED subsystem, LEED for Existing Buildings (LEED-EB). Further, it examines the premiums associated with each of the four certification levels found within that subsystem, as well as regional differences to the premium for LEED-EB. Testable hypotheses are developed based on the Fuerst and McAllister (2011) study and empirically tested with a hedonic real estate pricing model using Ordinary Least Squares. Using data obtained from the CoStar Commercial Real Estate Database, this study find that tenants are willing to pay an effective rental premium of about 11% for space in buildings with LEED-EB certification over otherwise-comparable buildings. However, the results also show that tenants' willingness to pay up does not increase as the certification level increases. The market does not appear to differentiate amongst the different iterations of LEED. Finally, results show that regional differences to the premium exist. Regions with higher premiums tend to have a smaller percentage of LEED-certified buildings, suggesting that the premium arises not only from increased demand for certified buildings, but a constrained supply as well.

Key Words: Green Building, Eco-Labelling, Commercial Real Estate

JEL Classification: R33, Q590

INTRODUCTION

In the battle against the looming problem of climate change, green building has emerged as a bright spot. The Environmental Protection Agency (EPA) defines green building as "the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's lifecycle" (EPA 2012). Implementing such practices can have a significant impact in the fight against climate change. The US Green Building Council (USGBC) asserts that an impressive 85% of future energy demand can be met simply by improving building efficiency (USGBC 2013).

While there are many ways that buildings can "go green," achieving official certification allows owners to reap not only the tangible benefits of reduced operational expenses, but also any intangible benefits associated with branding or corporate image. Several certification systems exist, but the USGBC's Leadership in Energy and Environmental Design (LEED) is the oldest and most widely used. It is likely that most owners who care about the environment have already greened their buildings. In order to convince additional owners on a scale that can have a significant impact on climate change, it must be shown that the benefits of certification outweigh the costs of achieving it.

A young but growing body of research has been attempting to quantify the benefits by evaluating the premiums in sales price, lease rates, and occupancy rates given to buildings certified under LEED. While the studies all point to a positive relationship between green certification and sale and lease rates, the results are mixed in the sense that the range of premiums is wide and the results are sometimes statistically insignificant. One possible reason is that the studies do not differentiate by LEED sub-system or level of certification. The two largest sub-systems of LEED are New Constructions (LEED-NC) and Existing Buildings

(LEED-EB), which have obvious differences that should be accounted for in the research. Most of the studies focus on newer buildings, suggesting the samples contain a high percentage of LEED-NC certified buildings. It could be argued, however, that converting existing buildings will actually have more of an impact in reducing energy usage, as the number of existing commercial buildings is much larger than the number by which the current stock is expected to grow in the near future.

This paper seeks to address this shortcoming and contribute to the literature by estimating the market premium associated with LEED-EB in particular.[1] Additionally, it extends the analysis to explore whether the market rewards higher levels of certification within the LEED-EB subsystem with higher premiums, as a higher premium would be necessary to offset the additional costs associated with obtaining higher certification. Finally, it explores whether regional differences to the premium exist, and possible reasons for the difference, in an attempt to better understand the market for eco-labelled buildings.

This study finds that the market grants a lease rate premium of about 11% to LEED-EB buildings, which is consistent with the average premium found in the literature. The premium, however, is not correlated with level of certification. The highest premium is actually observed at the lowest level of certification, Certified. When the LEED buildings are separated into two groups, the high certification level group is shown to receive a slightly higher premium than the low certification level group, though both are roughly 11%. Further, the 11% premium this

[1] LEED-EB is designed specifically for existing buildings that have undergone green retrofitting and incorporated green practices into their ongoing operations and management. After applying for certification, the building is assessed in the following areas: exterior building site maintenance programs, water and energy use, environmentally preferred products and practices for cleaning and alterations, sustainable purchasing policies, waste stream management, and ongoing indoor environmental quality. Points are awarded for meeting criteria within the preceding categories and a final score is reached. Certification is then either denied or granted at one of the following four levels: (1) Certified: 40-49 points; (2) Silver: 50-59 points; (3) Gold: 60-79 points; and (4) Platinum: 80+ points.

study finds for LEED-EB is fairly consistent with the average found in the literature, which focuses on LEED more generally.

All of this suggests that the market doesn't distinguish amongst the many iterations of LEED. LEED-NC and LEED-EB are granted a very similar premium, despite obvious differences in cost and scope. The same holds true for the levels of certification within each subsystem. Tenants are not willing to pay any more for space in a building with a high level of certification than a building with a low certification level. Building owners, therefore, face no additional rental premium for improving their building beyond the minimum level of certification. Inconsistent with expectations, this result demands exploration. It could be that the market finds the nuances of LEED too confusing, in which case education for prospective tenants is required. It could also be that the monetary benefits of greening can be achieved at the lowest levels of certification, in which case the rating systems may be in need of an overhaul.

In order to explore the possible source of the premium, an additional sensitive analysis is conducted, analyzing regional variation in the LEED premiums. The paper finds that while regional differences exist, having a higher premium is not associated with having a higher percentage of LEED certified buildings. Higher premiums tend to exist in regions where the preference for green buildings is high and the supply is constrained. These findings hint at the importance of supply in determining the premium, rather than just the demand for green buildings. In any event, the crucial puzzle going forward relates to what may be holding back building owners from converting to LEED, as just 14% of the buildings in this study's sample have done. Future study should focus on analyzing the variables that impact the decision to obtain LEED certification, of which expected rental premium is just one.

LITERATURE REVIEW

There are a number of recent studies which have examined the premiums granted to buildings with LEED certification in general. Nearly all of them employ a similar methodology, comparing historical market data obtained from the CoStar Real Estate Database for a set of green buildings against a control group of traditional buildings using Ordinary Least Squares estimation. The models used are all standard real estate pricing models that relate the rental or sales price of a building to a number of the building's physical attributes. The studies differ mainly in the way the samples were chosen within CoStar, which building attributes were included in the model, and how precisely location is controlled for. While the research generally supports the existence of market premiums for lease price, sales price, and occupancy rates, the range of premiums is wide.

Miller et al. (2008) found the greatest rental premium of 33% and an occupancy rate premium of 4.5% for green buildings certified either as LEED or Energy Star, controlling for age, location, and size of the buildings. These results, however, were not statistically significant. Wiley et al. (2010) found rental and sales price premiums of 16% and 17%, respectively, using Ordinary Least Squares and Two-Stage Least Squares estimations. Their model, which included only age and location, neglected many important building attributes useful as controls. Also, their location control, metropolitan area, was relatively imprecise.

Eichholtz et al. (2010, 2013) employ a more precise location control, using Geographic Information Technology to identify control buildings within 0.2 miles of each certified building. The other unique feature of these studies is the inclusion of regional employment data as a control variable. The earlier study found a rental price premium of 5.2% and a sales price premium of 11.3%, however neither result was statistically significant. The second study included an expanded data set, examining not only LEED certified buildings but Energy Star as well, and the dependent variable was changed from rent to effective rent. The changes yielded a statistically significant rental premium for Energy Star buildings of 10%; however, the LEED premium of 11% was still statistically insignificant.

Fuerst and McAllister (2009, 2011) employ a model which controls for lot size, building size, height, building class, submarket, and age. Additionally, they home in even more closely on the building location, including a control for geographic coordinate. Employing quantile regression using Ordinary Least Squares estimation, they found an occupancy rate premium of 8% for LEED buildings and 3% for Energy Star, and a 5% rental rate premium for LEED buildings. Fuerst and McAllister (2011) is the only study to include an estimation of the premiums for each of the four LEED certification levels separately. While they find a premium for each of the levels, only Certified and Platinum levels are found to be statistically significant, and each premium is not successively higher than the last. They argue that at that level the analysis is hampered by the relatively tiny proportion of buildings certified under each level.

A shortcoming of all of these studies, and a possible source of the wide ranging results and lack of statistical significance at times, is the fact that they do not differentiate between LEED sub-systems (Blumberg 2012). They make no distinction between new constructions and retrofits, despite obvious differences in cost and scope. LEED for New Constructions (LEED-NC) puts primary focus on design and construction aspects, while LEED for Existing Buildings (LEED-EB) emphasizes ongoing building operation and maintenance. Costs and benefits between the two obviously differ significantly. Kok et al. (2012) examined LEED certified buildings that had been built prior to 1990, thus eliminating LEED-NC. They found a lease rate premium of 7% and an occupancy rate premium of 2%. However, they did not break the LEED sample down further to examine the four certification levels (Certified, Silver, Gold, and Platinum) separately.

HYPOTHESES

All of the prior studies are based on one underlying assumption, that LEED certified buildings are more desirable than un-certified buildings due to the tangible benefit of decreased operating costs and the existence of intangible benefits, such as enhanced corporate image or worker productivity (Fombrun and Shanley 1990). Such buildings are not perfect substitutes, but the nature of the real estate market is such that an increase in demand for certified buildings decreases demand for un-certified buildings. Given the current relatively low levels of supply for certified buildings, a premium may arise. This leads to the formation of the first hypothesis, that buildings with LEED-EB certification receive a premium over comparable non-certified buildings. H1: Existing buildings that obtain LEED-EB certification receive a market premium in terms of rental and occupancy rates over comparable non-certified buildings.

The same reasoning can be extended to the four levels of certification within LEED-EB. A building with a higher certification level is assumed to be “greener,” and thus should capture higher levels of tangible and intangible benefits. That is, a LEED-EB Platinum building is assumed to reap higher levels of the benefits associated with certification than a building certified at one of the three lower levels. Additionally, it is assumed that the costs of certification increase with each successive level. If the increased benefit exceeds the increased cost, the premium for each successive level will be higher than the last, which is the second hypothesis. H2: The market premiums are successively higher for buildings that obtain increasingly higher levels of certification. That is, Certified < Silver < Gold < Platinum.

Finally, the premium is expected to arise out of an increased demand for green buildings coupled with a tight supply. If this is true, regions with a higher percentage of LEED-converted buildings will have lower premiums. Conversely, regions with higher observed premiums have a lower percentage of LEED-EB certified buildings. H3: Higher premiums exist in regions where fewer buildings have obtained certification, and lower premiums exist where more buildings are certified.

DATA and DESCRIPTIVE STATISTICS

The data used in this study was obtained from the CoStar Group Commercial Real Estate Database, "the largest and most comprehensive database of commercial real estate information" (Costar Realty Information, Inc. 2013). The complete CoStar database contains information on 3,960,492 buildings in the United States. By applying various filters within the database, a cross section of existing commercial buildings with similar attributes was obtained. Eliminating buildings that are not designated as existing and commercial yields a subset of 592,620 properties.[2] While CoStar does provide data about the LEED status of a building, including the certification level the building has achieved, it does not differentiate by subsystem. LEED was first introduced by the USGBC in March of 2000. While any commercial building built after LEED's introduction could be certified under either LEED-EB or LEED-NC, buildings completed prior to March of 2000 must, by definition, be certified under LEED-EB, the focus of this study. Eliminating buildings built after 1999 brings the sample to 406,152 observations. Single tenant buildings, which have either 0% or 100% occupancy, were eliminated to avoid any possible bias when analyzing occupancy rates. A minimum square footage of 15,000 is set for the same reason. Application of these filters reduces the sample to 74,721 observations. Finally,

[2] The data was obtained from the CoStar database on October 17, 2013.

buildings not classified as Class A are eliminated, leaving only those viewed as the most desirable investment grade properties. The final sample, containing only those buildings that met the preceding criteria, consisted of 7,461 buildings. Within that sample, 896 buildings had achieved some level of LEED certification. The remainder constitute the control sample. Complete data, however, was only available for 6,052 buildings, 743 of which are LEED certified.

Within the LEED sample, breakdown by certification level is as follows. 106 buildings are certified at the lowest level, Certified. 251 buildings had obtained Silver level certification. Gold, the level reached by 364 buildings, was the most common level within this sample. The number of buildings with Platinum certification, just 22, was small compared to the lower levels. This suggests that few building owners find the marginal benefit of achieving this highest level exceeds the marginal cost of doing so.

The first set of important variables are related to pricing. Rental rates are given as the quoted annual cost per square foot of space. If the building contains different rates for different spaces, the building's total rental rate is given as a weighted average of the various spaces to arrive at an accurate average price per square foot. Occupancy is defined as the percentage of total rentable building area (RBA) in a building either leased to or sublet by a tenant (CoStar Realty Information, Inc. 2013). Effective rent is obtained by multiplying a building's rental rate by its occupancy rate. In addition, CoStar reports some other information important as control variables. The state, county, and zip code of each building will allow the control of locational effects that have an effect on rental rates. Several physical building characteristics that could impact rental pricing are included as well. These include building age, rentable building area in square feet, the number of stories a building has, the square footage of a typical floor, and the parking ratio (the number of parking spaces a building has per 1,000 square feet). Descriptive statistics for the original sample are found in the Appendix. Descriptive statistics for the LEED-certified sample and the control sample are both found in Table 1.

Table 1 shows that despite a near-exact average age, the LEED buildings appear to command higher rent and occupancy, resulting in a significantly higher effective rent. Buildings that have achieved certification tend to be much taller and much bigger in terms of square footage, though they are located on much smaller lots. A typical floor is about the same size in certified and non-certified buildings. The tall buildings and small lot sizes are indicative of the fact that the retrofitting of existing buildings to achieve LEED certification has thus far taken place mostly in more urban areas. This is consistent with the literature, which emphasizes controlling for building location.

The regional breakdown of the LEED sample is found in Table 4. The Midwest contains the highest portion of the LEED buildings, the 247 buildings comprising 33.2% of the LEED sample. 239 buildings, or 32.2% of the sample is in the West. The Northeast contains 127 certified buildings and the South contains 130 buildings, which are 17.1% and 17.5% of the overall LEED sample, respectively. The Midwest and the West contain roughly two-thirds of the LEED buildings within this sample.

The percentage of buildings within each region that have converted to LEED is also important in order to analyze how a constrained supply influences the premium. Overall, LEED certified buildings comprise 14% of the entire sample. Regionally, the highest concentration of LEED buildings, 17.9%, is in the West. 15.5% of the buildings in the Midwest have obtained certification, while the Northeast and the South have just 7.4% and 9.1%, respectively.

Therefore, if H3 holds we expect to see higher premiums in the Northeast and South than in the West and Midwest.

METHODOLOGY

To estimate the effect that LEED-EB certification has on lease and occupancy rates, a hedonic model is used to analyze the data using Ordinary Least Squares with White-heteroskedasticity-consistent standard errors. The hedonic price model is widely used in real estate by researchers investigating pricing effects of locational and neighborhood attributes, as well as structural and building characteristics (Addae-Dapaah and Chieh 2011). Office lease pricing literature suggests, specifically, that in the hedonic model a range of physical and locational variables should be used as independent variables determining price, or lease rate (Fuerst and McAllister 2009). The following equation is used to estimate the market premium for buildings certified under LEED-EB.

$$log\mathrm{R}_{in} = \alpha_{in} + \delta_{in}\mathrm{LEED}_{in} + \beta_{in}X_{in} + \gamma_{in}\mathrm{D}_{in}$$

R is the effective rent, defined as the annual rent per square foot multiplied by the occupancy rate, for building *i* in county *n*. LEED is a binary variable which takes the value of 1 if building *i* is a LEED-EB certified building and zero otherwise. The effect of certification on effective rent, therefore, is given by the coefficient δ. X_i is a vector of hedonic characteristics of building *i* which serve as controls. The vector consists of the following characteristics: age, land, stories, and typical floor square footage.[3] The final term, D_{in}, represents the entity fixed effect

[3] Of the variables available in the dataset, 'Parking Ratio' is not included because of incomplete data and 'Rentable Building Area' is not used due to a high degree of correlation between the total area and height of a building, given as stories.

used to control for unobservable factors that vary across county, and which could potentially lead to omitted variable bias.

EMPIRICAL RESULTS

Table 2 contains the results of the OLS regression using three specifications. All three regressions contained two additional control variables that are not listed in the table. Neither of these two variables, land area or the size of a typical floor, appear to have much effect on rental rates. As expected, a building's age negatively impacts the rent it commands while the height of a building has a positive effect. Interestingly, the coefficients for age and height remain almost perfectly constant among each of the three specifications. The adjusted R-square for each is about 0.35, which is roughly in line with the literature; neither the highest nor the lowest.

In the first specification, the coefficient for LEED is 0.1087 and is statistically significant at the 1% level. This suggests the market observes a 10.87% premium for buildings with LEED-EB certification in general, supporting the first hypothesis. The result is consistent with expectations based on the literature, which found, on average, a rental premium of about 12.5%. In the second certification, when each certification level is examined separately, the expected result is not observed. The highest premium, 13.22%, is associated with the lowest certification level, Certified. The next level, Silver, had a premium of 9.5%, followed by the Gold level with 12.34%. Though not as expected, the premiums for the lowest three certification level were all positive and were all highly statistically significant. The estimate for the highest level, however, was a different story. Buildings with Platinum certification are estimated to have a negative rental rate premium, although the result is statistically insignificant.

The bizarre result for Platinum could result from a too small sample size. Platinum is easily the least popular certification level, its 22 observations comprising less than 3% of the total LEED sample. To mitigate this issue, the third specification combines the four levels into two groups: a lower group consisting of Certified and Silver, and a higher group consisting of Gold and Platinum. Although less precise, this will allow the comparison of different certification levels without compromising sample size. The lower group consists of 357 buildings and the higher group contains 386. As shown in the third specification, results find a premium of 10.74% for the low group and 11% for the high group, both statistically significant at the 1% level. The higher level of certification group did receive a higher premium, but the difference is too insignificant to support the second hypothesis, that higher certification is associated with a higher premium.

Empirical results for the additional sensitive analysis, which focuses on the differences in rental premium found in different regions, are found in Table 3. The data was separated into four regional samples: Northeast, South, Midwest, and West. Each region was then analyzed separately using the same methodology as the first specification in Table 2, which groups all levels of certification together and measures simply the premium granted to LEED-EB in general. The highest premium, 18.39%, is observed in the Northeast region. The South and the West have premiums of 12.01% and 11.41%, respectively, both of which are fairly consistent with the average observed across the entire sample. The lowest, although still positive, premium is found in the Midwest, where LEED-EB buildings can expect a rental premium of 5.78%. The LEED-premium coefficients were found to be statistically significant at the 1% level for the Northeast, South, and Midwest. The premium for the Midwest is statistically significant at the 10% level.

These results generally support the third hypothesis. In the Northeast, where the preference for green building is expected to be high and the supply is tight, with just 7.4% of the buildings having converted, we see the highest premium. In the West we also expect the preference for green buildings to be high, but an average premium is observed due to the higher percentage of buildings having obtained certification. The preference for green building in the South and the Midwest is likely lower than that in other regions. The low premium found in the Midwest and the average premium found in the South, therefore, likely emanate from the higher supply of certified buildings found in the Midwest than the South. These results are supportive of the third hypothesis, suggesting that supply as well as demand play a role in determining the level of premium.

CONCLUSION

This paper examines the rental premiums associated with obtaining LEED-EB certification and each of the four certification levels therein. In addition, it explores regional differences to the LEED-EB rental premium. The results of this study support the first hypothesis, which confirms the findings of prior studies. The market observes a significant premium of about 11% for buildings with LEED-EB certification. Retrofitting an existing building to obtain LEED certification is an economically viable proposition as long as the costs of doing so, which are easily estimated for any particular building, do not exceed this market-observed benefit. It does not appear, however, that one must achieve a high level of certification to obtain the 11% premium. The results are unsupportive of the second hypothesis. The market does not reward higher certification with a higher premium. The premiums observed in the low certification level group and the high certification level group were both around 11%, the same as the premium paid for LEED certification in general. Building owners face no incentive, at least in terms of expected income, to obtain anything beyond the lowest two levels of certification.

There are a couple of possible explanations for the puzzling result. First, it could be the case that the market doesn't really understand LEED. In their attempt to make a rating system capable of application across a broad range of projects, the USGBC may have made the system too complicated. Rather than unravelling the intricacies, potential tenants may tune out the noise and think simply in terms of LEED certified or not LEED certified. To remedy this, the USGBC should find ways to educate the market.

Alternatively, it is possible that the market actually does fully understand the rating system. It could be that the bulk of energy efficiency savings, the tangible benefit likely accounting for a large portion of the premium, can be achieved at the minimum certification level. Under this premise, achieving higher certification may bring additional intangible benefits, such as an enhanced corporate image, but they are not reflected in the price tenants are willing to pay. Further study, in the form of a survey given to market participants, could help to clear up the source of the discrepancy.

Future studies assessing the LEED premium should continue to focus on analyzing individual subsystems and certification levels, as the existence of a premium for LEED in general has already been well established. Until LEED becomes more prevalent at each level, however, such studies are likely to suffer from a small sample size, as this one did. One way the study could be expanded using currently available data would be to open the analysis to buildings further down the quality spectrum, rather than looking solely at Class A. The question should also be revisited in the future as more buildings achieve certification, increasing the available data.

It will also be beneficial to examine the broader question of a premium in general for LEED as more and more buildings achieve certification. An increase in the supply of green buildings could offset the higher demand for green space. At some point in the future, therefore, the premium could be diminished or even disappear altogether as eco-labelled space becomes an expected norm.

An additional avenue for future research is to examine how other factors, in addition to expected rental premium, impact the decision to obtain LEED certification. To do so, a Logit or Probit model could be employed, using a building's LEED certification status as a binary dependent variable. Given the right dataset, such a model could analyze the decision to obtain certification as a function of not just the expected premium, but tax incentives, costs associated with converting, borrowing costs, climate, energy prices, personal preference, and other potential variables. Such research would provide insight into why some regions have been quicker to adopt LEED than others. Between measuring the premium, tracking how it changes over time, and analyzing what factors impact the decision to obtain certification, the research opportunities surrounding the market for green buildings are numerous.

TABLES

TABLE 1 Descriptive Statistics by Building Type

LEED Certified Buildings					
Variables	**Observations**	**Mean**	**Std. Dev.**	**Min**	**Max**
Rent/SF/Year	743	31.58	31.43	10.50	734.18
Occupancy Rate	743	86.23	14.19	0.00	100.00
Effective Rent	743	27.65	31.16	0.00	718.76
Age	743	31.76	14.74	15.00	125.00
Rentable Area	743	442175.40	352493.20	27456.00	2550000.00
Land	739	4.06	6.25	0.03	65.00
Stories	742	19.39	14.72	2.00	77.00
Typical Floor SF	743	25782.95	13809.42	0.00	161000.00

Non-Certified Buildings					
Variables	**Observations**	**Mean**	**Std. Dev.**	**Min**	**Max**
Rent/SF/Year	5468	24.80	21.89	2.90	1152.61
Occupancy Rate	5468	81.46	19.00	0.00	100.00
Effective Rent	5468	20.56	21.29	0.00	1116.88
Age	5468	31.37	16.15	15.00	183.00
Rentable Area	5468	189099.20	205153.10	19648.00	3781045.00
Land	5375	12.16	328.97	0.03	23990.00
Stories	5463	8.83	8.87	1.00	110.00
Typical Floor SF	5468	25842.24	21122.81	0.00	444592.00

TABLE 2 Empirical Results – Rental Premium (General and by Certification Level)

Dependent Variable: Log Effective Rent			
Independent Variables	(1)	(2)	(3)
LEED-EB	**0.1087*** **		
	(0.0179)		
Certified		**0.1322*** **	
		(0.0326)	
Silver		**0.0953*** **	
		(0.0277)	
Gold		**0.1234*** **	
		(0.0219)	
Platinum		**-0.1435**	
		(0.1298)	
Low Level Certification			**0.1074*** **
			(0.0225)
High Level Certification			**0.1100*** **
			(0.0228)
Age	-0.0009*	-0.0009**	-0.0009*
	(0.0005)	(0.0003)	(0.0005)
Stories	0.0055***	0.0056***	0.0055***
	(0.0007)	(0.0007)	(0.0007)
Intercept	2.8959***	2.8873***	2.8953***
	(0.0974)	(0.1032)	(0.0981)
Other Control Variables	YES	YES	YES
County Dummies	YES	YES	YES
R-Square	0.3784	0.3793	0.3784

Notes: Standard errors are shown in parentheses.
The sample size is 6052.
***, **, * indicate significant at the 1%, 5% and 10% level, respectively.

Table 3 Rental Premium by Region

Dependent Variable: Log Effective Rent

Independent Variables	Northeast	South	Midwest	West
LEED	**0.1839***** **(0.0510)**	**0.1201***** **(0.0325)**	**0.0578*** **(0.0326)**	**0.1141***** **(0.0313)**
Age	-0.0015** (0.0007)	-0.0023* (0.0013)	0.0001 (0.0008)	0.0014 (0.0010)
Stories	0.0106*** (0.0019)	0.0074*** (0.0015)	0.0052*** (0.0009)	0.0011 (.0016)
Intercept	2.6855*** (0.0450)	2.7536*** (0.1682)	2.9205*** (0.0778)	2.8996*** (0.1016)
Sample Size	1671	1386	1659	1310
Other Control Variables	YES	YES	YES	YES
County Dummies	YES	YES	YES	YES
R-Square	0.4291	0.2972	0.2458	0.2028

Notes: Standard errors are shown in parentheses.
***, **, * indicate significant at the 1%, 5% and 10% level, respectively.

Table 4 Regional Analysis – LEED Breakdown and Findings

	Overall	**Northeast**	**South**	**Midwest**	**West**
LEED buildings	743	127	130	247	239
% of LEED sample	100%	17.1%	17.5%	33.2%	32.2%
LEED Premium	10.9%	18.4%	12.0%	5.8%	11.4%
LEED (as a % of region)	14.0%	7.4%	9.1%	15.5%	17.9%

APPENDIX

Descriptive Statistics for Original Sample

		Initial Sample			
Variables	**Observations**	**Mean**	**Std. Dev.**	**Min**	**Max**
Rent/SF/Year	6211	25.61	23.34	2.90	1152.61
Occupancy Rate	6211	82.03	18.56	0.00	100.00
Effective Rent	6211	21.41	22.81	0.00	1116.88
Age	6211	31.42	15.99	15.00	183.00
Rentable Area	6211	219373.80	242166.60	19648.00	3781045.00
Land	6114	11.18	308.47	0.03	23990.00
Stories	6205	10.09	10.34	1.00	110.00
Typical Floor SF	6211	25835.15	20385.69	0.00	444592.00

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