HEALTHY BUILDINGS

SA+P
MIT SCHOOL OF ARCHITECTURE AND PLANNING

MIT CENTER FOR REAL ESTATE

The Real Estate Innovation Lab

The Financial Impacts of Healthy Buildings

Rental Prices and Market Dynamics in Commercial Office Markets

Researchers

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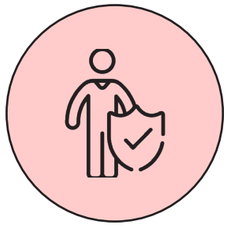
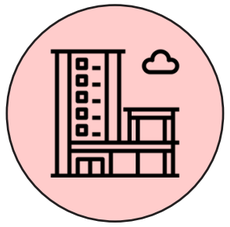
introduction

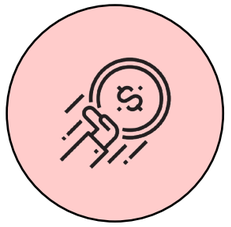


With the rise of COVID-19, a large proportion of global offices cannot return to work. Businesses at every level must strategize on restarting our daily normalcy, and more importantly, how to provide a safe, healthy space for all of us to occupy.



Healthy Buildings are seen as the next level of Green Buildings - an emphasis not only on green building practices, but also integrates health, wellness, and human experience in buildings.

With 90% of Americans spending their time indoors, our indoor built environment represents a crucial opportunity to enhance factors that impact our health.



An emphasis on happy employees through providing healthier buildings can positively influence thinking, productivity, behavior, and health well being.

Health does not stop at the hospital, it starts in our homes, our work, and in our everyday life. While this holistic approach to real estate has been implemented in a wide range of design strategies and certifications, not much has been done in exploring the financial impacts.

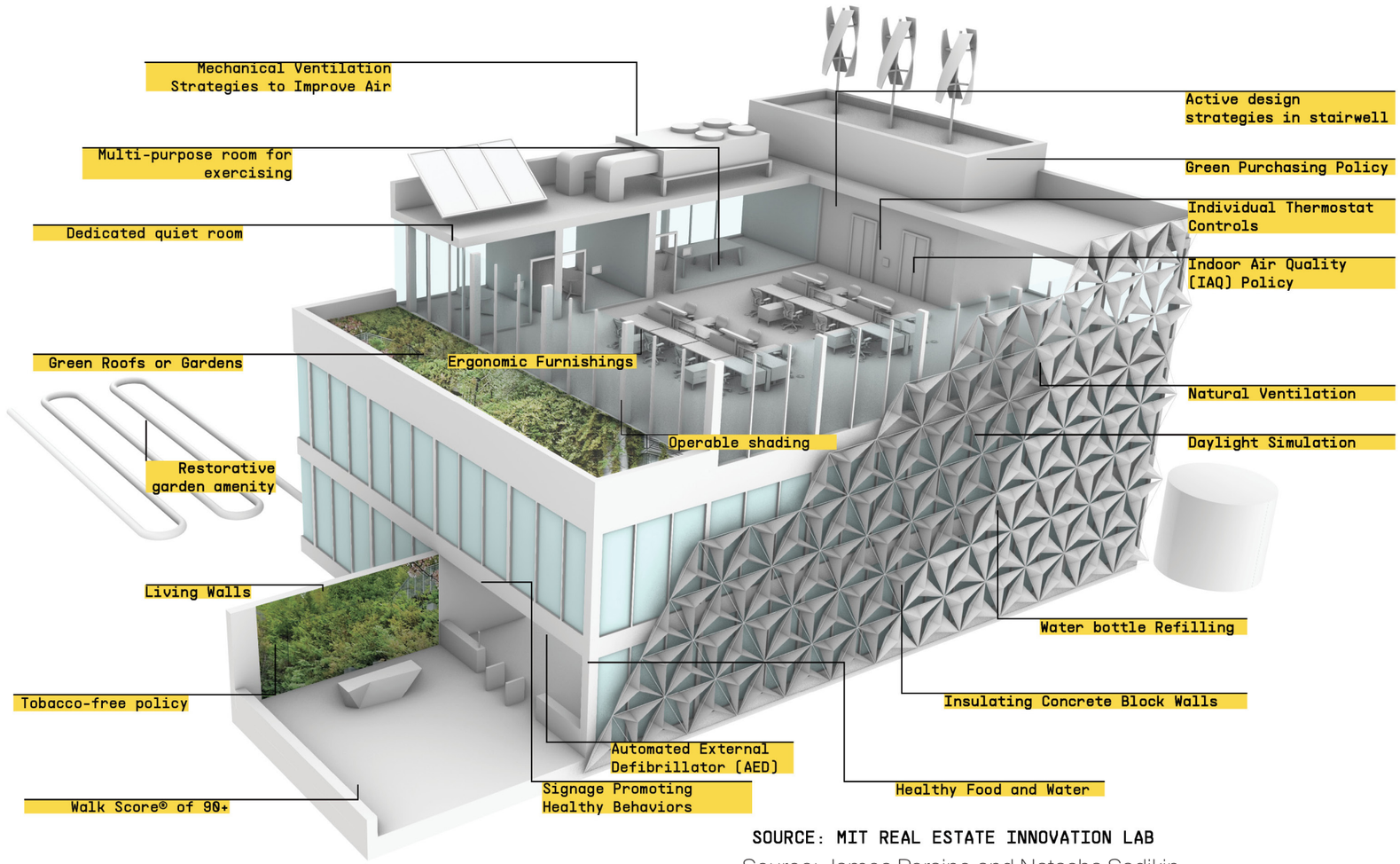
This project takes a first steps towards understanding the financial and economic impact of Healthy Buildings on achieving asset level parity and perhaps outstanding performance in key US markets.

what is a healthy building?

A healthy building is a space that supports the physical, psychological, and social health and well-being of people.

Healthy building can be seen as the next generation of Green Buildings that not only includes environmentally responsible and resource-efficient building concepts, but also integrates "health, wellness, and human experience in buildings."

Source: **The World Health Organization (WHO)**



SOURCE: MIT REAL ESTATE INNOVATION LAB

Source: James Peraino and Natasha Sadikin

fitwel vs well standard

comparison as of 2020

For asset-level certification, Fitwel Standard and WELL Building Standard are most common in the United States.

Since their initial start in the mid-2010s, over 755 projects have registered with WELL and Fitwel in 65 countries worldwide.

WELL US Certified Projects: 140
WELL US Registered Projects: 344
WELL World Certified Projects: 185
WELL World Registered Projects: 3753

Fitwel US Certified Projects: 120
Fitwel US Registered Projects: 170
Fitwel World Certified Projects: 310
Fitwel World Registered Projects: 1230

	WELL	FITWEL
Description	Well Building Standard is modeled closely to LEED, but focused exclusively on impacts to human health and wellbeing.	Fitwel was designed for commercial interiors, multi-tenant, and single-tenant buildings and encourages certification without engaging a consultant.
Project Types	• WELL Certification • WELL Core • WELL Community Standard	• Multi-Tenant Base Building • Multi-Tenant Whole Building • Single-Tenant Building • Commercial Interior Space • Multi-Family Residential
Certification Level	Silver Gold Premium	1 - Star 2 - Star 3 - Star
Registration & Certification Cost	Registration fees range from $1,500 to $10,000 depending on the size and type of the project.	$500 project registration and $6,000 certification cost per project.
3rd Party Certified	Yes	Yes
Prerequisites	Project must meet all preconditions for any certification level	None
Recertification	Every 3 years	Every 3 years
Verification	Documentation, on-site assessment, and performance testing	Documentation

research question

What could a positive, negative or equal effective rents between certified and non-certified spaces mean?

- If building owners perceive healthy buildings as equal to other assets, this suggests that tenants do not ascribe economic value to occupying health certified space, or at least are not willing to adjust their rent in light of a certification.
- If building owners perceive healthy buildings as negative, this would suggest that the spaces do not provide the benefits promised by the certification.
- If building owners perceive healthy buildings as positive, this would suggest that tenants see value in occupying healthy space and preserving their employees health and will pay a premium to do so.

The Financial Impacts of Healthy Buildings

Healthy Buildings poses an interesting financial puzzle - are they seen as equal asset types, a delivery failure, or the key to a healthy employee or tenant?

NO VALUE (EQUIVALENT)
Result: equal

Healthy Buildings are seen as a non-differentiator in the marketplace.

DELIVERY FAILURE (DOWNSIDE)
Result: negative

Healthy Buildings are not delivering what they promised.

HEALTHY EMPLOYEE (UPSIDE)
Result: positive

Healthy Buildings are seen as an asset that improve employee or tenant well being and productivity.

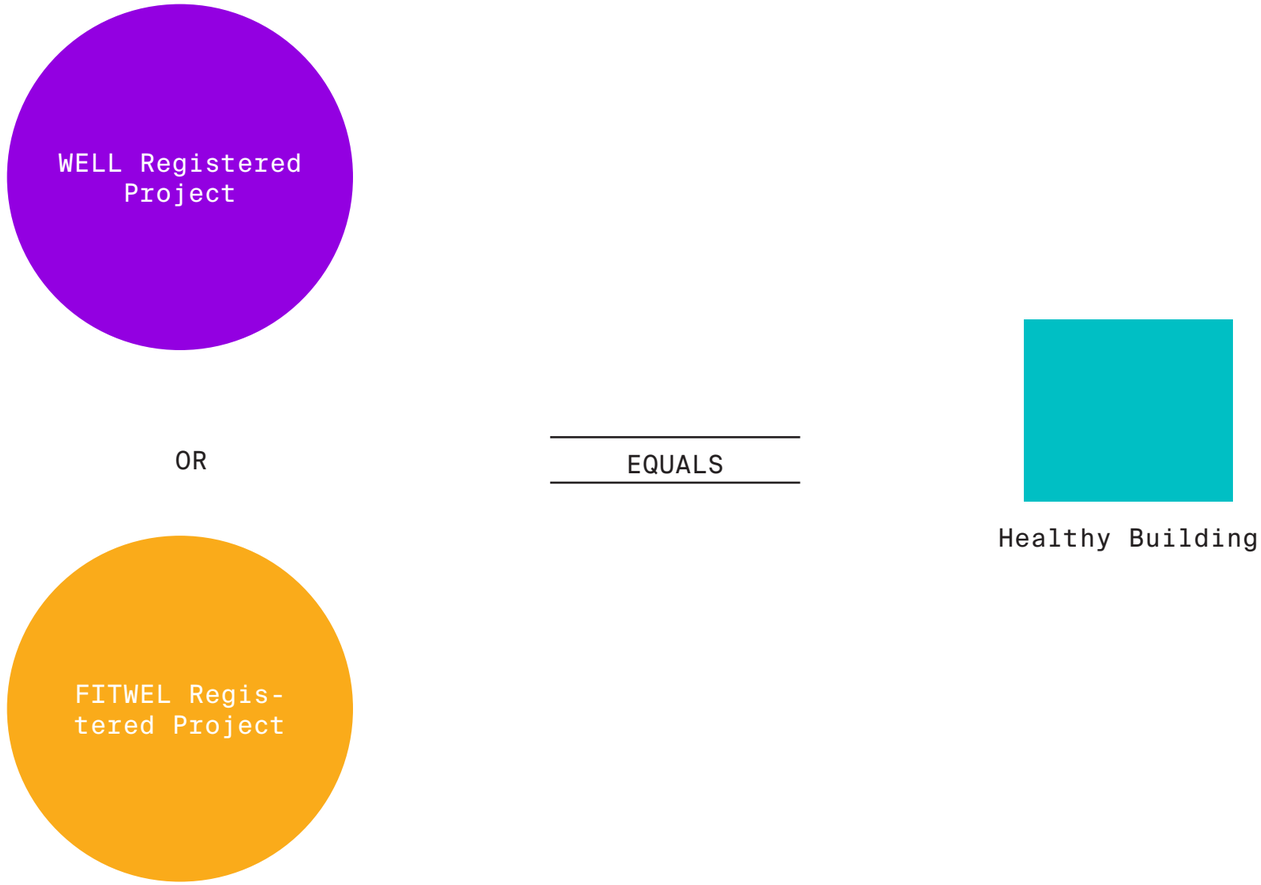
how we identify that a contract is healthy

Identification strategy: healthy

We identify that a contract as healthy if they are fitwel or well registered, and occurs after the earliest certification date in that market.

Our identification strategy is seeking a rigorous matching strategy for time and location of the healthy building experience.

1. Collect publicly available addresses from WELL and Fitwel which results in [755] office projects spanning the United States.
2. From here, we identify the top 10 healthy-building cities, resulting in [407] projects spanning Atlanta, Boston, Chicago, Denver, Los Angeles, New York, Philadelphia, San Francisco, Seattle, and Washington D.C.



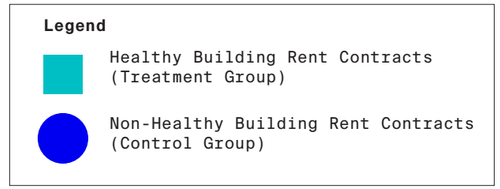
matching to financial information

Identification strategy

We identify healthy building contracts and pair them with non-healthy building contracts.

Our identification strategy is seeking a rigorous matching strategy for time and location of the healthy building experience.

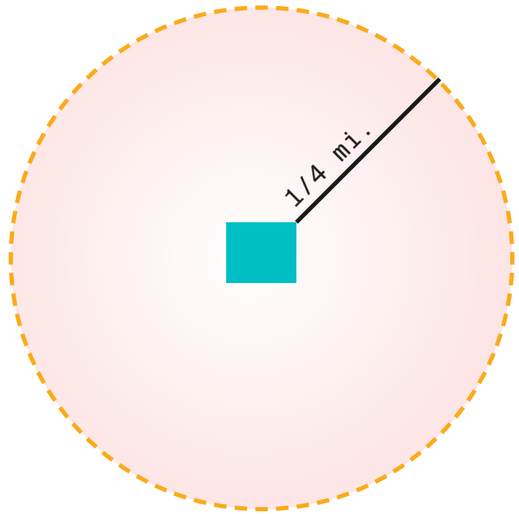
3. We then extract CompStak rental contract data points in each of the ten cities from the earliest certification date, resulting in [45,733] data points.
4. To investigate the impact of healthy buildings, we match each of these certified buildings to nearby commercial buildings in the same market to ensure neighborhood quality controls, similar to Kok et al., (2010)'s Doing Well by Doing Good.
5. Based on the address, we draw a radius of one quarter mile.



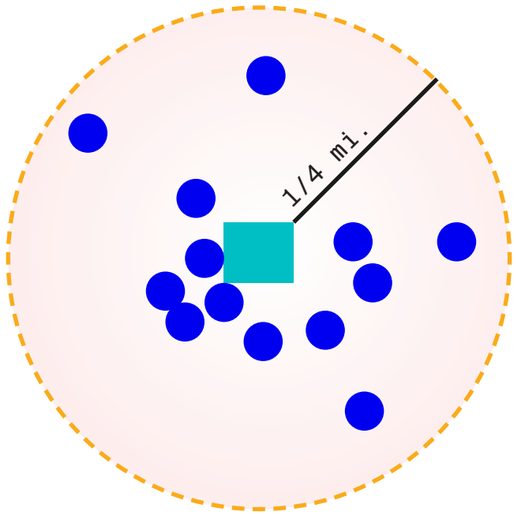
Healthy Building Rental Contracts

Healthy Building rental contracts are identified.

Disclaimer: we observe rental contracts as opposed to building level transactions for now.



Based on the address, we draw a radius of one quarter mile.



To investigate the impact of healthy buildings, we match each of these certified buildings to nearby commercial buildings in the same market.

Using Compstak data we examine the effective rent characteristics of healthy and non-healthy spaces.

Sample statistics

A sample of 2,324 certified healthy effective rent leases and 13,533 non-certified matched leases over the 2016 to 2020 (6) period.

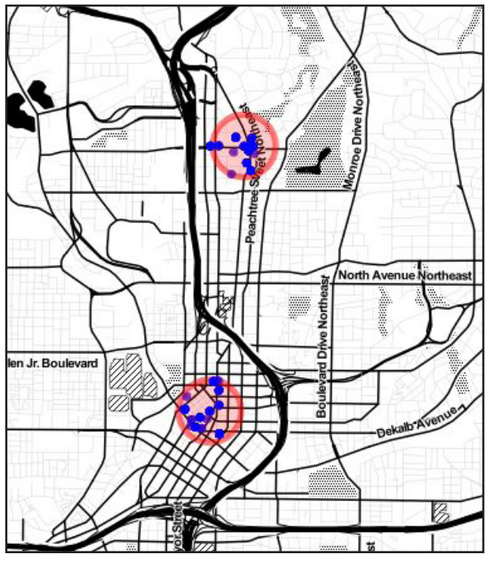
Healthy Building Descriptives

Statistic	N	Mean	St. Dev.	Min	Max
Fitwel	2,324	0.6	0.5	0	1
Well	2,324	0.4	0.5	0	1
Effective Rent (per Year)	2,324	56.4	29.4	1.2	246.6
Logged Effective Rent	2,324	3.9	0.6	0.2	5.5
Transaction Squarefoot	2,324	24,725.0	56,902.0	227	1,463,234
Year Built	2,324	1,967.9	28.2	1,895	2,019
Building Age	2,324	49.9	28.1	-2	124
Year Renovated	2,324	2,006.8	9.8	1,936.0	2,019.0
Renovated Building (Yes=1)	2,324	0.8	0.4	0	1
Commencement Year	2,324	2,017.8	1.2	2,016	2,020
Building Class A (Yes=1)	2,324	0.9	0.3	0	1
Building Class B (Yes=1)	2,324	0.1	0.3	0	1
Building Class C (Yes=1)	2,324	0.001	0.03	0	1
Tenant Broker (Yes=1)	2,324	0.3	0.4	0	1
Landlord Broker (Yes=1)	2,324	0.3	0.5	0	1
Lease Term (in months)	2,324	89.5	49.4	12.0	368.0
Free Rent (in months)	2,324	4.5	4.7	0	36
Work Type: As Is (Yes=1)	2,324	0.1	0.3	0	1
Work Type: Tenant Improv (Yes=1)	2,324	0.7	0.5	0	1
Work Type: Built to Suit (Yes=1)	2,324	0.002	0.04	0	1
Work Type: Paint and Carpet (Yes=1)	2,324	0.003	0.1	0	1
Work Type: Pre Built (Yes=1)	2,324	0.03	0.2	0	1
Work Type: Turn Key (Yes=1)	2,324	0.02	0.1	0	1
Work Type: Other (Yes=1)	2,324	0.0	0.0	0	0
Work Type: Spec Suit (Yes=1)	2,324	0.01	0.1	0	1
Work Type: Workletter (Yes=1)	2,324	0.0	0.0	0	0
Work Type: Not Specified (Yes=1)	2,324	0.0	0.0	0	0
Transaction Type: Expansion (Yes=1)	2,324	0.1	0.3	0	1
Transaction Type: New Lease (Yes=1)	2,324	0.5	0.5	0	1
Transaction Type: Extension(Yes=1)	2,324	0.03	0.2	0	1
Transaction Type: Renewal (Yes=1)	2,324	0.2	0.4	0	1
Transaction Type: NA (Yes=1)	2,324	0.0	0.0	0	0

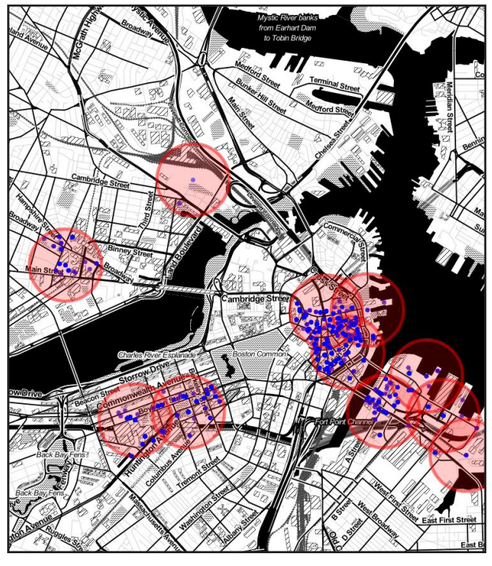
Control Building Descriptives

Statistic	N	Mean	St. Dev.	Min	P	Max
Fitwel	13,533	0.0	0.0	0		0
Well	13,533	0.0	0.0	0		0
Effective Rent (per Year)	13,533	53.3	23.7	0.8		448.8
Logged Effective Rent	13,533	3.9	0.5	-0.3		6.1
Transaction Squarefoot	13,533	15,718.0	40,859.9	60		1,122,702
Year Built	13,533	1,956.7	33.3	1,765		2,020
Building Age	13,533	61.1	33.2	-3		254
Year Renovated	13,533	2,002.1	12.3	1,912.0		2,019.0
Renovated Building (Yes=1)	13,533	0.6	0.5	0		1
Commencement Year	13,533	2,017.8	1.1	2,016		2,020
Building Class A (Yes=1)	13,533	0.6	0.5	0		1
Building Class B (Yes=1)	13,533	0.3	0.5	0		1
Building Class C (Yes=1)	13,533	0.1	0.2	0		1
Tenant Broker (Yes=1)	13,533	0.2	0.4	0		1
Landlord Broker (Yes=1)	13,533	0.2	0.4	0		1
Lease Term (in months)	13,533	76.1	44.3	12.0		396.0
Free Rent (in months)	13,533	3.5	4.3	0		50
Work Type: As Is (Yes=1)	13,533	0.1	0.3	0		1
Work Type: Tenant Improv (Yes=1)	13,533	0.6	0.5	0		1
Work Type: Built to Suit (Yes=1)	13,533	0.002	0.04	0		1
Work Type: Paint and Carpet (Yes=1)	13,533	0.005	0.1	0		1
Work Type: Pre Built (Yes=1)	13,533	0.02	0.1	0		1
Work Type: Turn Key (Yes=1)	13,533	0.03	0.2	0		1
Work Type: Other (Yes=1)	13,533	0.000	0.01	0		1
Work Type: Spec Suit (Yes=1)	13,533	0.01	0.1	0		1
Work Type: Workletter (Yes=1)	13,533	0.001	0.02	0		1
Work Type: Not Specified (Yes=1)	13,533	0.0	0.0	0		0
Transaction Type: Expansion (Yes=1)	13,533	0.1	0.3	0		1
Transaction Type: New Lease (Yes=1)	13,533	0.5	0.5	0		1
Transaction Type: Extension(Yes=1)	13,533	0.03	0.2	0		1
Transaction Type: Renewal (Yes=1)	13,533	0.2	0.4	0		1
Transaction Type: NA (Yes=1)	13,533	0.0	0.0	0		0

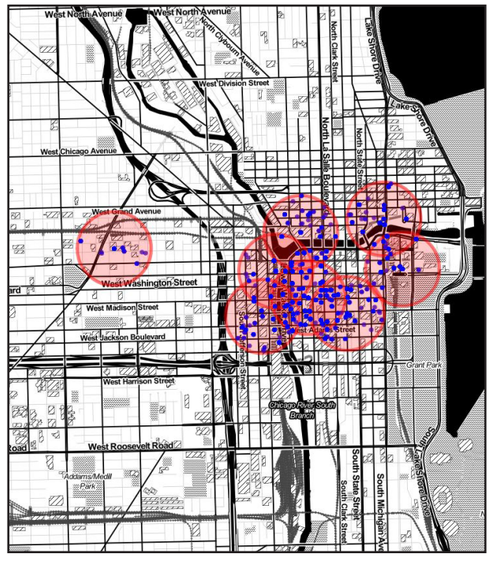
Certified and Registered Healthy Contract Locations and nearby control contract locations.



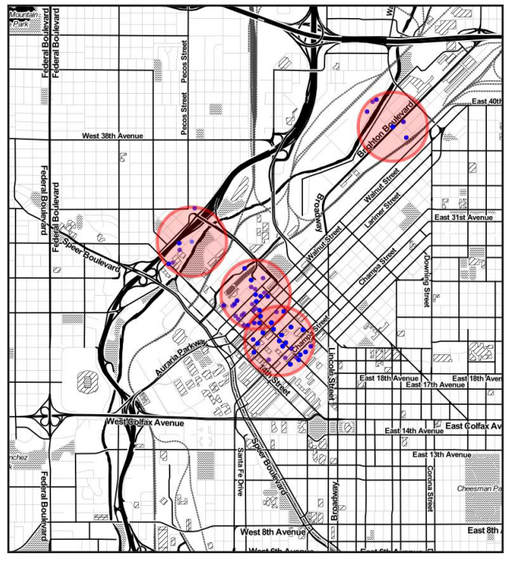
Atlanta



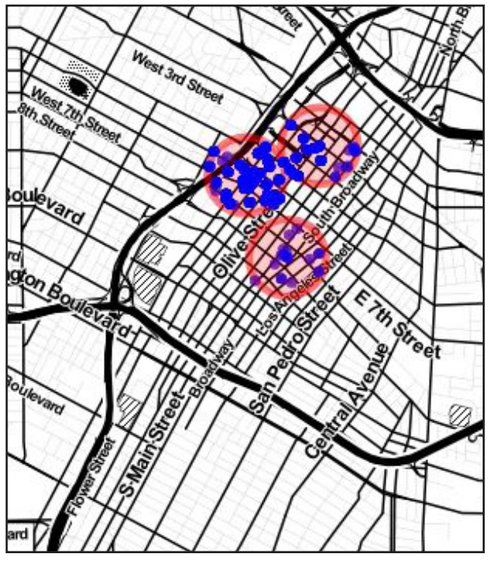
Boston



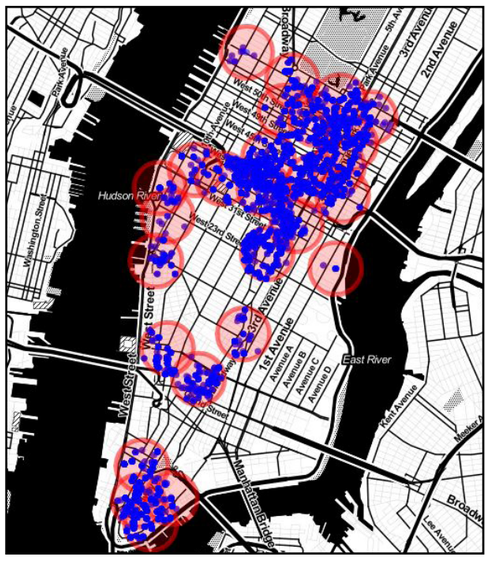
Chicago



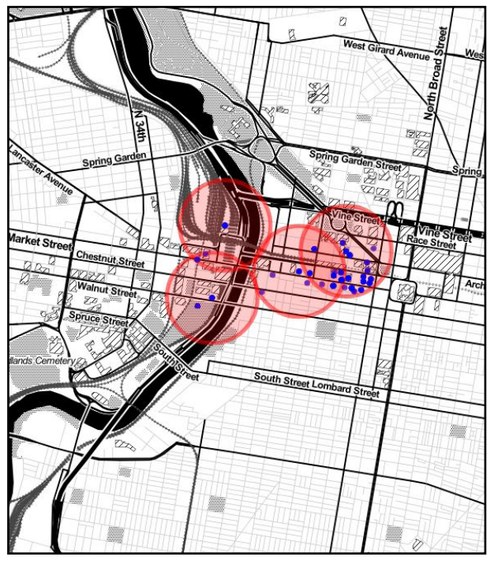
Denver



Los Angeles

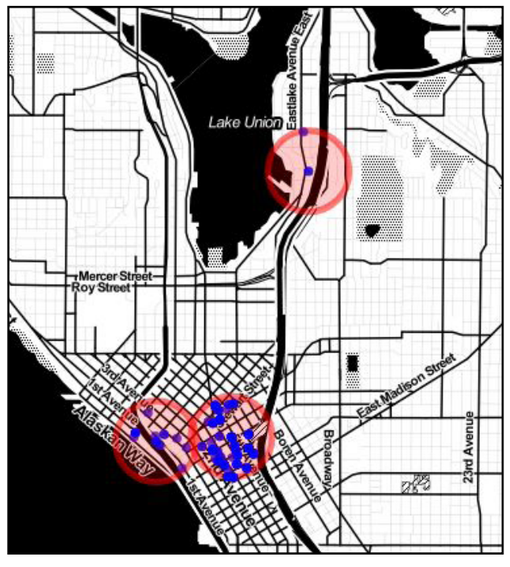


New York

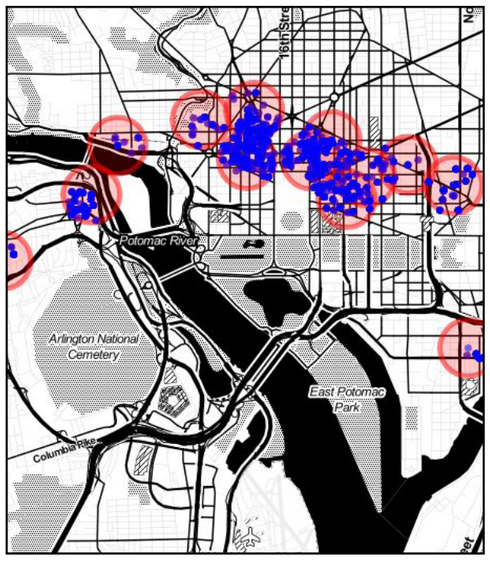


Philadelphia

San Francisco



Seattle



Washington DC

Legend

250 meter radius cluster

Non-Healthy Building Rent Contracts (Control Group)

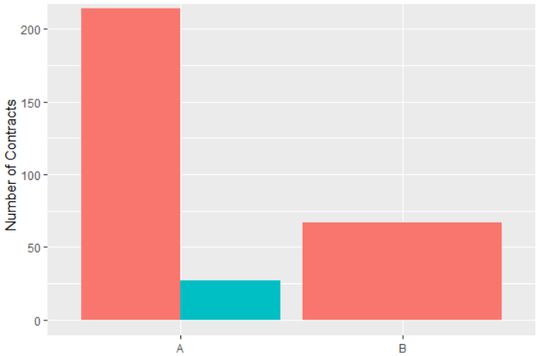
total number of healthy leases
2324

Healthy Lease Distribution

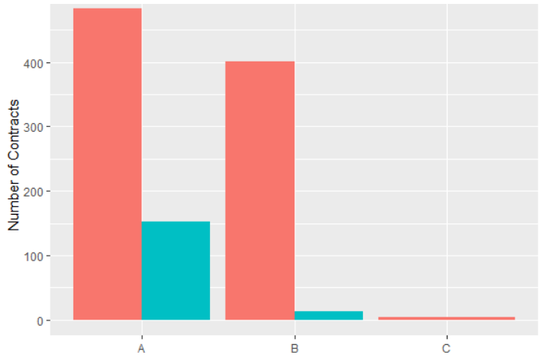
New York is densest health certified environment in the US, followed by San Francisco and Washington DC

City	Healthy Projects	Healthy Rental Contracts	Non-Healthy Rental Contracts	Earliest Certification Date
Atlanta	23	35	244	9/1/2017
Boston	29	179	854	6/27/2017
Chicago	38	343	1717	10/11/2016
Denver	18	56	249	1/29/2018
Los Angeles	37	252	774	9/22/2016
New York	128	992	5718	11/8/2016
Philadelphia	14	39	84	11/1/2018
San Francisco	59	249	2333	11/8/2016
Seattle	20	43	187	12/21/2018
Washington DC	41	136	1373	6/9/2017
	407	**2324**	**13533**	

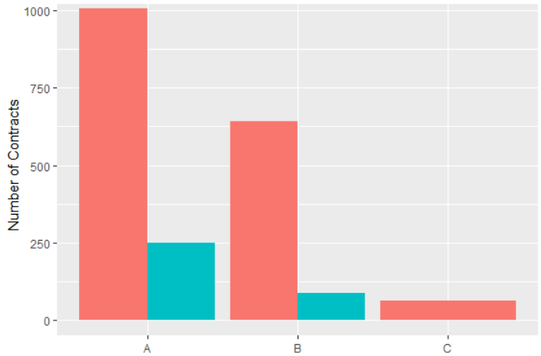
Sample by Building Class and City



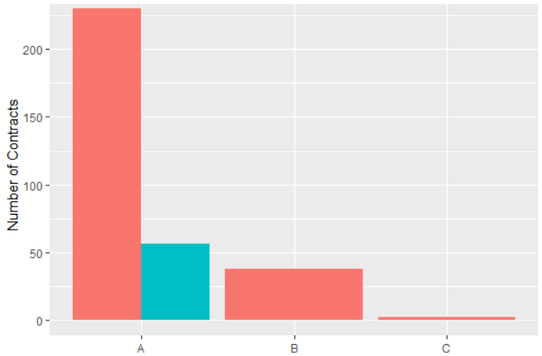
Atlanta



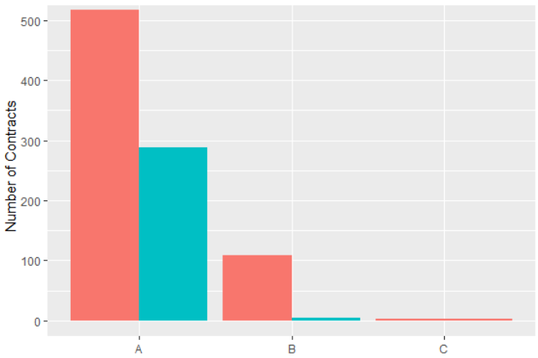
Boston



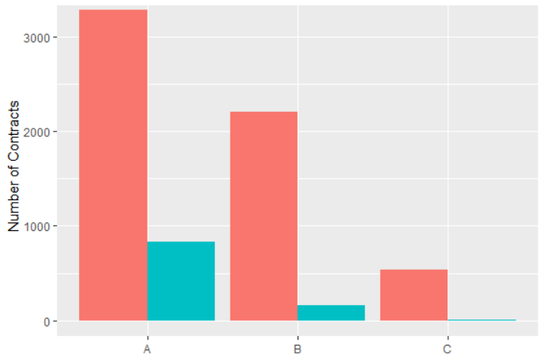
Chicago



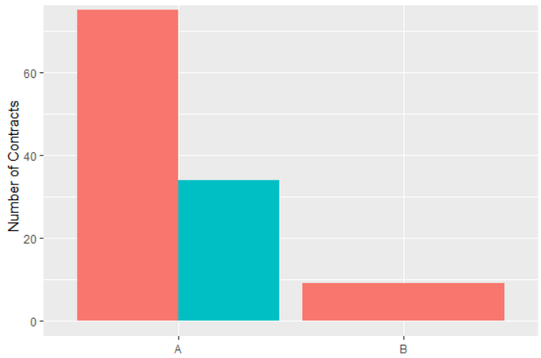
Denver



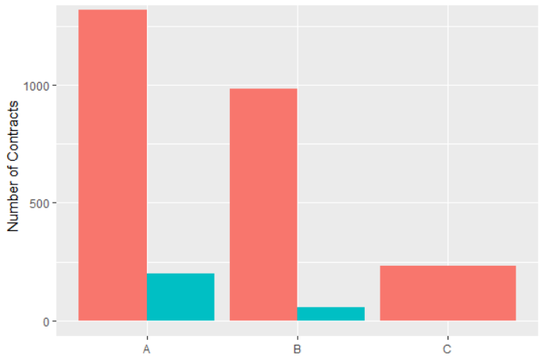
Los Angeles



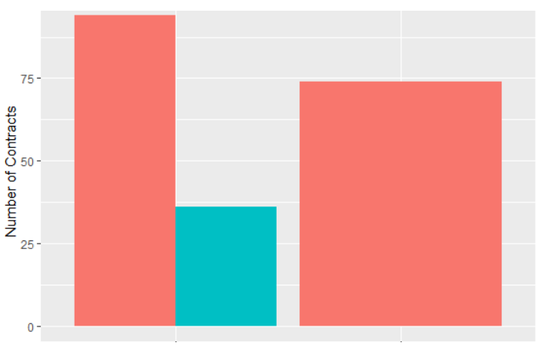
New York



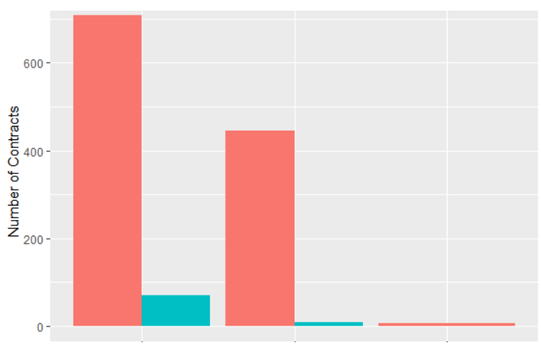
Philadelphia



San Francisco



Seattle



Washington DC

Legend

Healthy Building Rent Contracts (Treatment Group)

Non-Healthy Building Rent Contracts (Control Group)

Study Framework

Question: What is the relative financial impact of certified healthy buildings as measured by effective rents in US markets?

Data Source and Observational Unit:
CompStak (Private database)
WELL (Publicly available data)
FitwelP**U**blicly available data)

Data Time and Place: Effective Rent Contracts from 2016 in top ten markets
Outcome: Effective Rent per square foot (logged for estimation)

Model Explains/Predicts: Explains

Method: Econometric Linear Regression

Features: Health Certification, Effective Rent (USD), Building Floors, Transaction Quarter, Commencement Date, Transaction Square footage, Year Built, Year Renovated, Building Class, Submarket, Execution Date
Lease Term, Total Transaction Size
Transaction Type, Free Rent, Work Value (USD)

Effective Rent Contracts Quantity:

Non-Health Certified: 13,533 Effective Rent Contracts (Control Group)

Health Certified: 2,324 Effective Rent Contracts (Treatment Group)

Explaining Effective Rents

We employ a regression framework to explain effective rents with a treatment variable.

We estimated a semi-log linear regression model where we explain the effective rent per square foot for a given lease contract (i) as a cross-section, where (Z_i), building features (T_i), lease contract features (R_i), time and location fixed effects (sub-market), is the healthy contract dummy, where the value is 1 if the lease was for a healthy certified space(S_i) (

$$logP_i = \alpha + \phi Z_i + \theta T_i + \delta R_i + \beta S_i + \varepsilon$$

The explanatory variable is the effective rent per square foot for a given contract. We observe individual lease contracts over the earliest certification date by market.

Effective Rent for Certified Buildings

results of the hedonic model explain between 65 and 70 percent of the effective rent per square foot

Notable findings:

- Healthy buildings effective rents transact between 4 and 7% more per square foot than their nearest unhealthy neighbor peers.
- Lease duration, building age, renovation and building class have the anticipated pricing effect.
- City rents relative to Boston make sense. LA, New York and San Franciso have higher effective rents per square foot.

	Dependent variable:			
	Logarithm of Effective Rent per Sqft			
	(Location)	(+Time)	(+Building Char.)	(+Lease Char.)
Healthy Contract (Certified ==1)	0.07*** (0.01)	0.07*** (0.01)	0.05*** (0.01)	0.04*** (0.01)
Building Class A (Yes = 1)			0.14*** (0.01)	0.14*** (0.01)
Building Class B (Yes = 1)			0.06*** (0.01)	0.06*** (0.01)
Building Age (in years)			-0.001*** (0.0001)	-0.001*** (0.0001)
Renovated Building (Yes = 1)			0.02*** (0.01)	0.03*** (0.01)
Log Transaction Size				-0.02*** (0.002)
Lease Term (in months)				0.002*** (0.0001)
Free Rent Months (in months)				-0.01*** (0.001)
Tenant and Broker Flag				
Tenant Broker (Yes = 1)				-0.01 (0.01)
Landlord Broker (Yes = 1)				0.02*** (0.01)
Constant	3.77*** (0.01)	3.75*** (0.09)	3.64*** (0.09)	3.61*** (0.09)
Location Fixed-Effects	YES	YES	YES	YES
Transaction Period Fixed Effects	NO	YES	YES	YES
Tenant Industry Fixed Effects	NO	NO	NO	YES
Lease Improvement Types	NO	NO	NO	YES
Transaction Types	NO	NO	NO	YES
Observations	15,857	15,857	15,857	15,857
R2	0.65	0.66	0.67	0.70
Adjusted R2	0.65	0.66	0.67	0.70
Residual Std. Error	0.29 (df = 15789)	0.29 (df = 15771)	0.29 (df = 15767)	0.27 (df = 15448)
F Statistic	445.69*** (df = 67; 15789)	368.12*** (df = 85; 15771)	366.54*** (df = 89; 15767)	338.89*** (df = 107; 15448)

Note: *p<0.1; **p<0.05; ***p<0.01

healthy buildings point to value

Preliminary Results

What we have found so far

Healthy Buildings are gaining traction fast. Relative to green building certification at the same time, there 2x as many contracts according to internal data in the REI Lab.

The Covid-19 pandemic makes this outcome relevant for investors, the financial performance of healthy buildings that pays particular attention to the health and well being of occupants is critical to our return to a “new normal” in the office environment where tenants and landlords will now discuss air quality as a important feature in their leases

These preliminary financial results point to similar outcomes to green building rental outcomes. Kok et al., (2010) found effective rents were 2.8% more per square foot. We are finding a comparable 4.4% more per square foot for the top ten US markets.

Future work, we will seek out transaction data with RCA to estimate any transaction outcomes for the 407 healthy certified projects.