green-buildings

Nemo

8/16/2021

No we do not agree with the inference of the stat-guru.

While the guru's explanation sounds logical, the guru relies heavily on the assumption that the *green rating* of a building is the sole driver behind the rent of a property.

A simple linear regression run on the rent premium against green building indicates that it is statistically very signficant.

```
##                Estimate Std. Error  t value     Pr(>|t|)
## (Intercept)   0.7119434  0.1156967 6.153532 7.947381e-10
## green_rating1 2.4124581  0.3927573 6.142363 8.524150e-10
```

Coefficient of Green_Rating: 2.4125; P-Value: 8e-10

However, our model suffers from an extremely high bias and has a very low R^2. This is a clear indicator that our model is inadequate.

Thus we try looking for confounding variables.

```
## 1 ) MLR, green-building rating with CS_PropertyID : Non Confounding
## 2 ) MLR, green-building rating with cluster : Non Confounding
## 3 ) MLR, green-building rating with size : Non Confounding
## 4 ) MLR, green-building rating with empl_gr : Non Confounding
## 5 ) MLR, green-building rating with leasing_rate : Non Confounding
## 6 ) MLR, green-building rating with stories : Non Confounding
## 7 ) MLR, green-building rating with age : Non Confounding
## 8 ) MLR, green-building rating with renovated : Non Confounding
## 9 ) MLR, green-building rating with class_a : Confounding
## 10 ) MLR, green-building rating with class_b : Non Confounding
## 11 ) MLR, green-building rating with net : Non Confounding
## 12 ) MLR, green-building rating with amenities : Non Confounding
## 13 ) MLR, green-building rating with cd_total_07 : Non Confounding
## 14 ) MLR, green-building rating with hd_total07 : Non Confounding
## 15 ) MLR, green-building rating with total_dd_07 : Non Confounding
## 16 ) MLR, green-building rating with Precipitation : Non Confounding
## 17 ) MLR, green-building rating with Gas_Costs : Non Confounding
## 18 ) MLR, green-building rating with Electricity_Costs : Non Confounding
```

Therefore, It seems that whether a building is rated as a ***Class-A*** listing is actually an underlying confounding variable with the *Rent* and *Green Ratings*

THis is not surprising since a *Class-A* listing is the most desirable property and will be superior to its neighbourhood competition in terms of not only amenities and services but will also be technologically superior and therefore will have lower costs. All these factors will raise the price and also increase the chances that the property qualifies as a *Green* building.

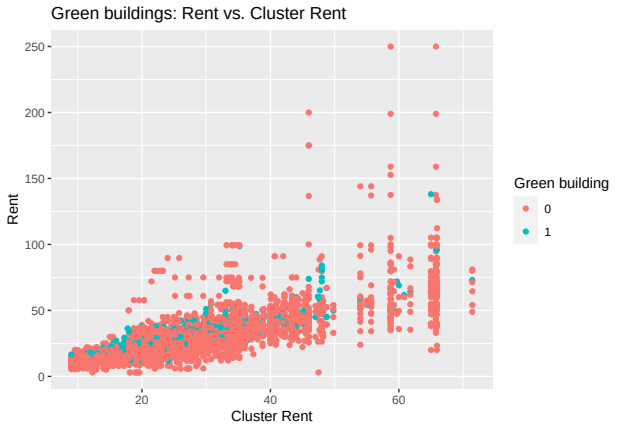
```
##                 Estimate Std. Error   t value
## (Intercept)   -0.7401308  0.1405214 -5.267032
## green_rating1  0.6688835  0.3979776  1.680706
## class_a1       4.0091931  0.2286928 17.530914
```

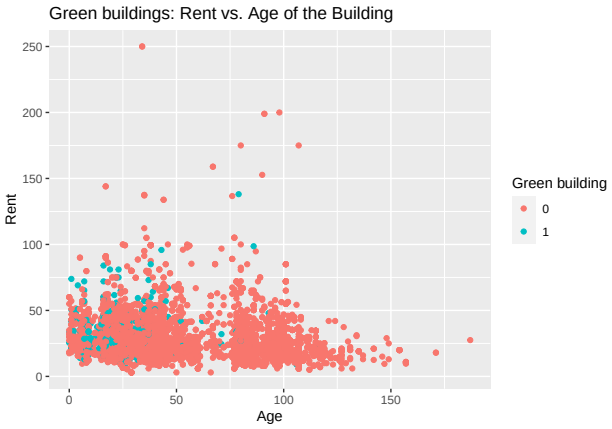
The T-statistic shows that at a 95% confidence, *Green Rating* is in fact not statistically significant in determining the rent!

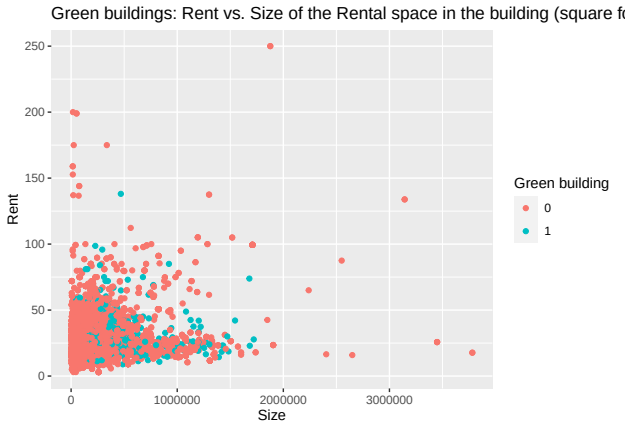
It is the Class-A rating which determines the rent instead!!

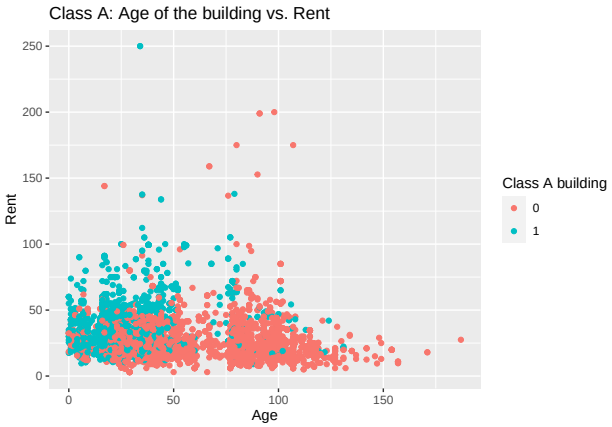
The medians (black lines on the box-plots) and means (the red stars) of green and non-green building revenue per square foot show that green buildings have higher revenue. The non -green buildings have a lower mean than the green buildings

Visualizations



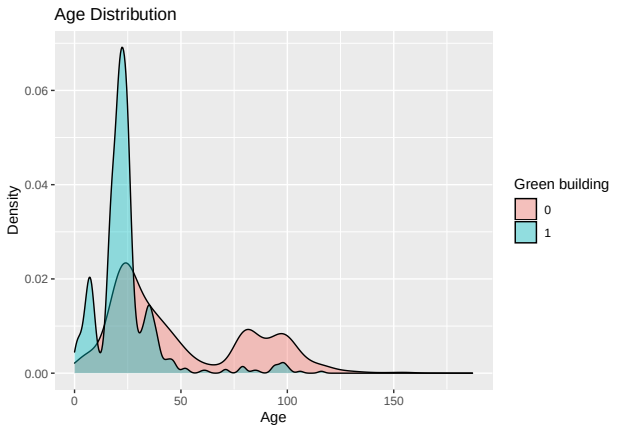


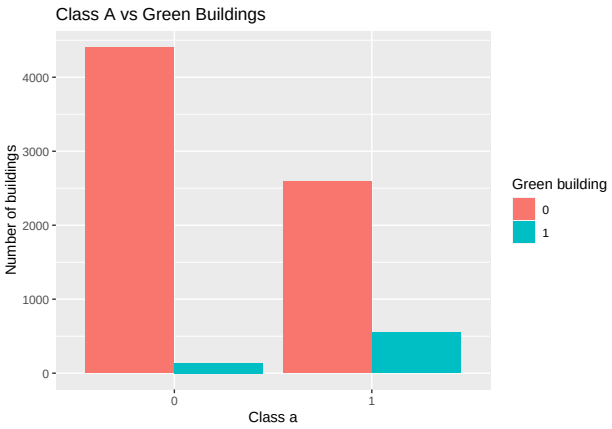


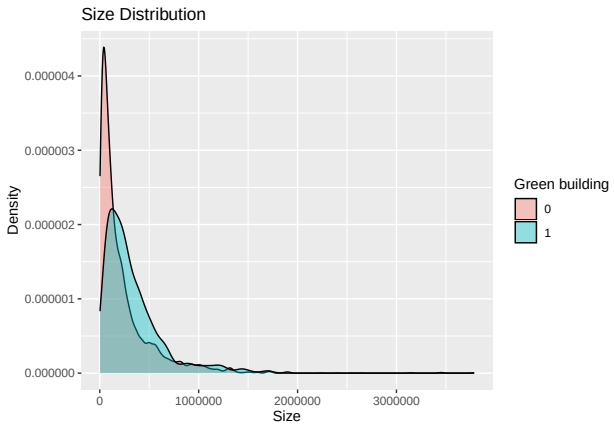


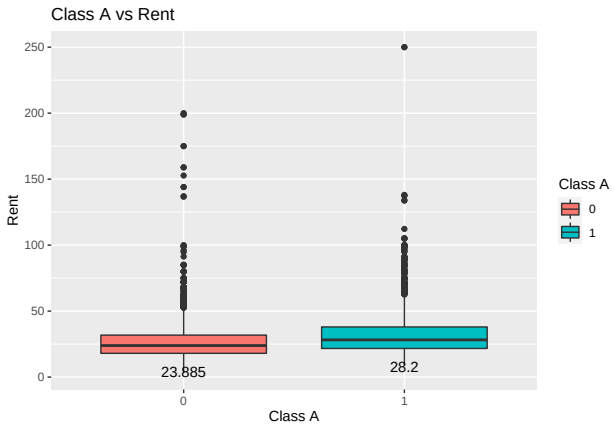
##Inference

- There is a correlation between rent and the cluster rent
- The size of the rental space in the building is also correlated with the Rent
- A Class buildings appear to be younger
- Age does not not seem to have a high correlation with rent
- Class A buildings have higher rent






Size Distribution
Density
0.000004
0.000003
0.000002
0.000001
0.000000
0
1000000
2000000
3000000
Size
Green building
0
1


Class A vs Rent
Rent
250
200
150
100
50
0
23.885
28.2
0
1
Class A
Class A
0
1