Vertical Sorting, Height Premiums and Productivity in Multi-Tenant Office Buildings

P5 Presentation

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22-06-2020

PERSONALIA

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CONTENTS

1 RESEARCH INTRODUCTION

2 METHODOLOGY

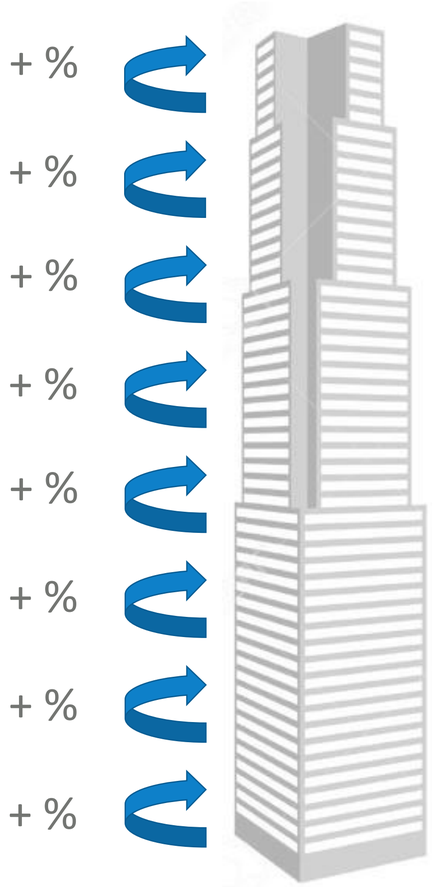
3 ANALYSIS

4 CONCLUSION & DISCUSSION

DEFINITIONS

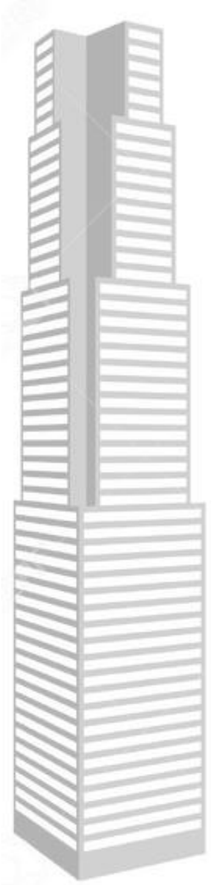
Floor Level Price Premiums

The extra price paid for a higher vertical location in terms of floor levels

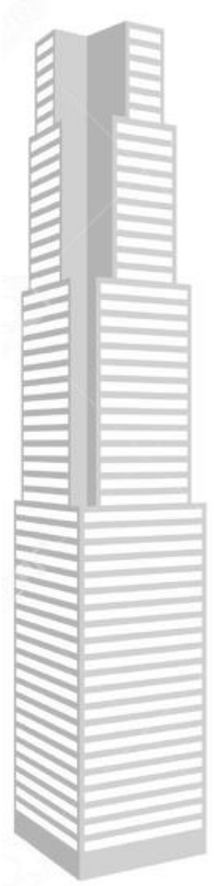


Vertical Sorting

Vertical composition of tenants within a building, caused by the tension between access and amenities



* example



Financial Sector

Consultancy & Research

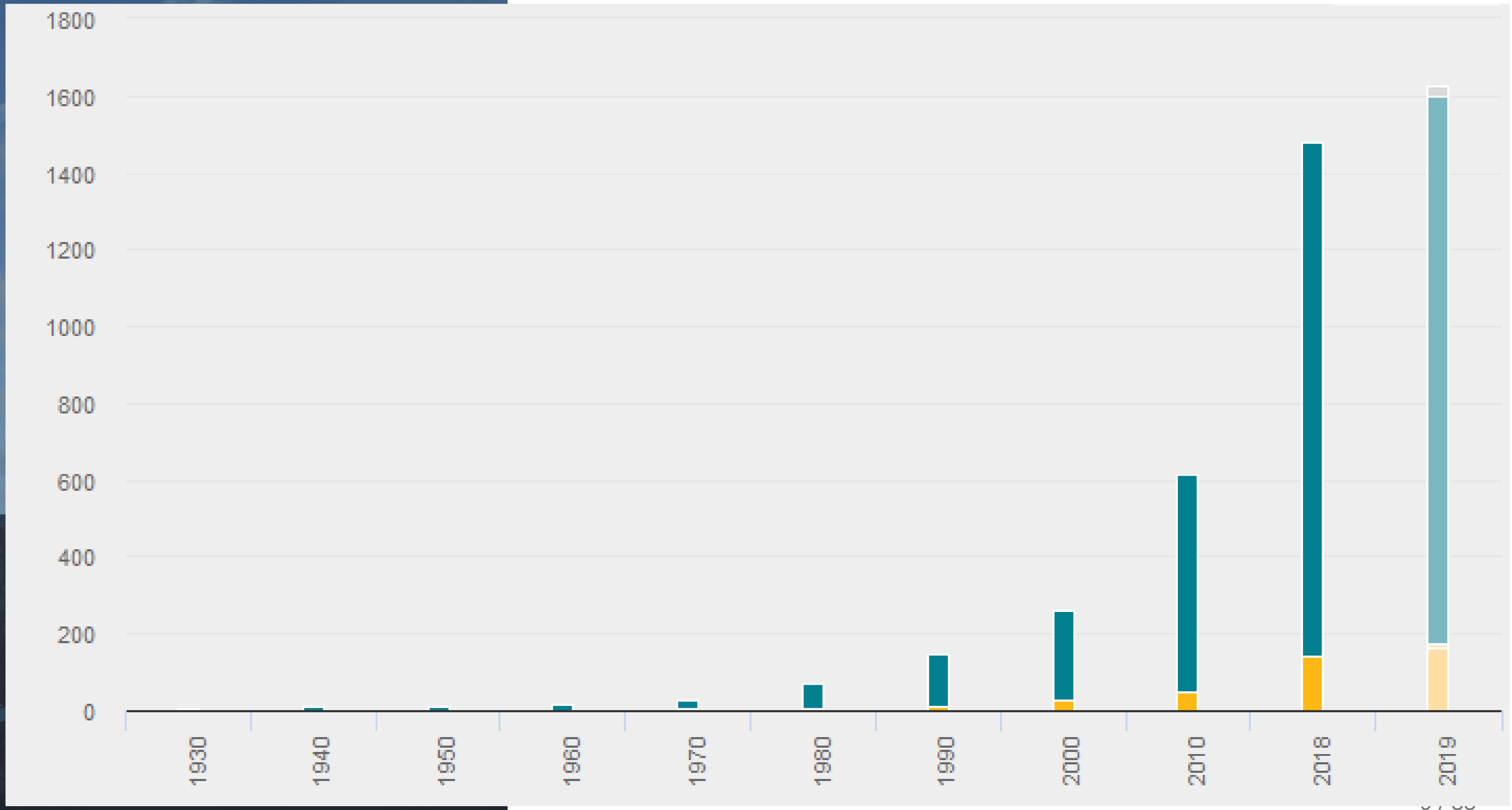
Law Services

ICT Services

Productivity

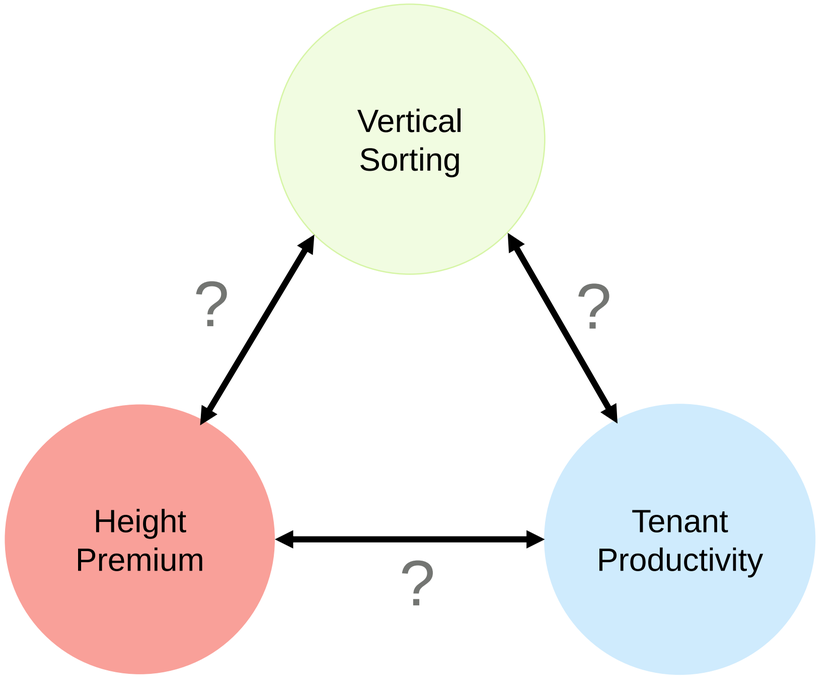
In this study, the value when a company’s revenue is divided by the number of employees

Company X Productivity =


1800
1600
1400
1200
1000
800
600
400
200
0
1930
1940
1950
1960
1970
1980
1990
2000
2010
2018
2019

*What is **the interrelationship** between **price premiums** per floor level, **vertical sorting** and **productivity** of firms in multi-tenant office buildings in the three largest cities (Amsterdam, Rotterdam & The Hague) of the Netherlands?*

INTRODUCTION



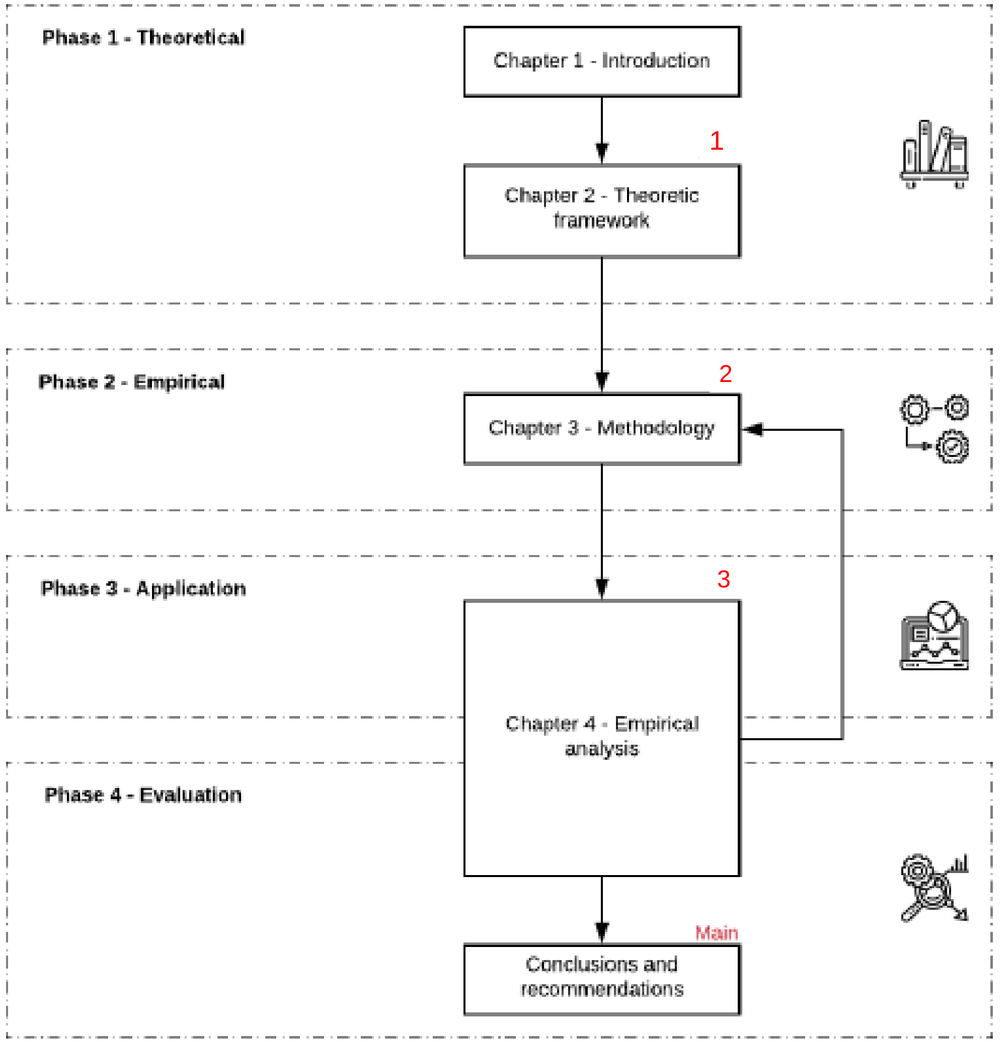
Sub-questions

- What are the **determinants** of building height?

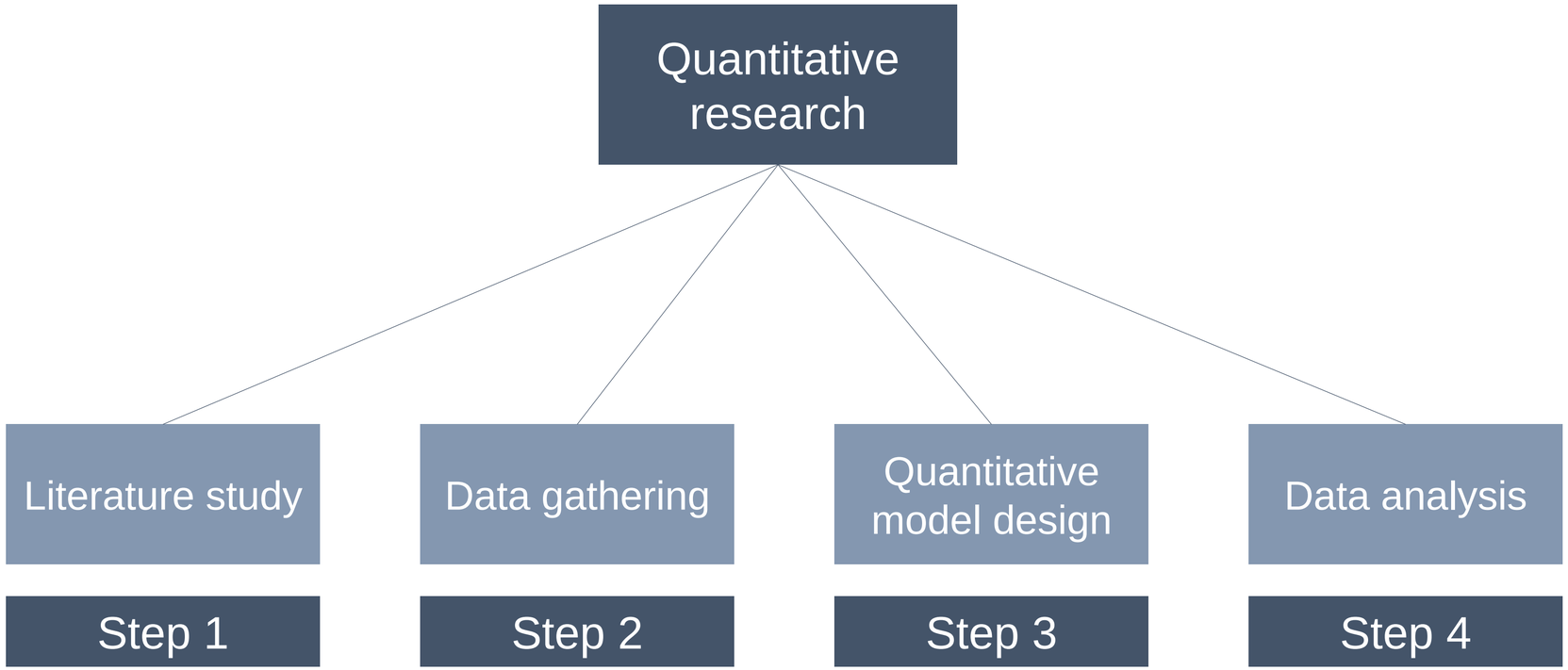
- How can the interrelationship between productivity, price premium and vertical sorting per rental transaction be determined **through a model**?

- How do the **different tenant sectors** affect vertical price premiums within the three cities?

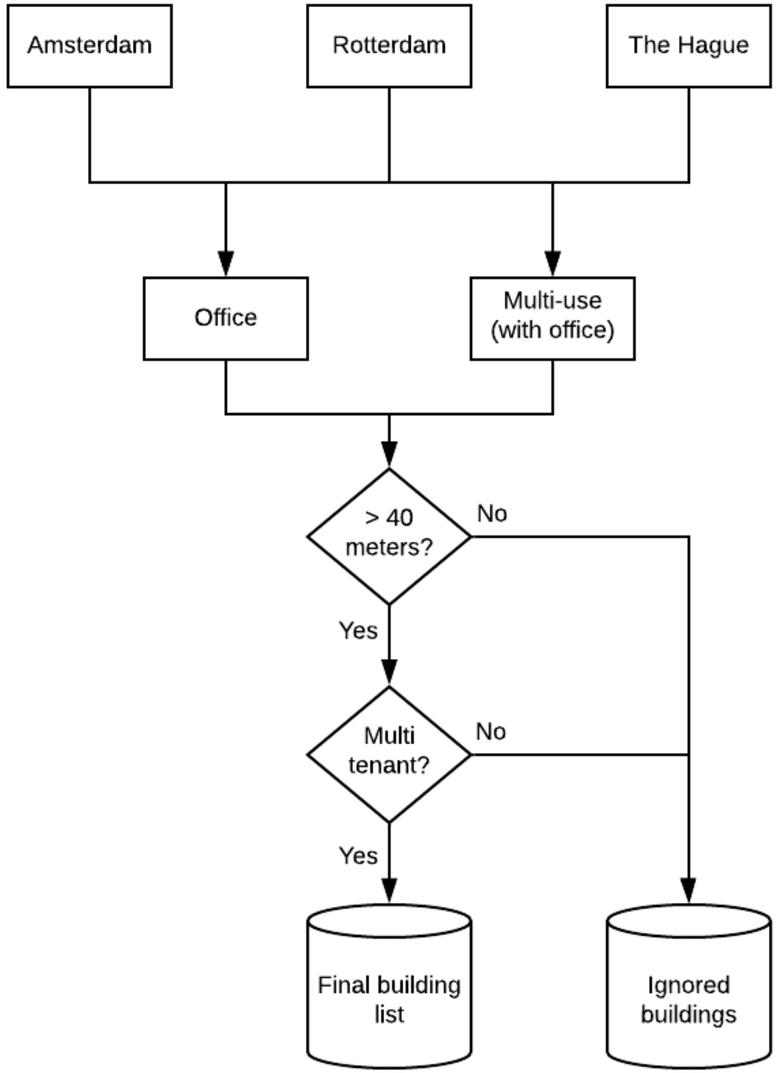
METHODOLOGY



akd

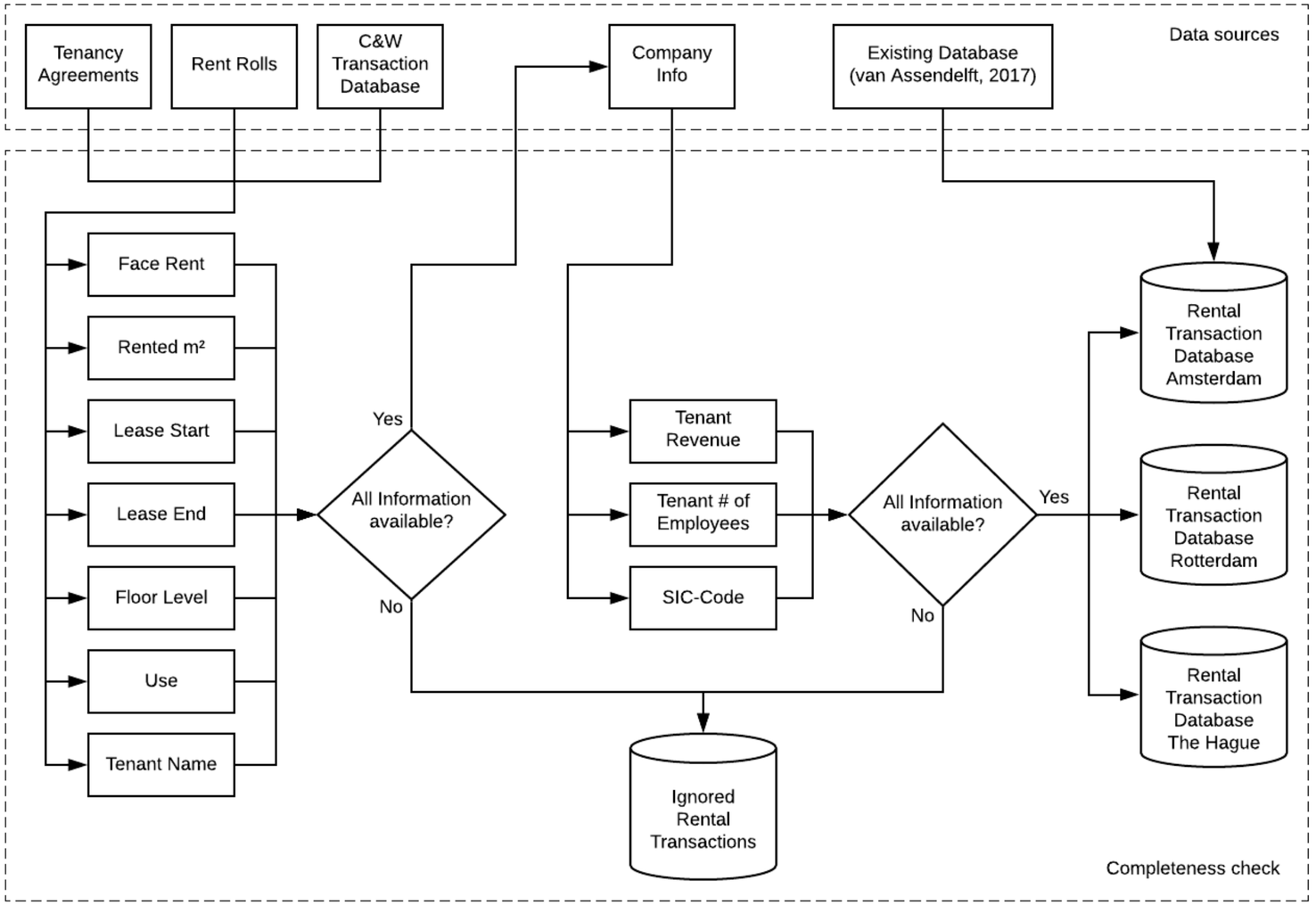

Quantitative research
Literature study
Data gathering
Quantitative model design
Data analysis
Step 1
Step 2
Step 3
Step 4

akd


Amsterdam
Rotterdam
The Hague
Office
Multi-use (with office)
> 40 meters?
No
Yes
Multi tenant?
No
Yes
Final building list
Ignored buildings

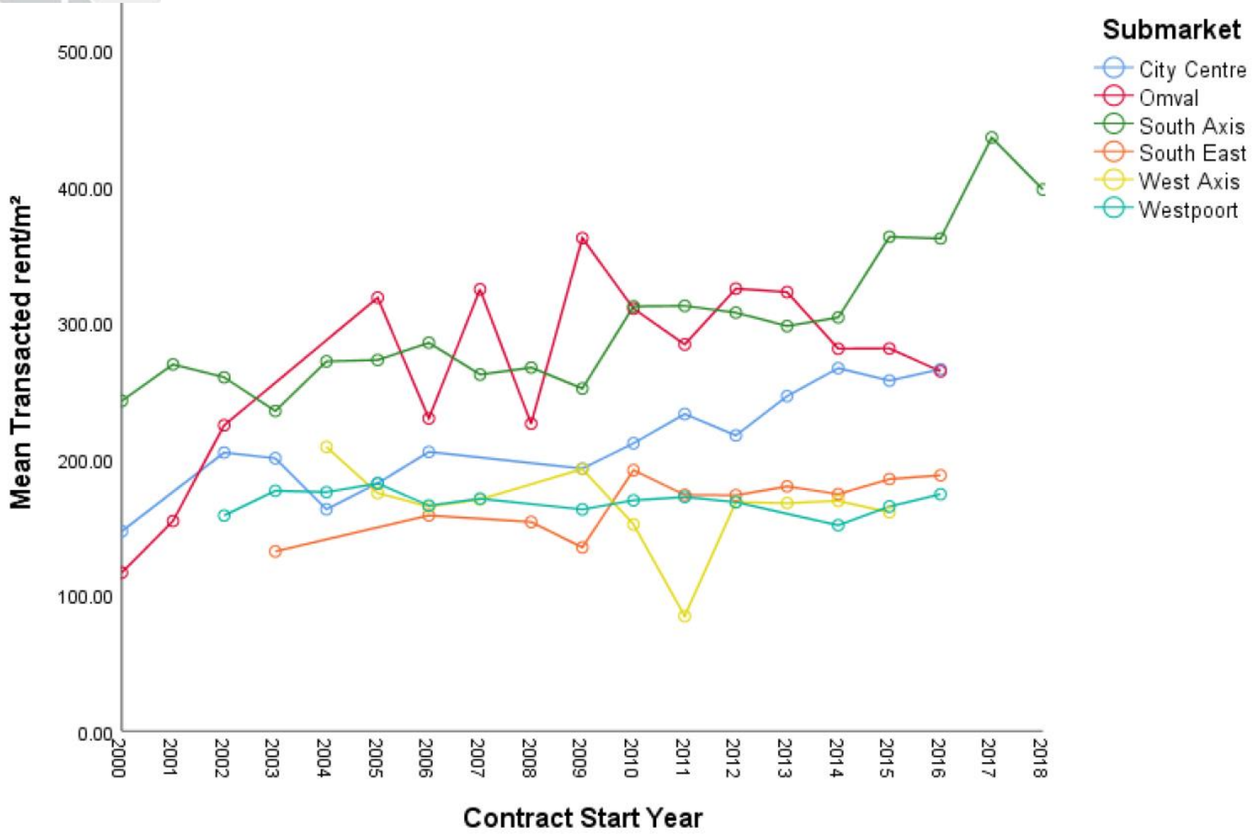
	Tall office buildings	Multi-tenant buildings	Final building list	Percentage of tall building stock
Amsterdam	76	41	34	82,9%
Rotterdam	57	30	21	70,0%
The Hague	36	9	6	66,7%
Total	169	80	61	76,3%

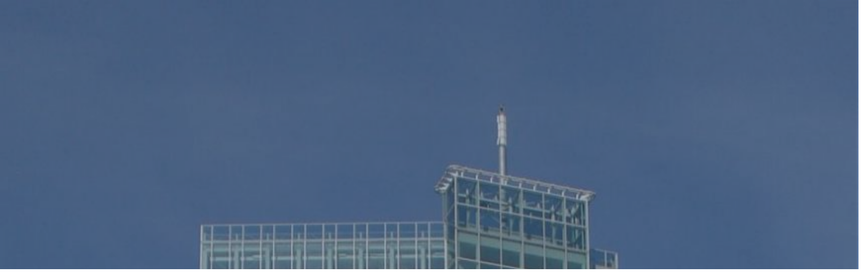
akd

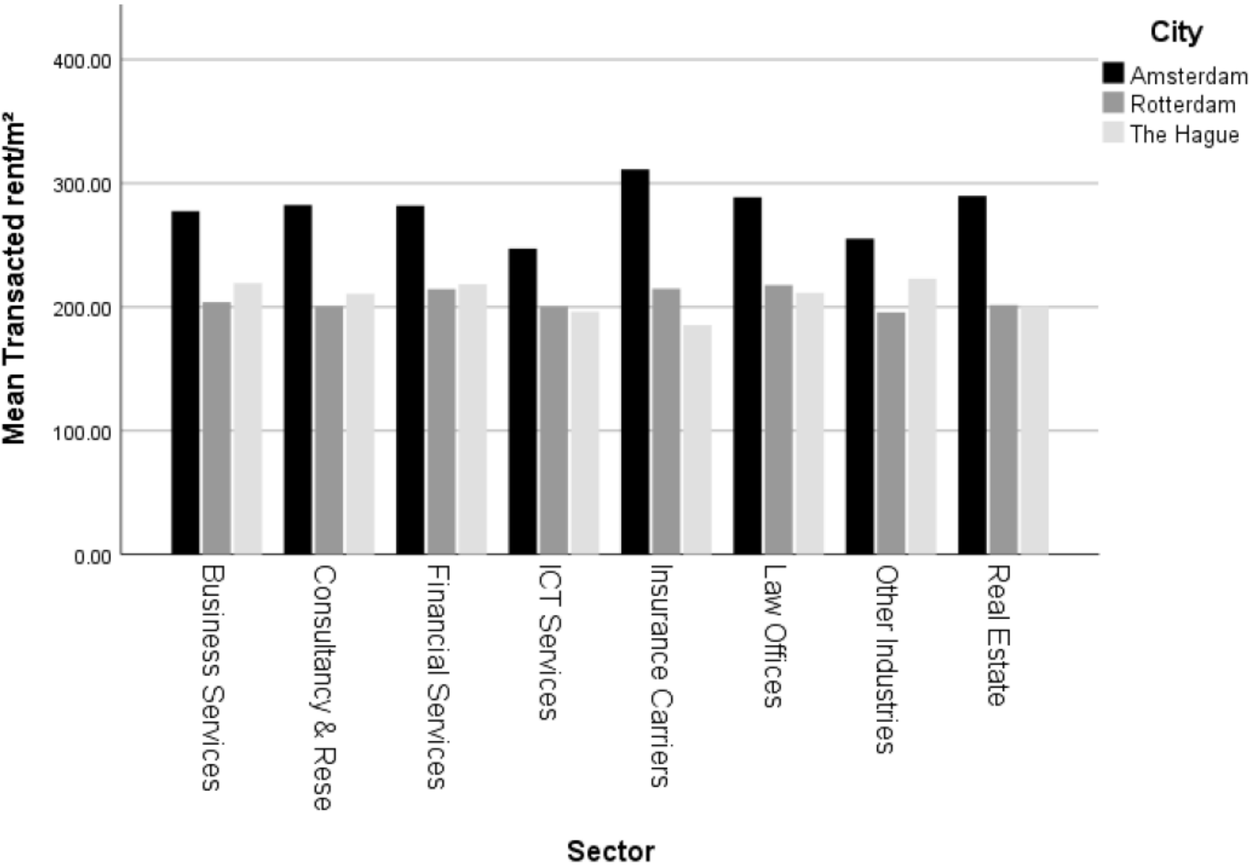

Data sources
Tenancy Agreements
Rent Rolls
C&W Transaction Database
Company Info
Existing Database (van Assendelft, 2017)
Face Rent
Rented m²
Lease Start
Lease End
Floor Level
Use
Tenant Name
All Information available?
Yes
No
Tenant Revenue
Tenant # of Employees
SIC-Code
All Information available?
Yes
No
Rental Transaction Database Amsterdam
Rental Transaction Database Rotterdam
Rental Transaction Database The Hague
Ignored Rental Transactions
Completeness check

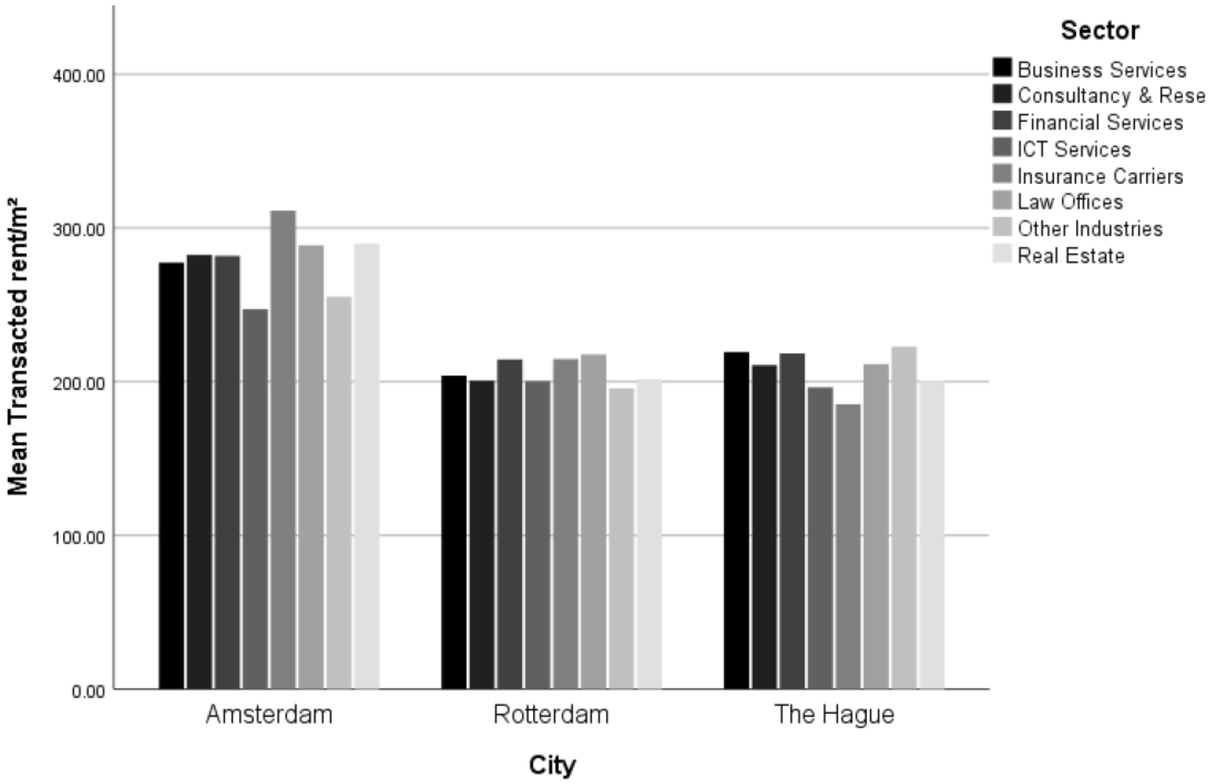
ANALYSIS

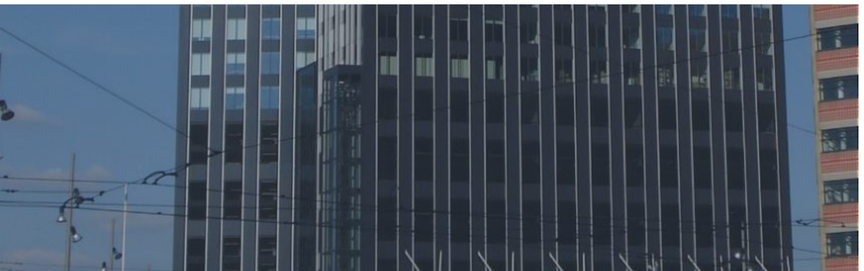
Westpoort
City Centre
West Axis
Omval
South Axis
South East

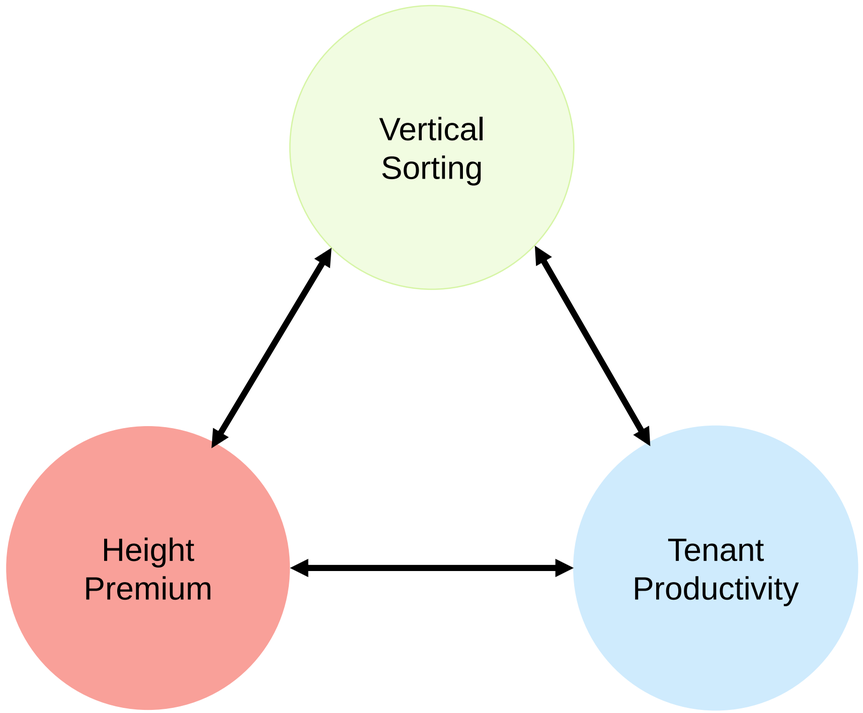

Submarket
City Centre
Omval
South Axis
South East
West Axis
Westpoort
Mean Transacted rent/m²
500.00
400.00
300.00
200.00
100.00
0.00
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Contract Start Year

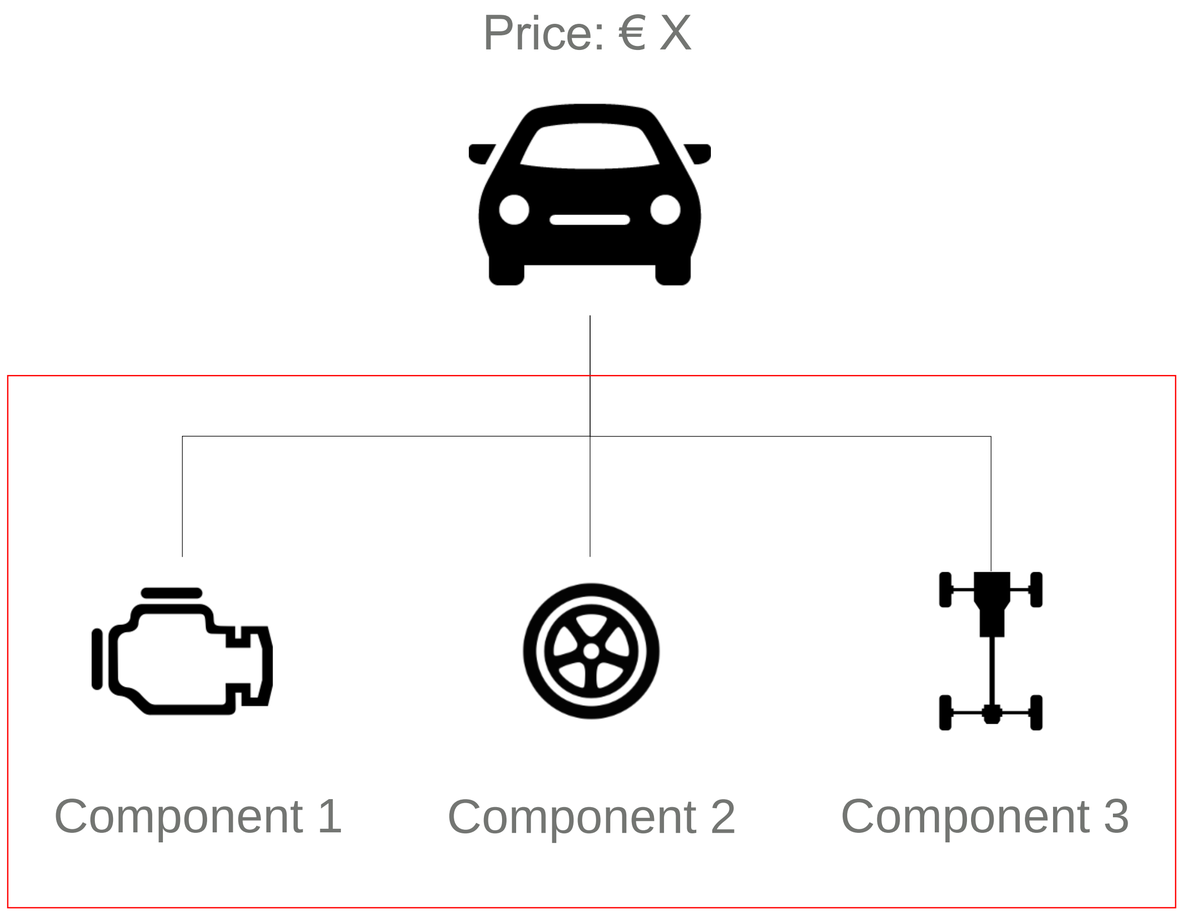



City
Amsterdam
Rotterdam
The Hague
Mean Transacted rent/m²
400.00
300.00
200.00
100.00
0.00
Business Services
Consultancy & Rese
Financial Services
ICT Services
Insurance Carriers
Law Offices
Other Industries
Real Estate
Sector

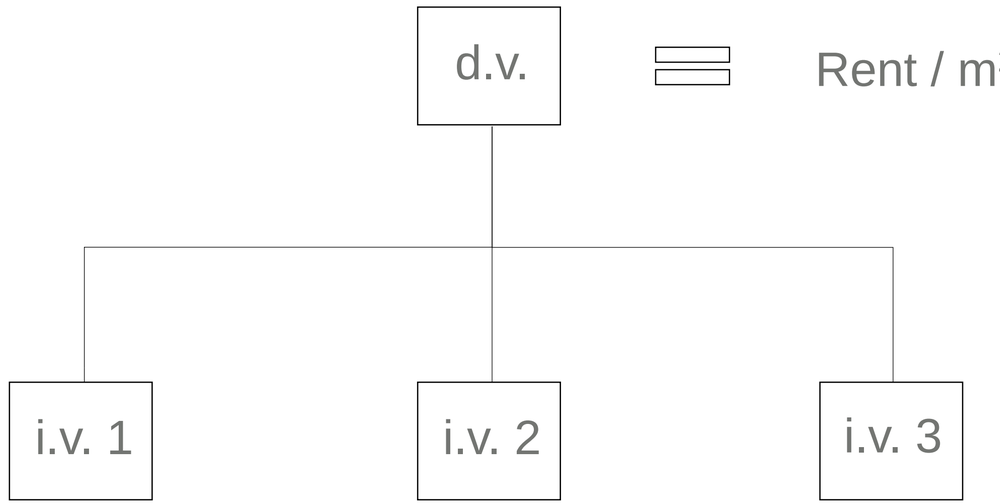

Sector
Business Services
Consultancy & Rese
Financial Services
ICT Services
Insurance Carriers
Law Offices
Other Industries
Real Estate
Mean Transacted rent/m²
400.00
300.00
200.00
100.00
0.00
Amsterdam
Rotterdam
The Hague
City




Vertical
Sorting
Height
Premium
Tenant
Productivity


Price: € X
Component 1
Component 2
Component 3
Regression model

Dependent variable



Independent variables

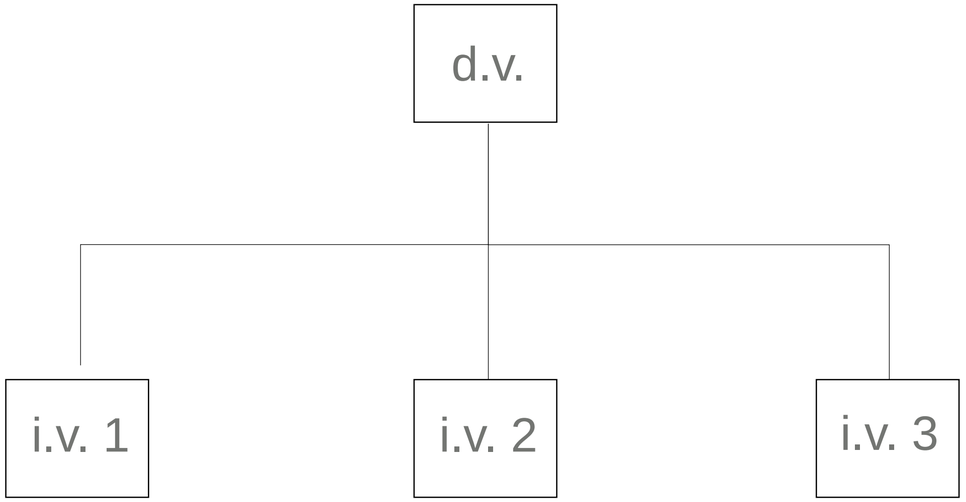
d.v. i.v.

$$Tr_i = (\beta_0 + \beta_1 Fl_i + \beta_2 B_i + \beta_3 L_i + \beta_4 Tra_{i+} + \beta_5 P_i + \beta_6 C_{i+} + \beta_7 D_i + \beta_8 T_i) + \varepsilon_i$$

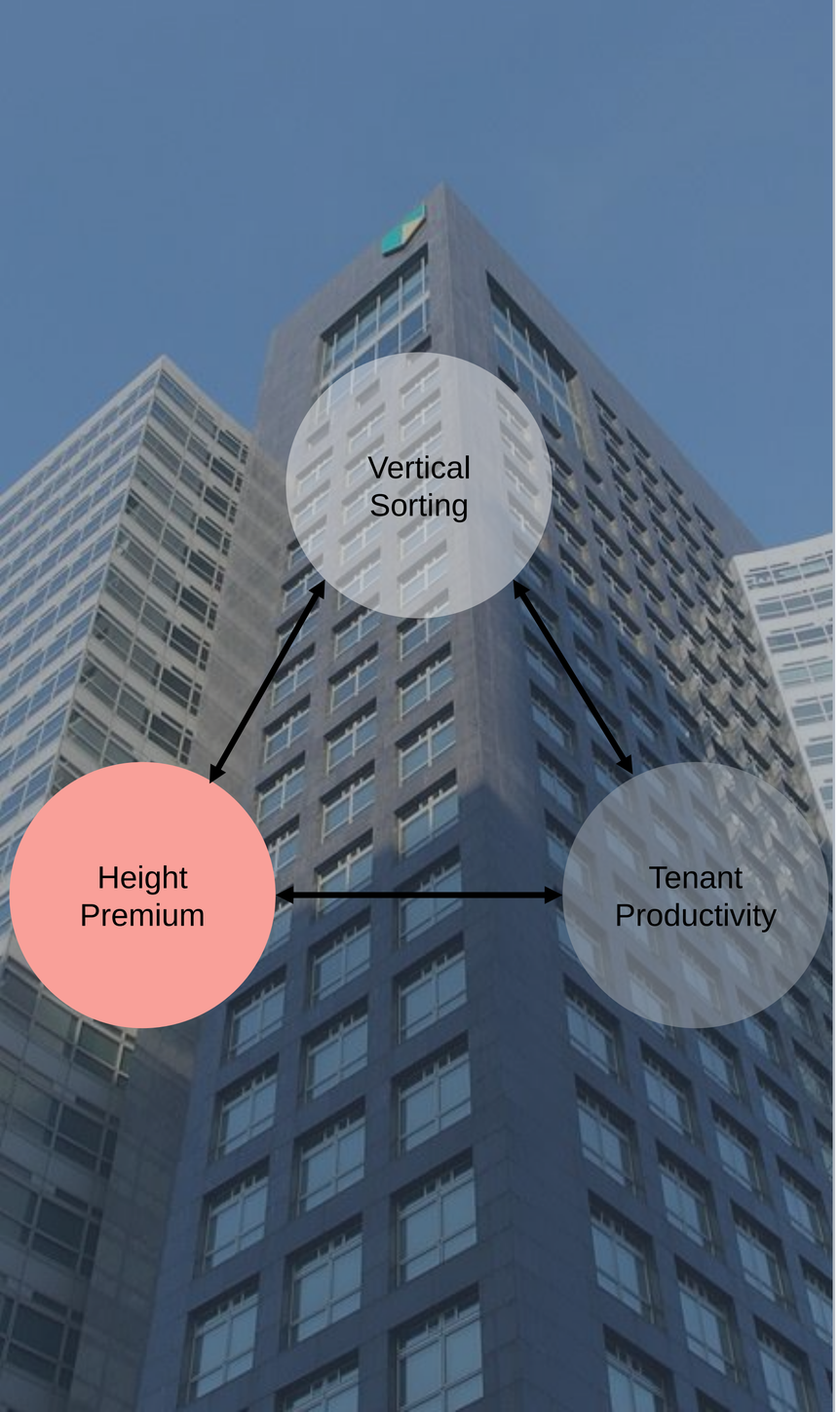
Variable	Description
Tr	Rent / m^2
Fl	Number of Floors
B	Building variables
L	Location variables
Tra	Transaction variables
P	Tenant characteristic variables
C	Sector
D	Submarket
T	Time variables

** = 99% confidence interval * = 95% confidence interval	Model 1 (Baseline Model)			Model 2			Model 3			Model 4			Model 5		
	Coefficient	t-value	VIF	Coefficient	t-value	VIF	Coefficient	t-value	VIF	Coefficient	t-value	VIF	Coefficient	t-value	VIF
Constant	5,745**														
Object # Floors	0,007**														
Object # Tenants	0,001**														
Highest Floor Level	0,006**														
Highest Floor Squared															
Relative Floor Level															
Ln Surface Area	-0,007														
Lease Term	0,003														
Ln Distance to Station	-0,001														
Ln Distance to Highway	-0,015														
Ln Age since Renovation	-0,110**														
Elevators #	0,003**														
Parking Spots	-0,0002**														
Penthouse Effect	-0,008														
Multiple Floor Tenant	0,030														
ICT Services	0,040*														
Financial Services	0,035**														
Insurance Carriers	0,041														
Real Estate	0,050*														
Business Services	0,043*														
Law Offices	0,038														
Consultancy Services	0,035**														
Ln Tenant Employees															
Ln Tenant Asset/Employee															
Ln Tenant Revenue/Employee															
Dependent variable	Ln Transacted Rent / m^2														
N	1.223														
k	49														
Nk-ratio	24,96														
Time Fixed Effects (Trans. Year)	Yes (19)														
Space Fixed Effects (Submarket)	Yes (10)														
R^2	0,730														
Adjusted R^2	0,719														
Standard Error Estimate	0,14672														

Don’t worry!



*/** = Significant

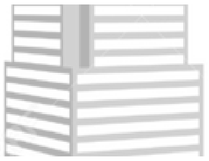


CONCLUSIONS

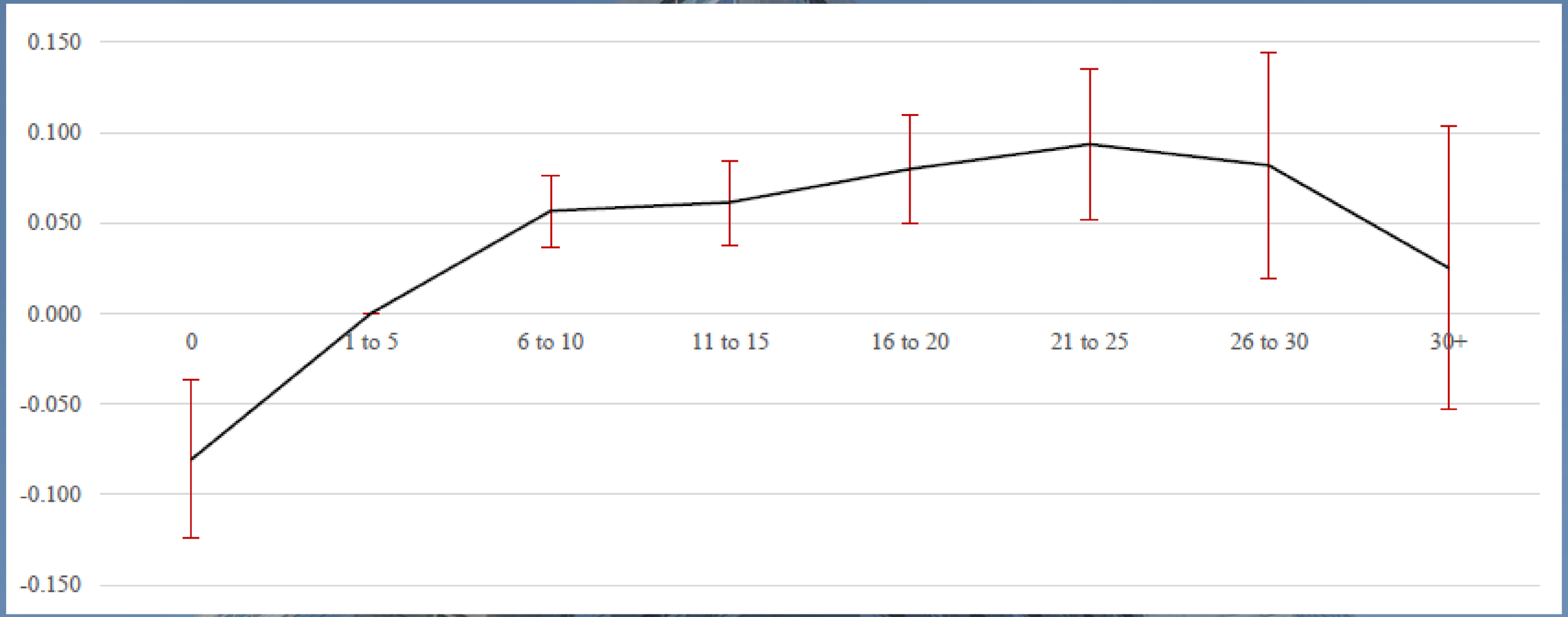
Rent per square meter increases by 0,6% per absolute floor level

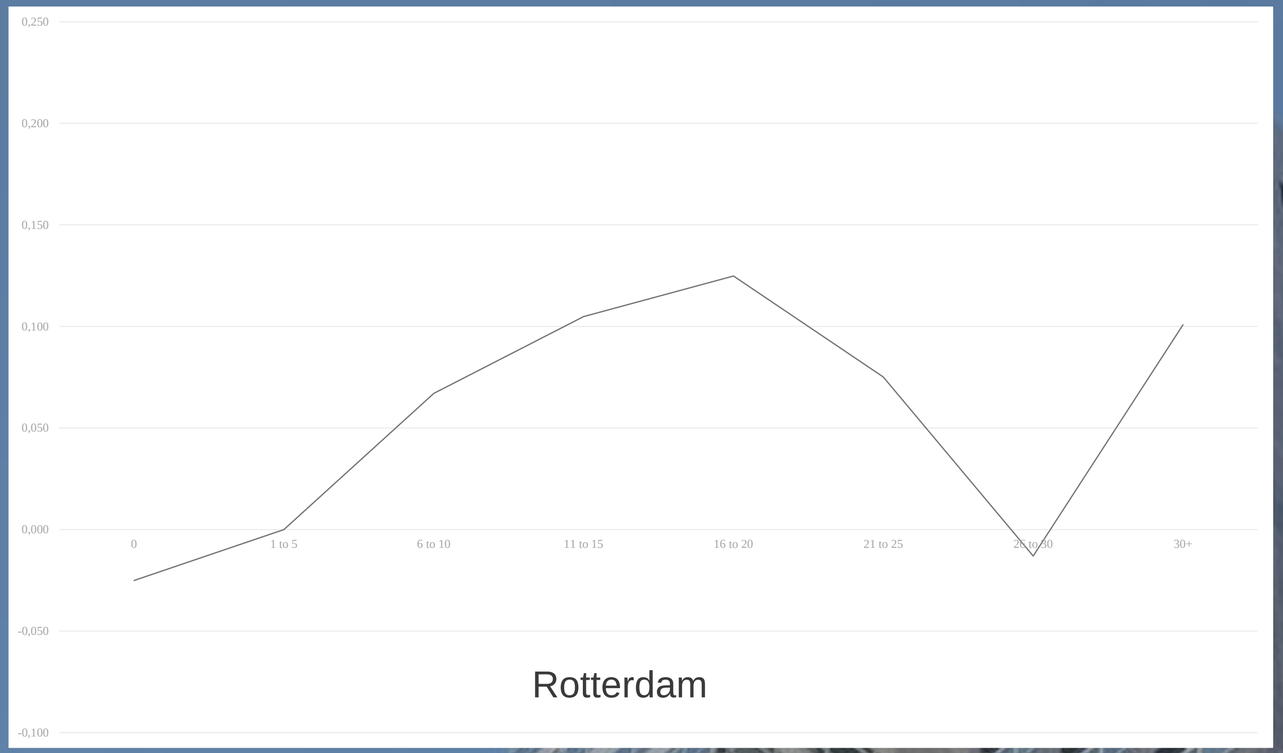
+ 0,6 %

+ 0,6 %

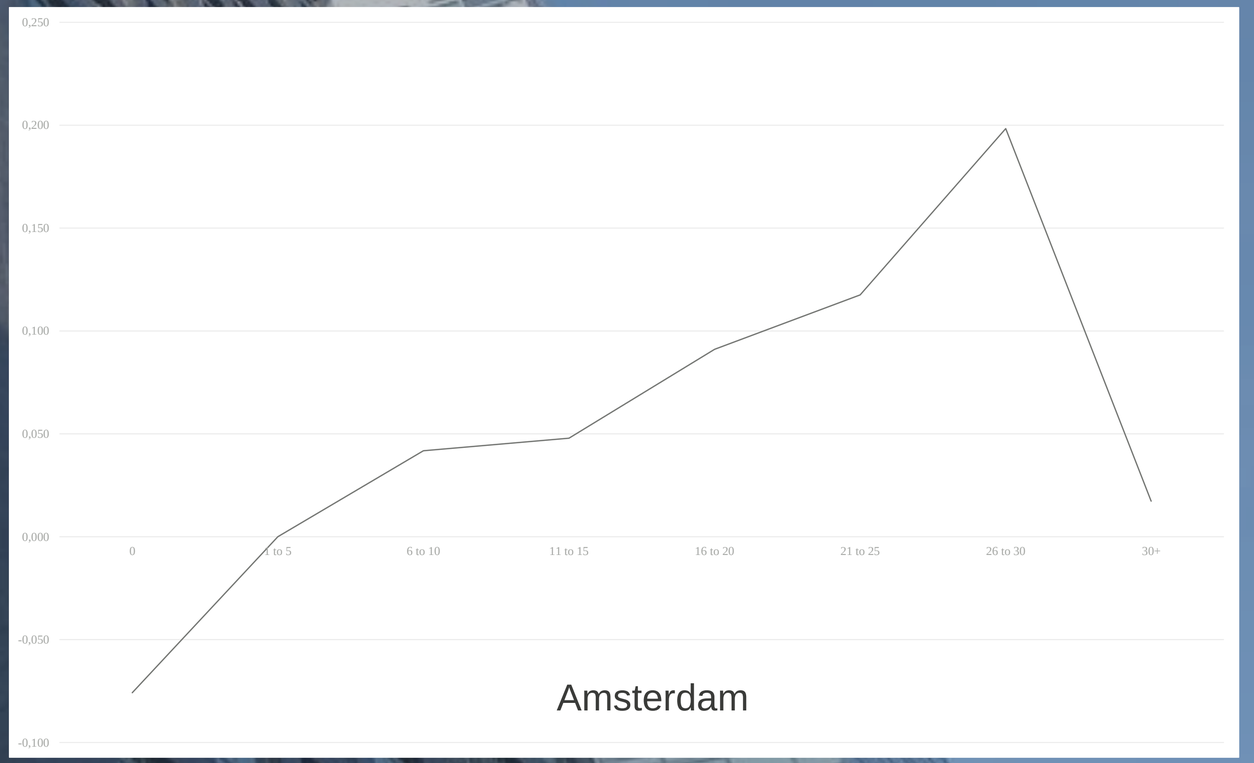


** = 99% confidence interval	Model
* = 95% confidence interval	Coefficient
Constant	5,745**
Object # Floors	0,007**
Object # Tenants	0,001**
Highest Floor Level	0,006**

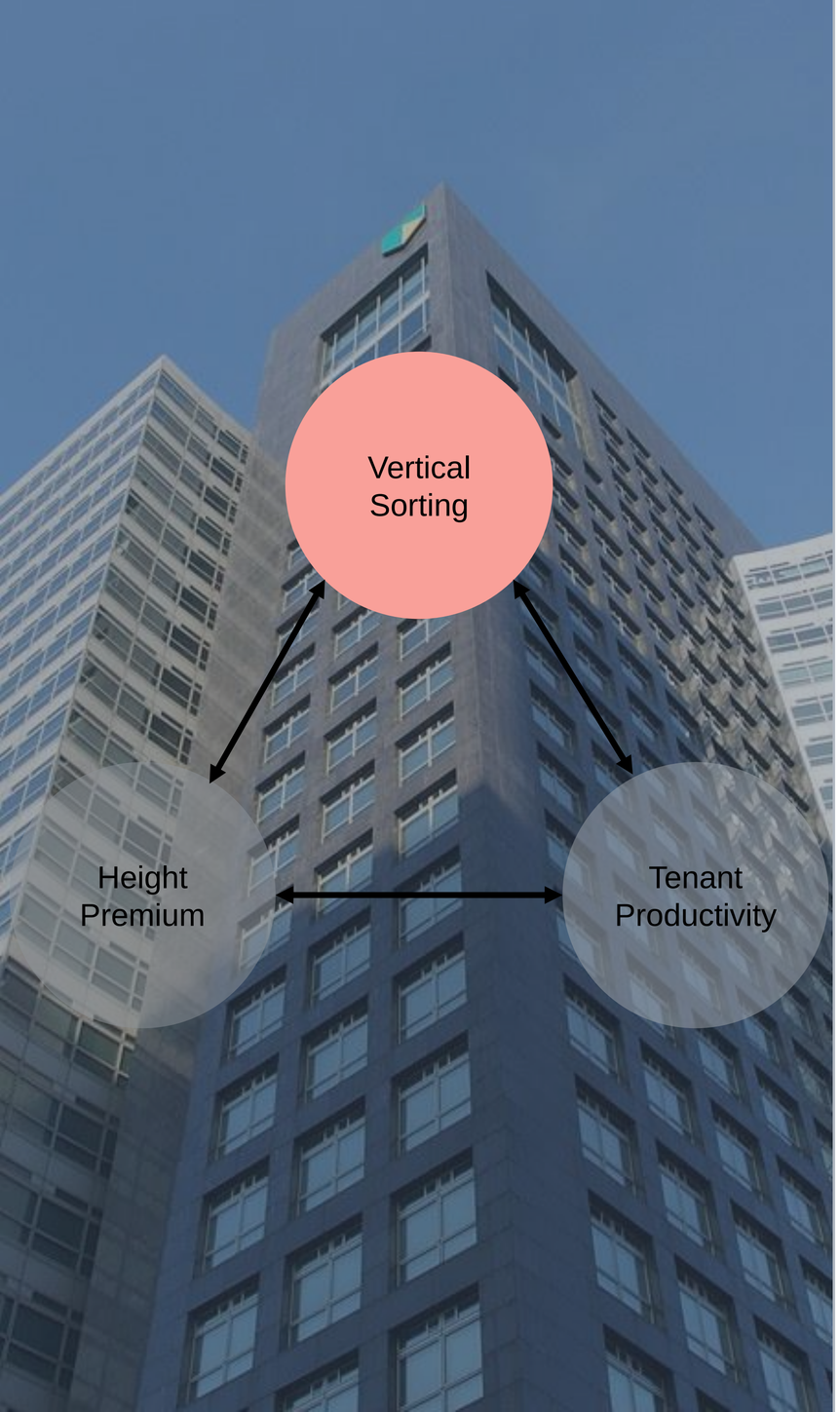

0.150
0.100
0.050
0.000
-0.050
-0.100
-0.150
0
1 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
30+

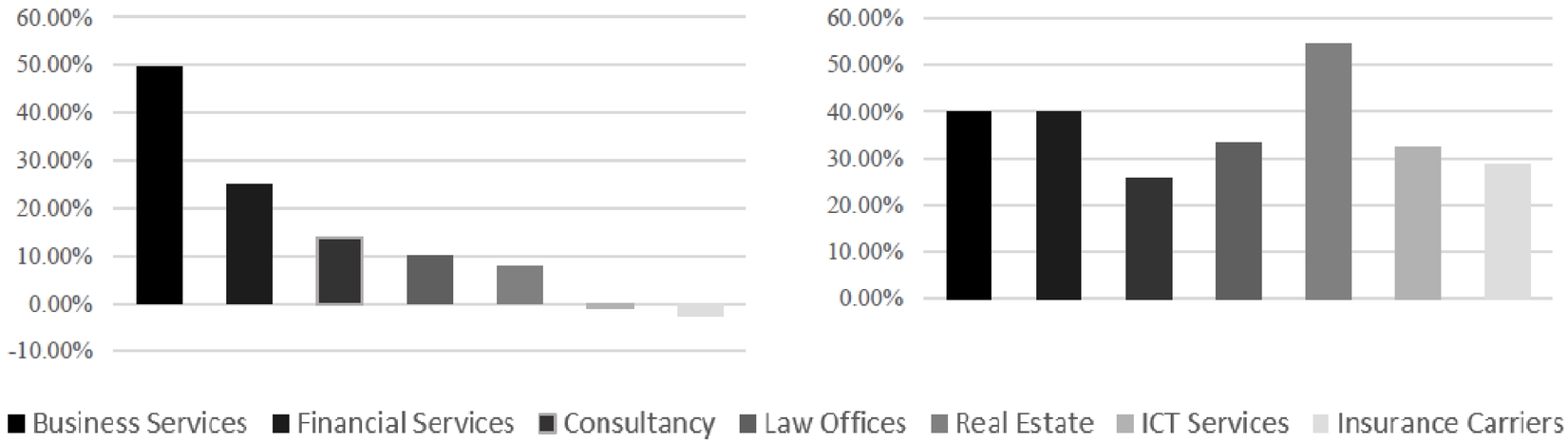


Rotterdam

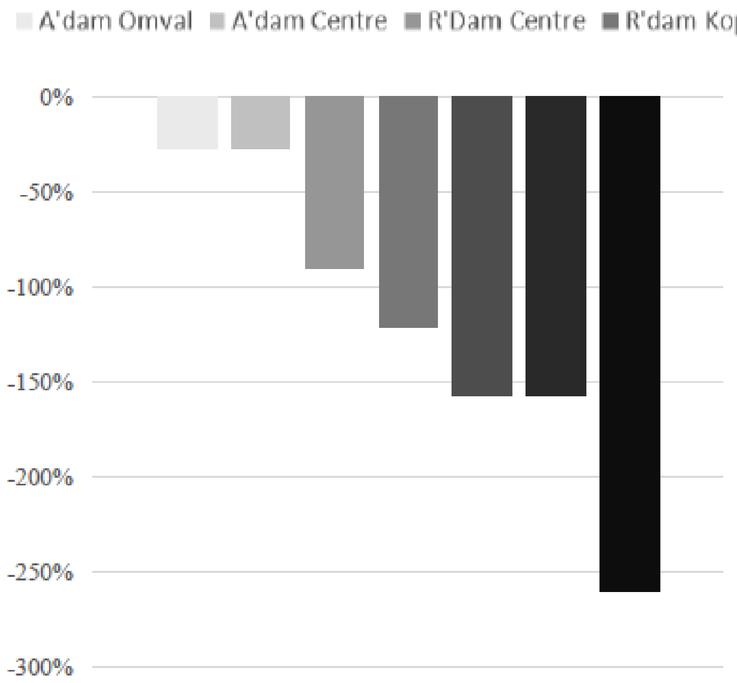


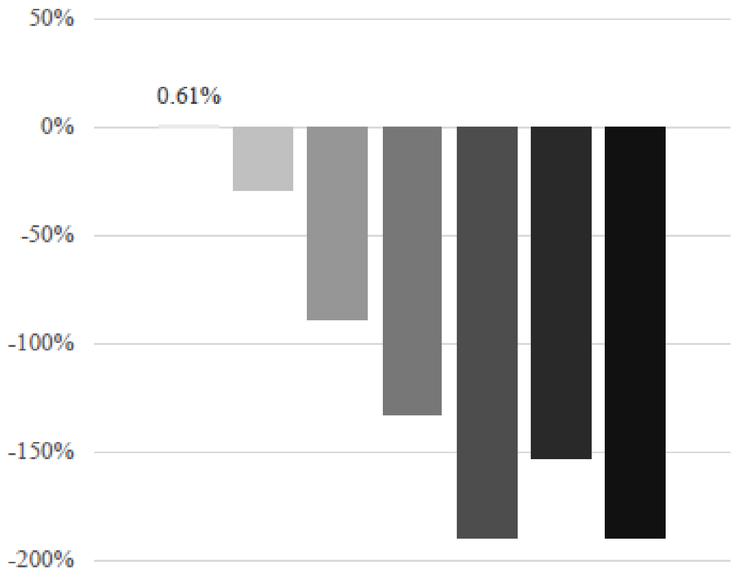
Amsterdam



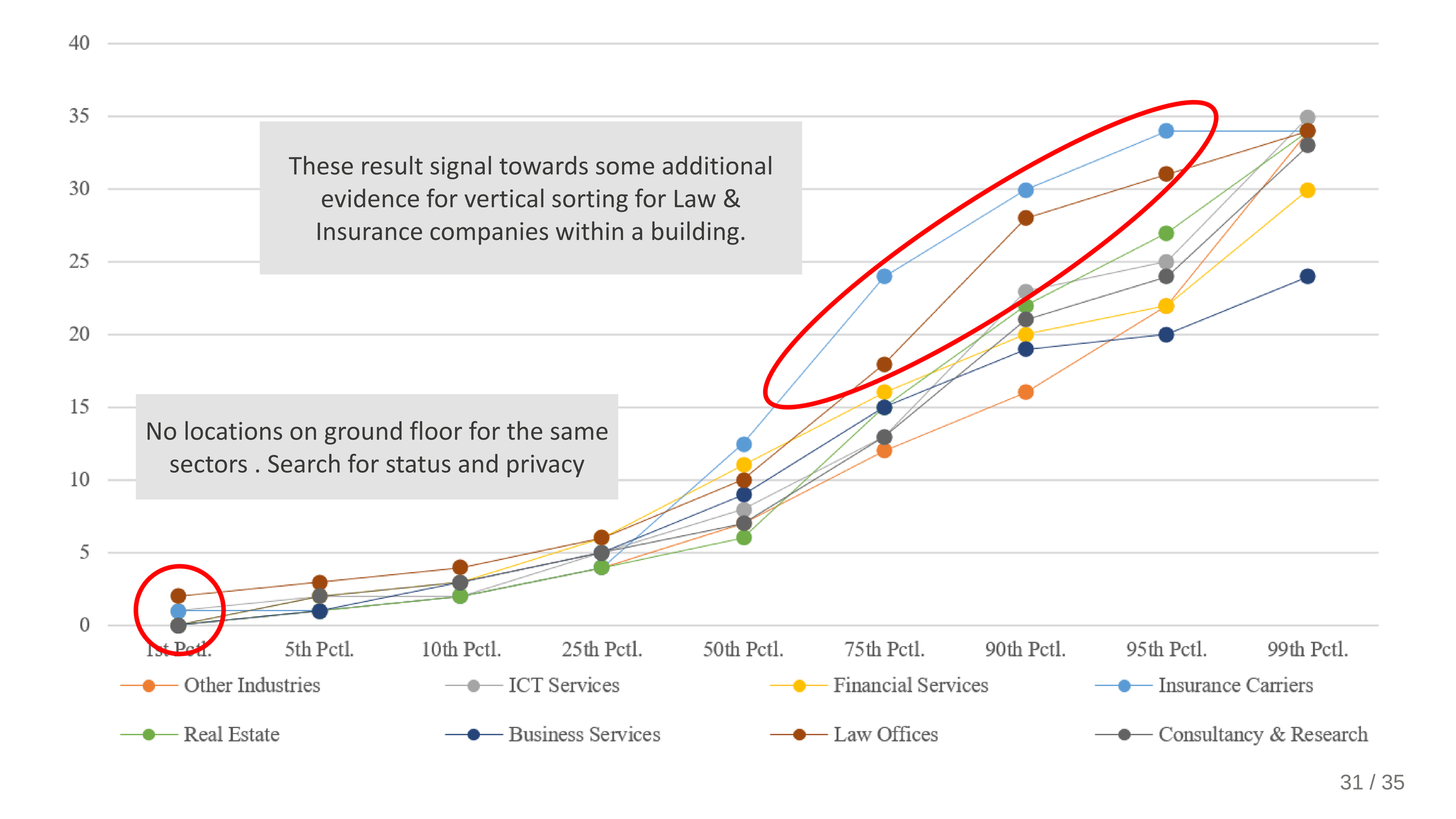


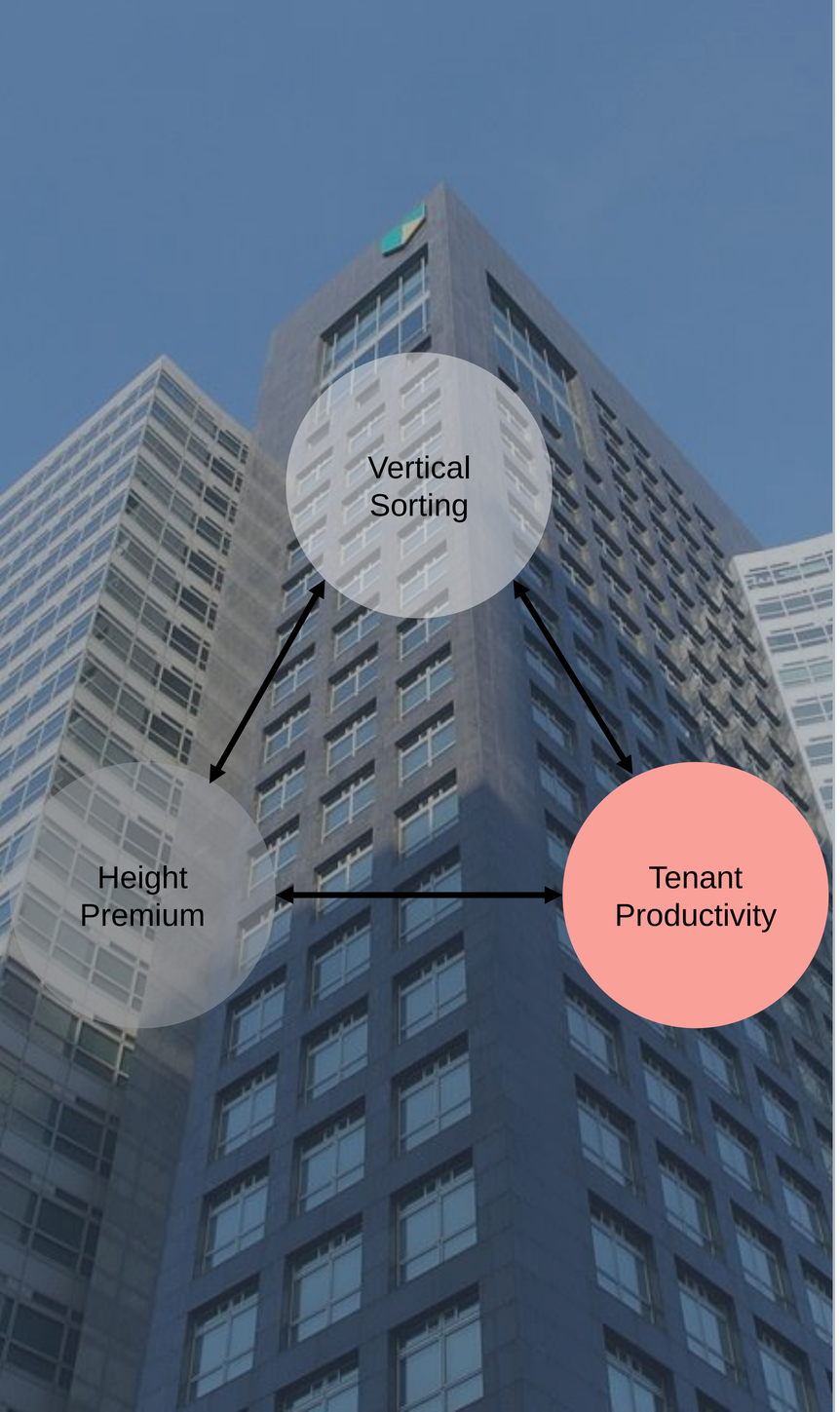
All figures in comparison to the South-Axis Amsterdam





All figures in comparison to the South-Axis Amsterdam


These result signal towards some additional evidence for vertical sorting for Law & Insurance companies within a building.
No locations on ground floor for the same sectors . Search for status and privacy
40
35
30
25
20
15
10
5
0
1st Pctl.
5th Pctl.
10th Pctl.
25th Pctl.
50th Pctl.
75th Pctl.
90th Pctl.
95th Pctl.
99th Pctl.
Other Industries
ICT Services
Financial Services
Insurance Carriers
Real Estate
Business Services
Law Offices
Consultancy & Research



** = 99% confidence interval * = 95% confidence interval	Model 10		
	Coefficient	t-value	VIF
Constant	0,946*	2,103	
Object # Floors			
Object # Tenants			
Highest Floor Level			
Highest Floor Squared			
Relative Floor Level			
Ln Surface Area			
Lease Term			
Ln Distance to Station			
Ln Distance to Highway			
Ln Age since Renovation			
Elevators #			
Parking Spots			
Penthouse Effect			
Multiple Floor Tenant	0,294**	3,703	1,361
ICT Services	0,368**	2,732	1,277
Financial Services	0,136	1,685	1,628
Insurance Carriers	0,057	0,314	1,230
Real Estate	-0,110	-0,514	1,2416
Business Services	-0,121	-0,737	1,289
Law Offices	0,407*	2,161	1,243
Consultancy Services	-0,026	-0,272	1,468
Ln Tenant Employees	0,007	0,503	1,249
Ln Tenant Asset/Employee			
Ln Tenant Revenue/Employee	0,048*	2,027	1,206
Dependent variable	Ln Highest Floor		
N	419		
k	38		
Nk-ratio	11,03		
Time Fixed Effects (Trans. Year)	Yes (19)		
Space Fixed Effects (Submarket)	Yes (10)		
R^2	0,346		
Adjusted R^2	0,279		
Standard Error Estimate	0,59960		

+1%

Productivity

+4,8%

Highest Floor

Height Premium

- 0,6% increase of rent per absolute floor level (view)
- 1,5% increase of rent per relative floor level (status)

Vertical Sorting

- Evidence of willingness to pay for height
- Evidence of vertical sorting patterns

Tenant Productivity

- Relationship identified between productivity and floor height, treat with care

DISCUSSION

- Data coverage of 76,3%
- Nationwide data
- Tenant characteristic source years
- Limitation of interpretability

THANK YOU FOR YOUR ATTENTION

Are there any questions?