AESOP Planning and Complexity

Manchester
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Rent and Transport in the Polycentric City

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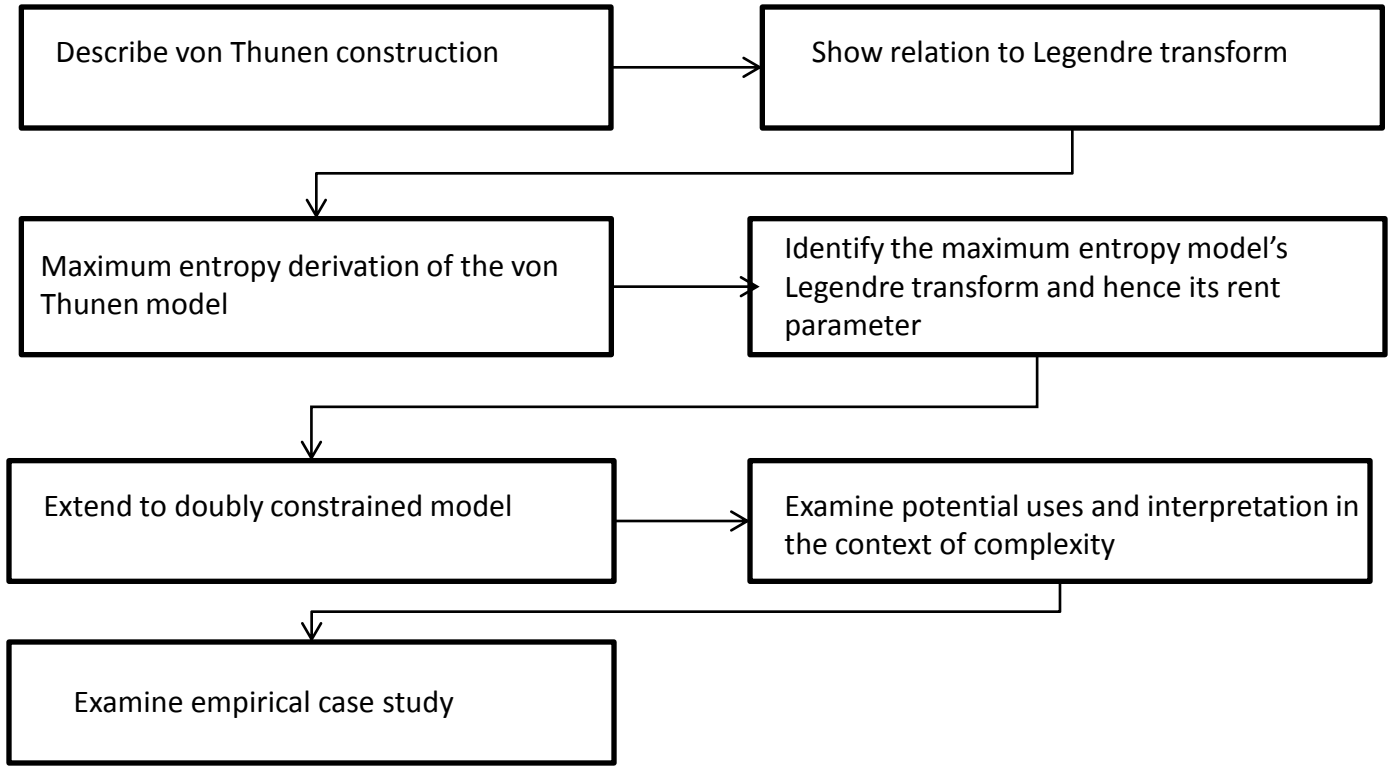
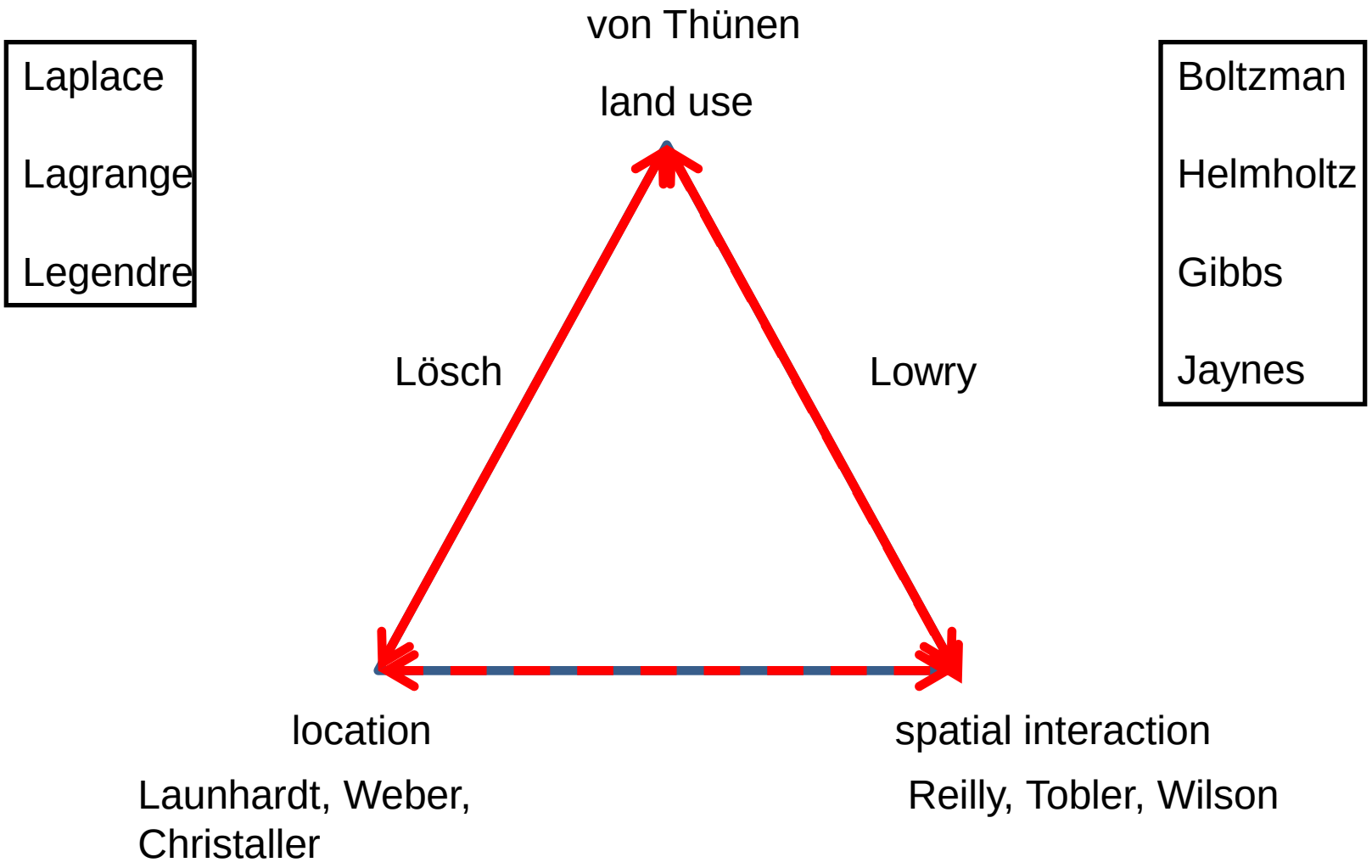
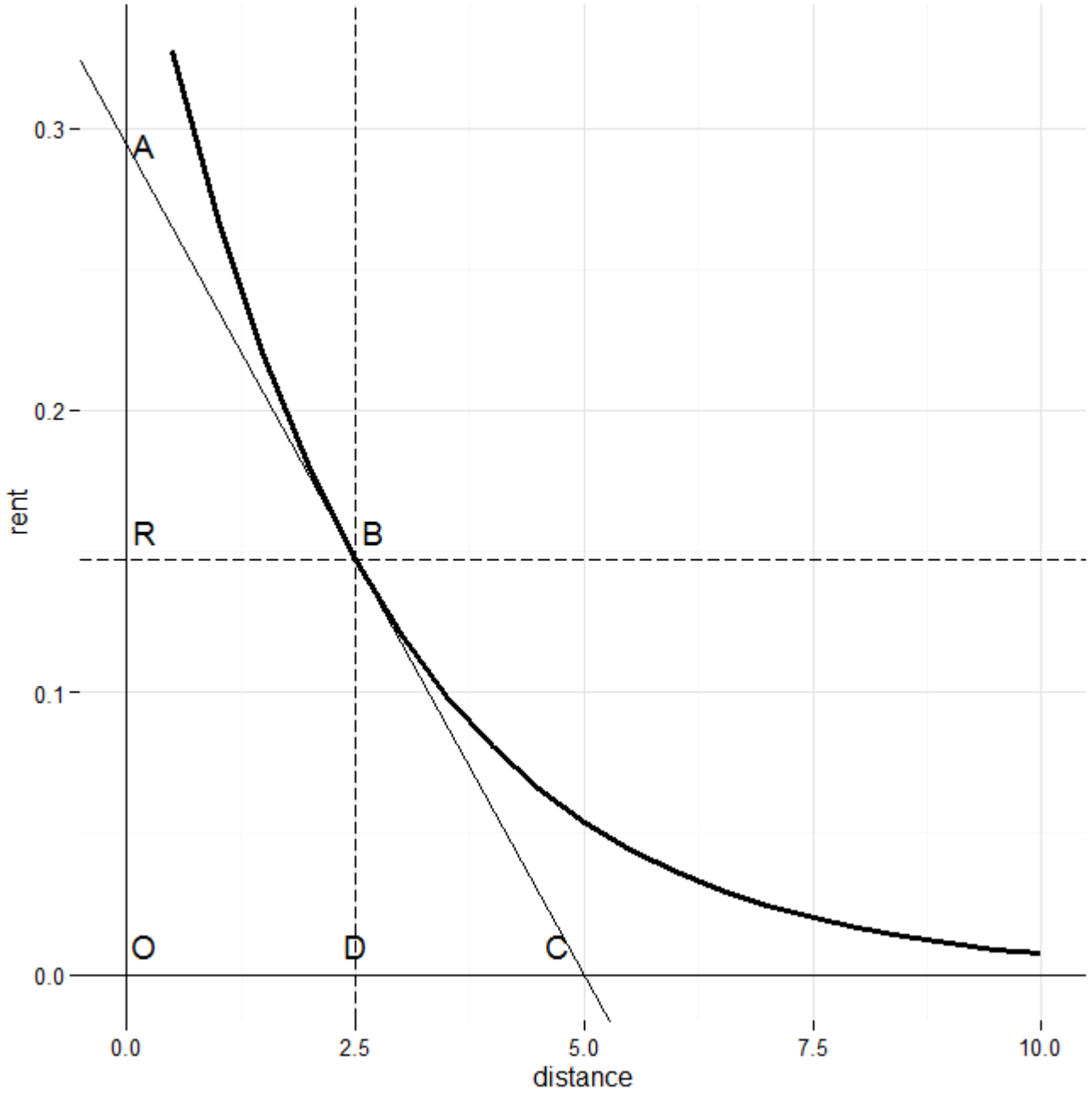
1. Show the link between von Thunen Rent and the Spatial Interaction Model
2. Relate the determination of rent to complexity thinking and the new economic geography
3. Examine the performance of the model and its inherent fractality

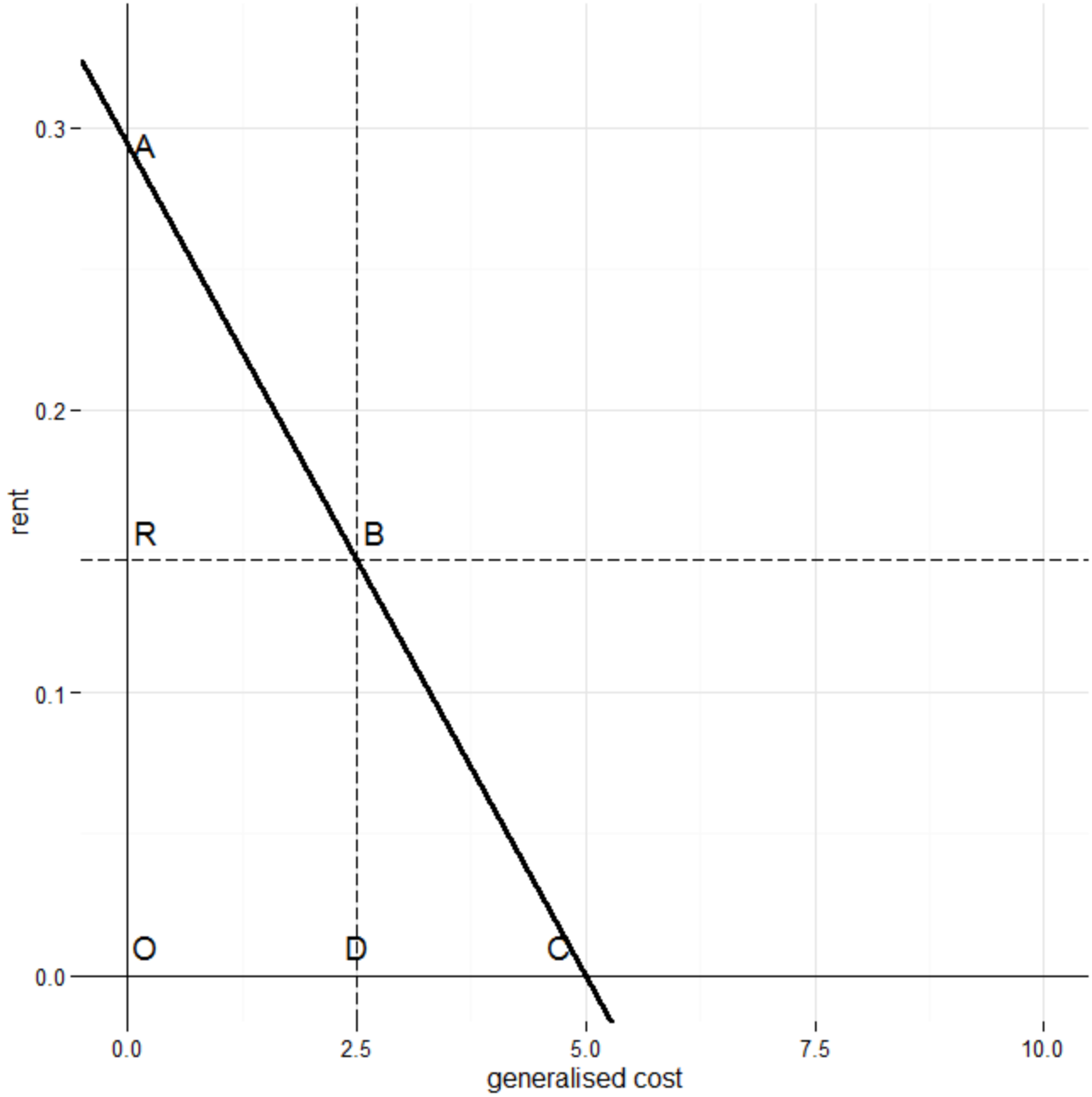


The point to emphasise is that in any entropy maximising transportation model the von Thunen land rent is automatically calculated

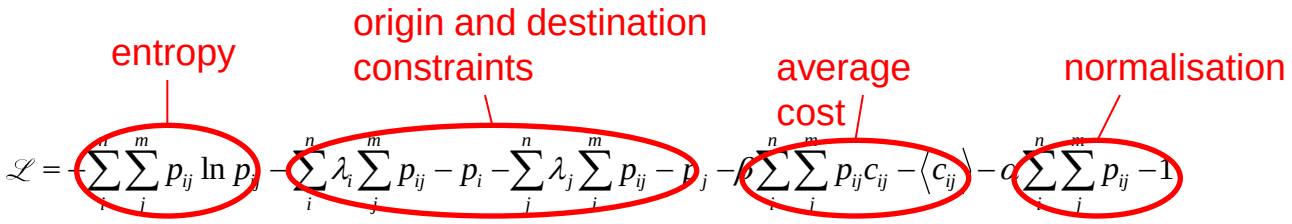
Aims


Laplace
Lagrange
Legendre
von Thünen
land use
Boltzman
Helmholtz
Gibbs
Jaynes
Lösch
Lowry
location
spatial interaction
Launhardt, Weber, Christaller
Reilly, Tobler, Wilson


0.3
0.2
0.1
0.0
rent
A
R
B
O
D
C
0.0
2.5
5.0
7.5
10.0
distance


0.3
0.2
0.1
0.0
rent
A
R
B
O
D
C
0.0
2.5
5.0
7.5
10.0
generalised cost

The Doubly Constrained TransportationModel



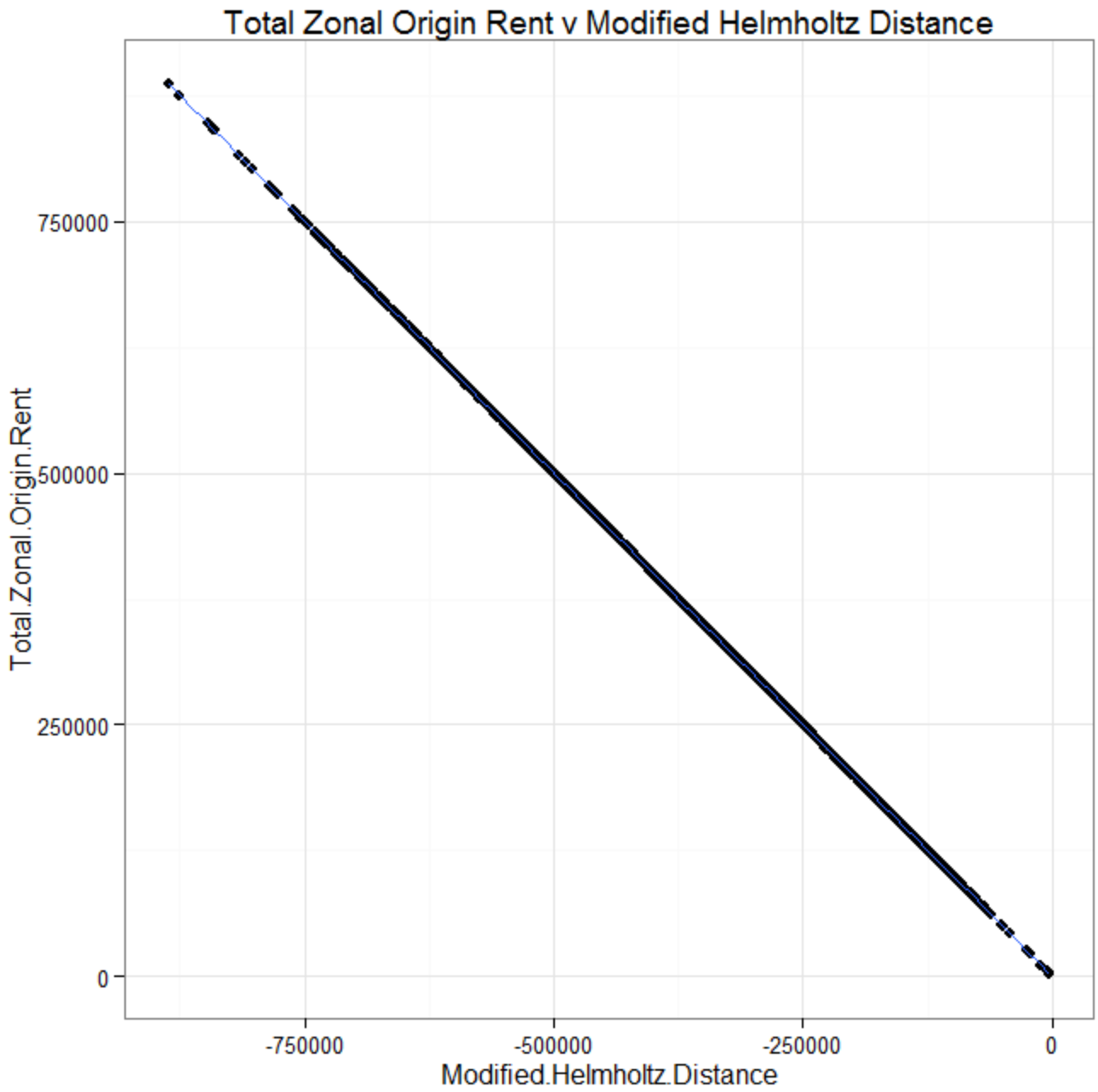
This equation is dimensionless: β converts cost to information

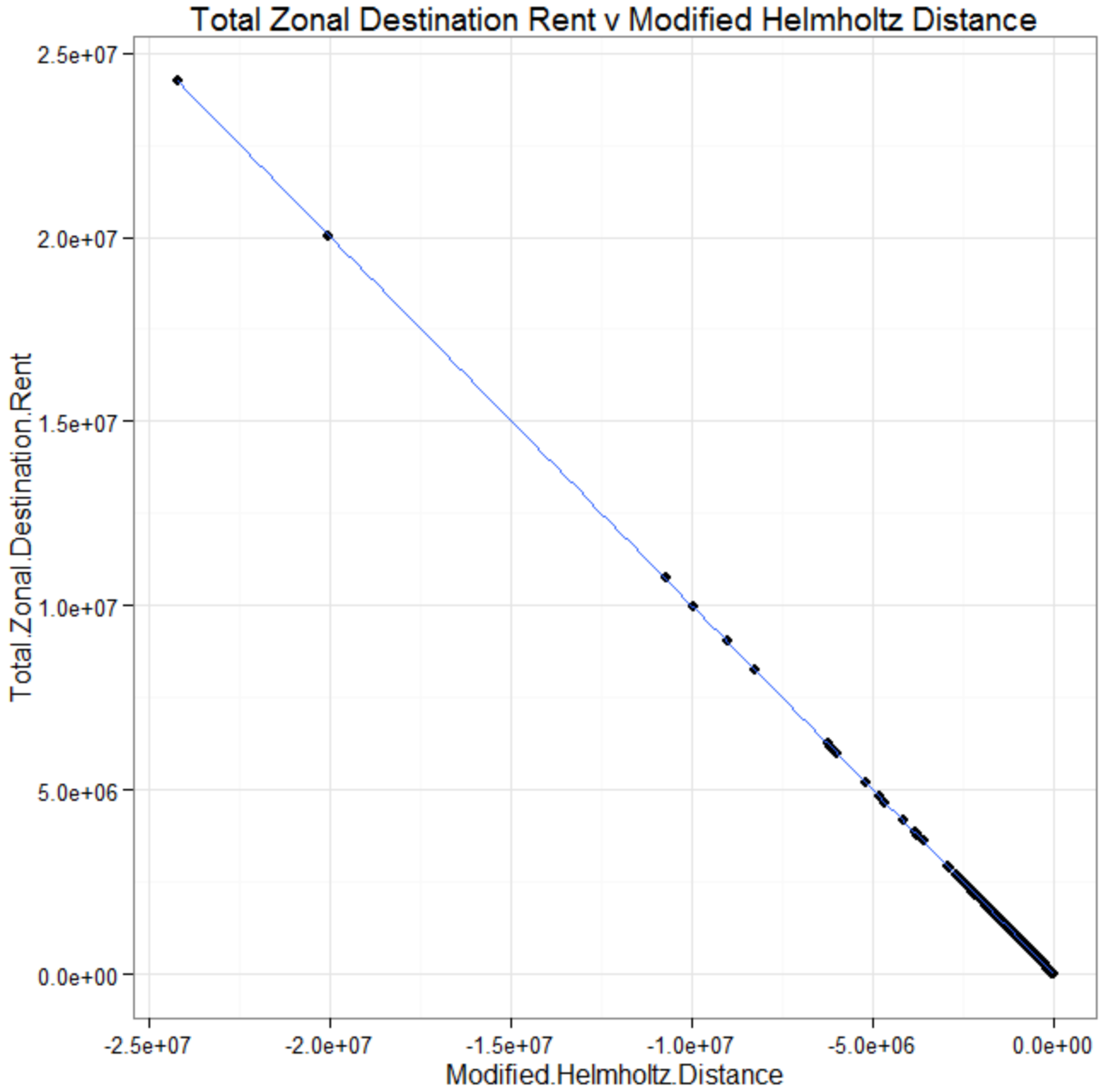
It gives $p_{ij} = e^{-\lambda_0 - \lambda_i - \lambda_j - \beta c_{ij}}$

which is the spatial interaction model (in slightly unfamiliar form)

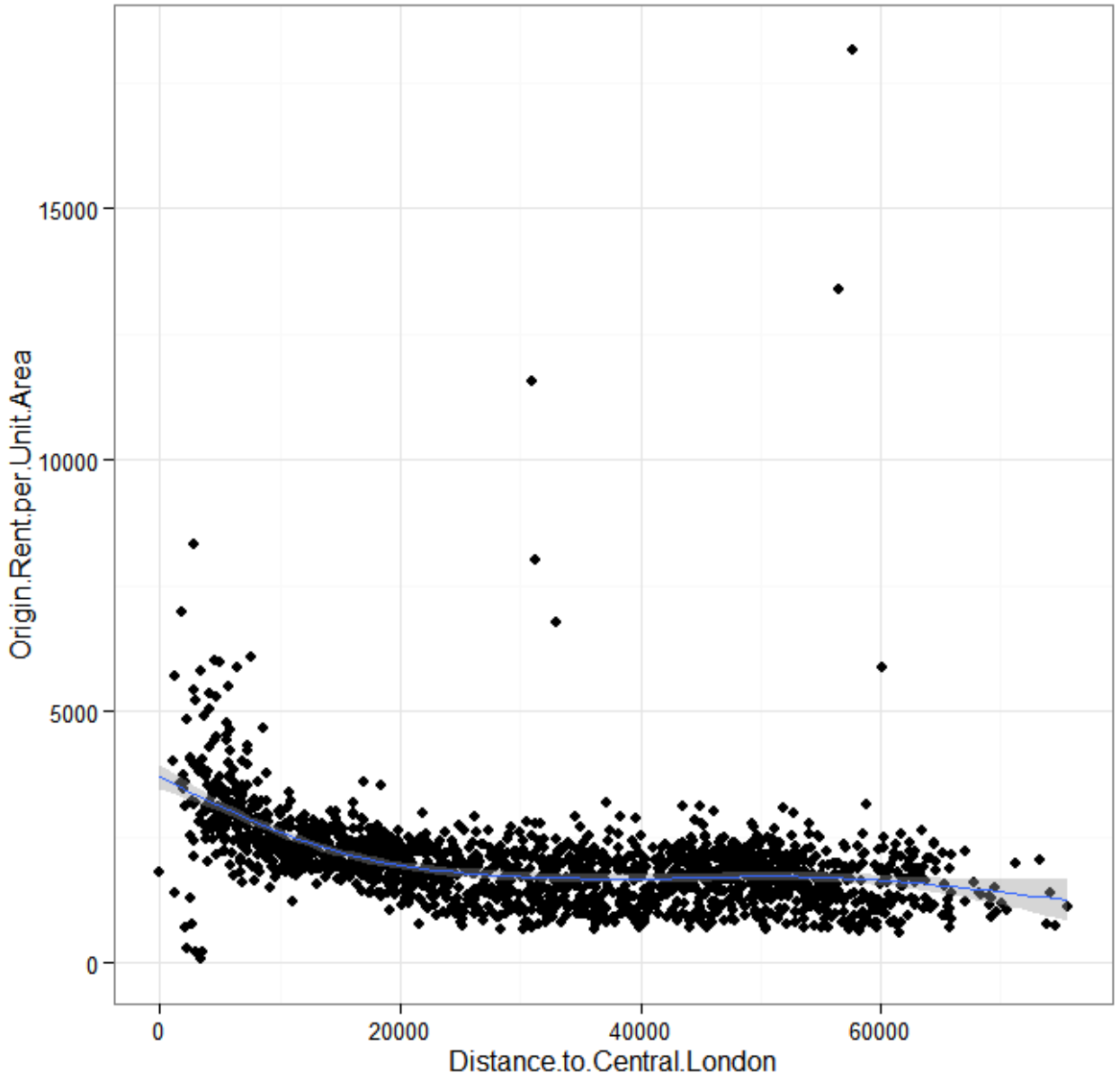
Destination rent $\frac{\lambda_j}{\beta}$

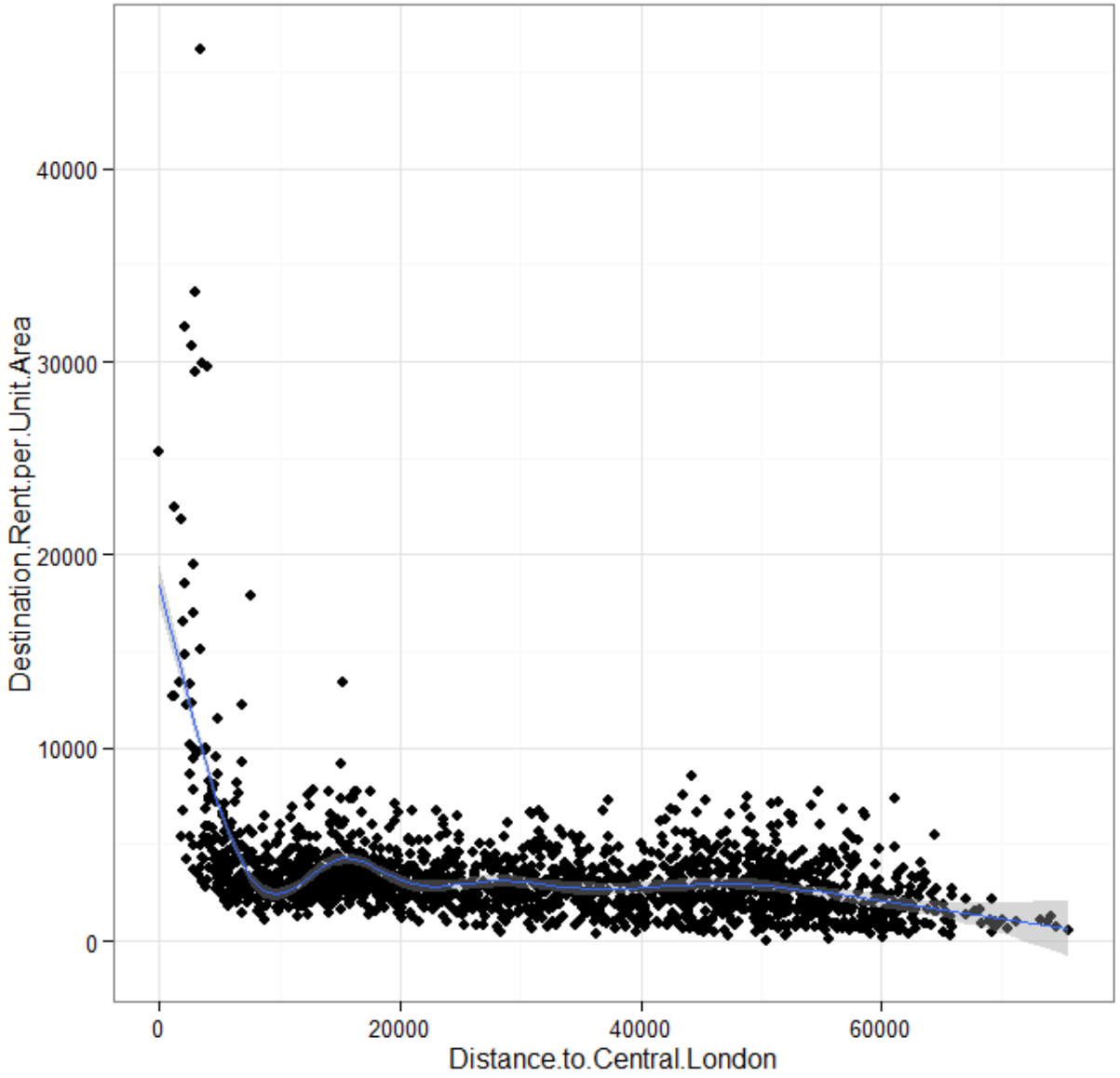
Origin rent: $\frac{\lambda_i}{\beta}$

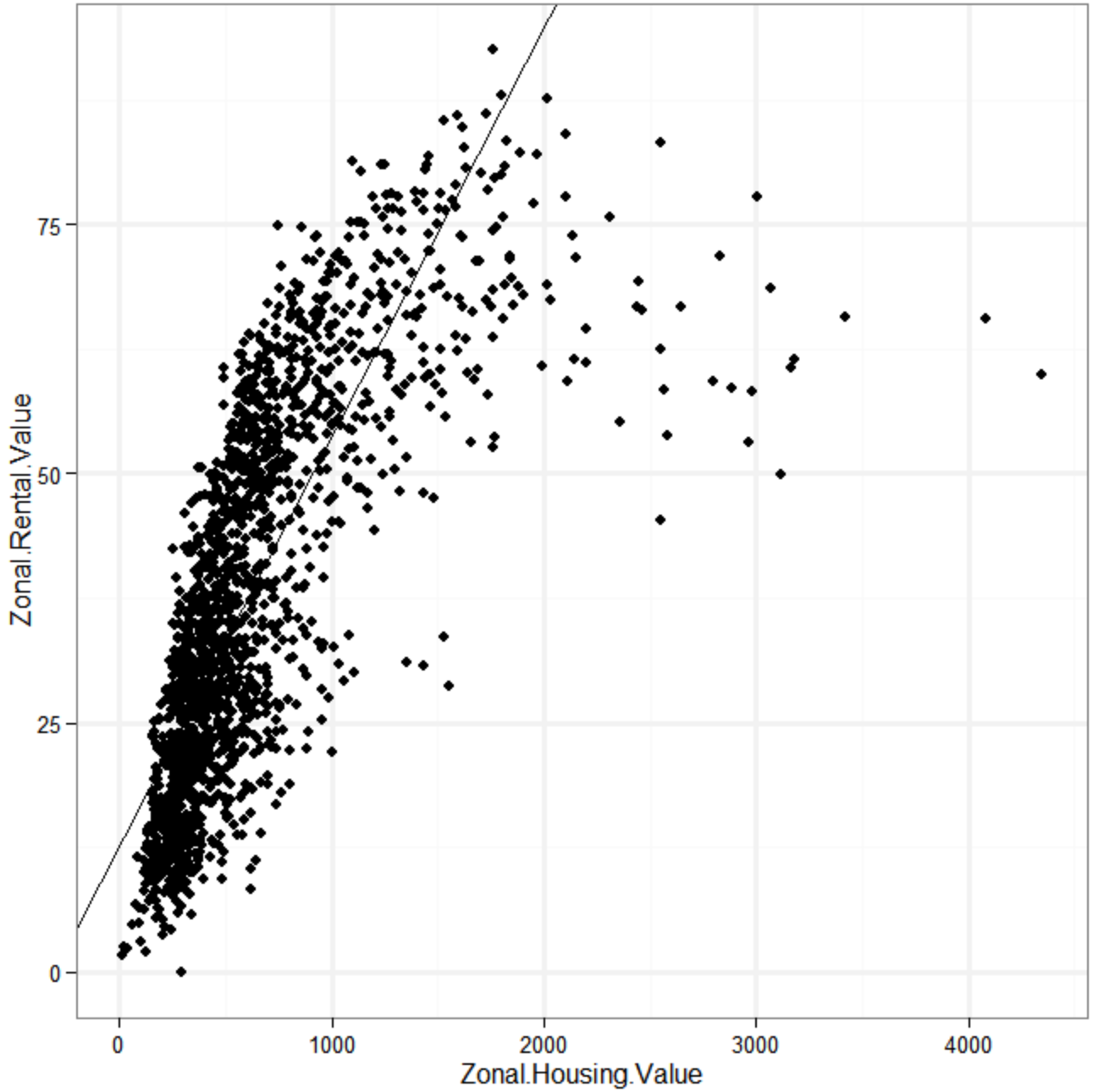

Total Zonal Origin Rent v Modified Helmholtz Distance
750000
500000
250000
0
Total.Zonal.Origin.Rent
-750000
-500000
-250000
0
Modified.Helmholtz.Distance

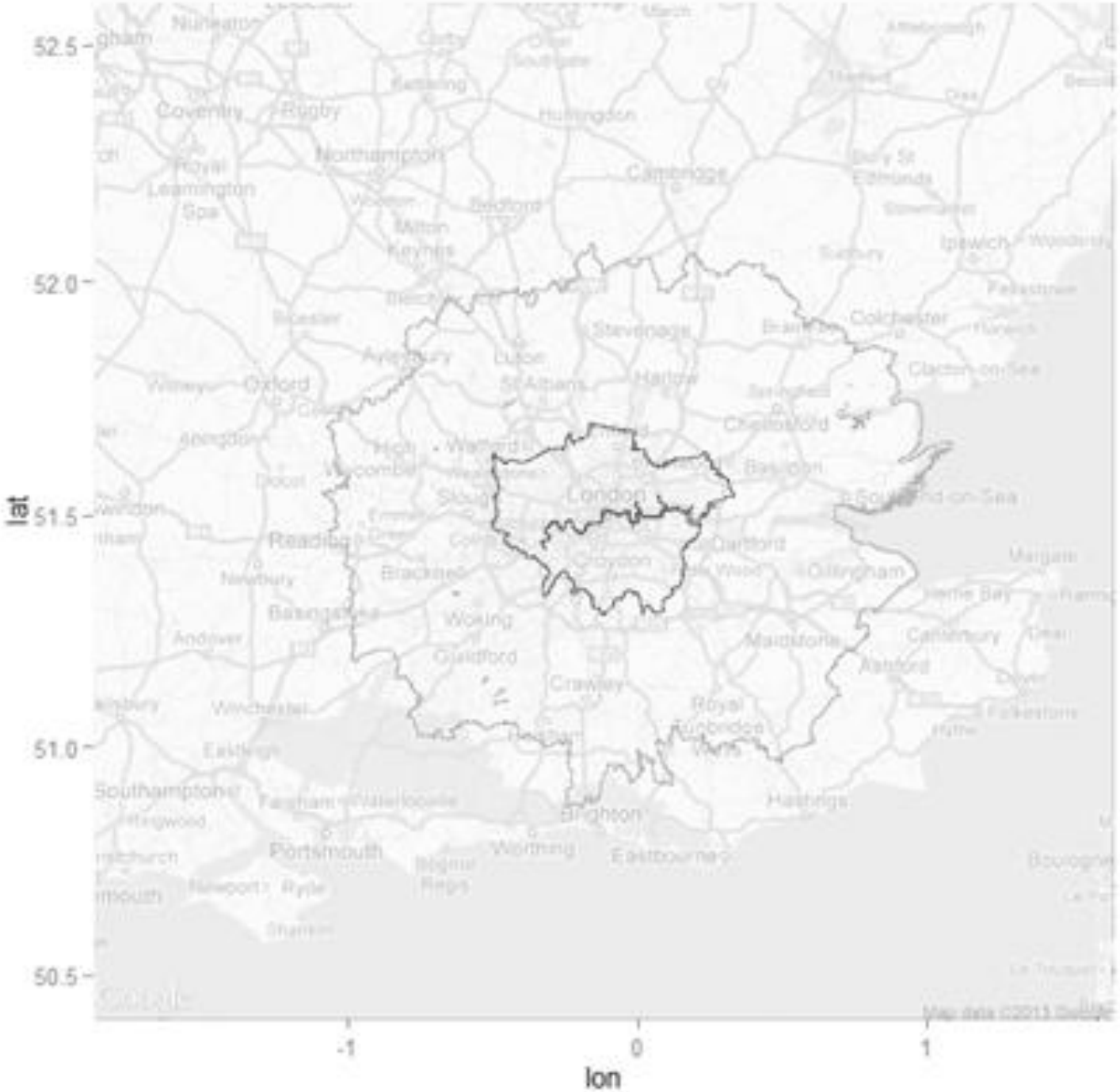

Total Zonal Destination Rent v Modified Helmholtz Distance
2.5e+07
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
Total.Zonal.Destination.Rent
-2.5e+07
-2.0e+07
-1.5e+07
-1.0e+07
-5.0e+06
0.0e+00
Modified.Helmholtz.Distance

Level	Model	Effective Distance	Rent	Economy
1	Von Thunen	c_{id}	$c_{id}^{\max} - c_{id}$	Perfect competition
2	Singly(origin) constrained	$U - TS = -\left\langle \lambda_i / \beta \right\rangle - 1/\beta \ln(Z_1)$	λ_i / β	Mixed competitive and monopolistic competition
3	Doubly constrained	$U - TS + \left\langle \lambda_j / \beta \right\rangle = -\left\langle \lambda_i / \beta \right\rangle - 1/\beta \ln(Z_2)$	$\lambda_i / \beta, \lambda_j / \beta$	Monopolistic competition
4	Dynamic Interaction	Not defined		Oligopolistic competition


15000
10000
5000
0
Origin.Rent.per.Unit.Area
0
20000
40000
60000
Distance.to.Central.London


Destination.Rent.per.Unit.Area
40000
30000
20000
10000
0
0
20000
40000
60000
Distance.to.Central.London


Zonal.Rental.Value
75
50
25
0
0
1000
2000
3000
4000
Zonal.Housing.Value


52.5
52.0
51.5
51.0
50.5
lat
-1
0
1
lon
Coventry
Rugby
Northampton
Royal Leamington Spa
Milton Keynes
Cambridge
Bury St Edmunds
Ipswich
Colchester
Clacton-on-Sea
Stevenage
Luton
St Albans
Harlow
Oxford
Chelmsford
High Wycombe
Slough
London
Basildon
Southend-on-Sea
Reading
Bracknell
Dartford
Gravesend
Sittingbourne
Margate
Newbury
Basingstoke
Woking
Guildford
Maidstone
Canterbury
Ashford
Andover
Crawley
Winchester
Royal Tunbridge Wells
Folkestone
Eastleigh
Southampton
Fareham
Waterlooville
Hastings
Brighton
Worthing
Eastbourne
Portsmouth
Bognor Regis
Newport
Ryde
Shanklin
Boulogne
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