Crime and urban design

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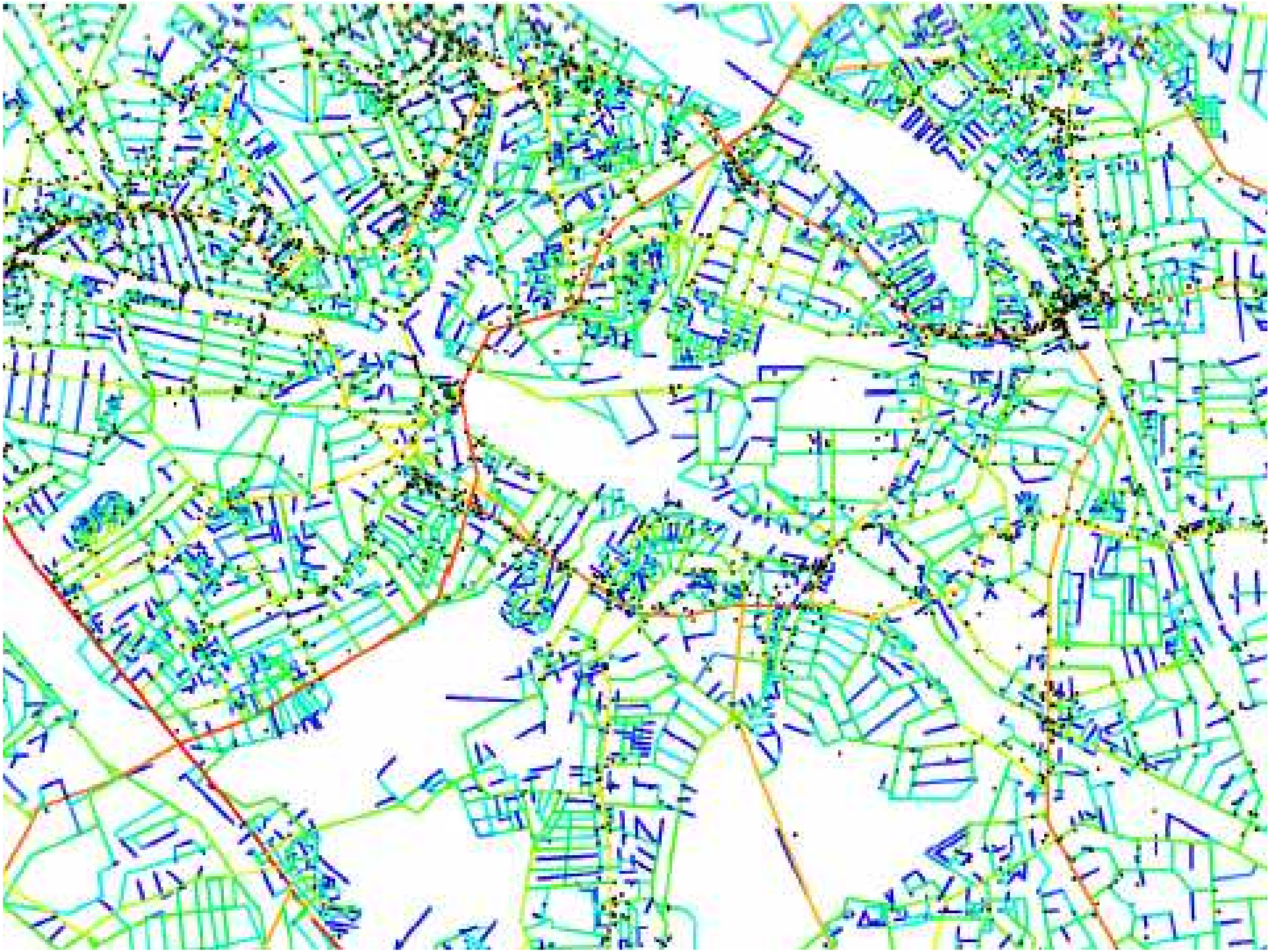
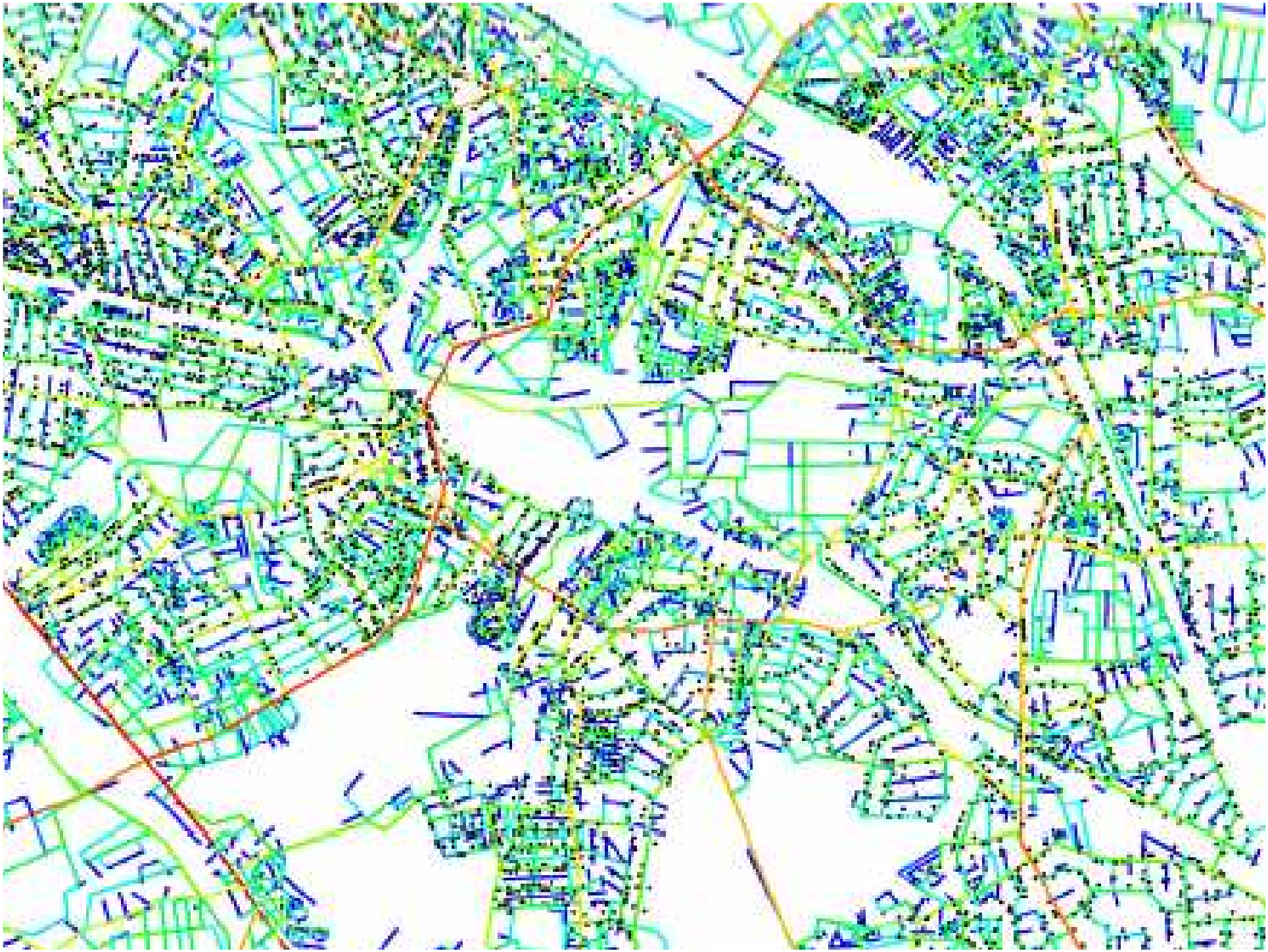
	SafeScape	Defensible Space
Public vs. Private	Maximize commons to promote interaction and a sense of community	Maximize private areas to create defensible space; create a sense of community through smaller developments with fewer strangers
Uses	Mix uses to provide activity and increase eyes on the street	Mixed use reduces residential control and therefore increases crime
Streets and Footpaths	Encourage walking and cycling, increase surveillance through a grid street pattern	Limit access and escape opportunities to provide more privacy and increase residential control
Alleys	Face buildings toward alleys to provide eyes on the alley	Eliminate or gate alleys as they increase burglary and are dangerous for pedestrians
Autos	Build homes close to the street, forcing parking to be on the street or in rear courtyards	Autos are safest in garages or visible in front of the house; rear courtyards facilitate burglary
Density	High density to promote activity, sustain public transit, and reduce sprawl	Density creates vulnerability when it increases common areas or unsafe parking

- There is a battle between two theories. We might call them the closed and open solutions. Roughly speaking, one theory seek to make places safer by keeping people out, the other by bringing people in ?

The key design-crime questions for residential burglary

- - Are some kinds of dwellings safer than others ?
- - Is density good or bad ?
- - Is movement in your street good or bad ?
- - Does it matter how we group dwellings ?
- - Are cul de sacs safe or unsafe ?
- - Is mixed use beneficial or not ?
- - Should residential areas be permeable or impermeable ?
- - Do social factors make a difference ?





https://www.ipam.ucla.edu/publications/chs2007/chs2007_6801.ppt

- The study reported here is of 5 years of all the police crime data in a London borough made up of:
  - A population of 263000
  - 101849 dwellings in 65459 residential buildings
  - 536 kilometres of road, made up of 7102 street segments
  - Many centres and sub-centres at different scales
  - Over 13000 burglaries
  - Over 6000 street robberies
- We are focusing our study on residential burglary and street robbery as these are the two crimes that people most fear today.

- Residential burglary and street robbery data tables have been created at several levels:

  - the 21 *Wards* (around 12000 people) that make up the borough for average residential burglary and street robbery rates. At this level, spatial data is numerically accurate, but reflects only broad spatial characteristics of areas. Social data from the 2001 Census is available, including 'deprivation index', but at this level patterns are broad and scene-setting at best.

  - the 800 *Output Areas* (around 125 dwellings) from the 2001 Census, so social data is rich and includes full demographic, occupation, social deprivation, unemployment, population and housing densities, and ethnic mix, as well as houses types and forms of tenure. Unfortunately spatial data is fairly meaningless at this level due to the arbitrary shape of Output Areas.

  - the 7102 *street segments* (between intersections) that make up the borough. Here we have optimal spatial data, good physical data and 'council tax band' data indicating property values which can act as a surrogate for social data

  - Finally, the 65459 *individual residential buildings*, comprising 101849 dwellings. Here spatial values are taken from the associated segment, and again we have good physical data with Council Tax band as social surrogate. Street robbery cannot of course be assigned here.

Band		A	B	C	D	E	F	G	H	Mean
Type 1	Sample		590							
	Burglary rate (5yrs)		.084							.084
Type 2	Sample		228							
	Burglary rate (5yrs)		.046							.046
Type 3	Sample	732	588	1098	1031	431	87	23		
	Burglary rate (5yrs)	.086	.193	.118	.111	.105	.093	.087		.109
Type 4	Sample	1018	2198	5673	1136	256				
	Burglary rate (5yrs)	.096	.081	.08	.065	.142				.084
Type 5	Sample		133	594	1296	358	24			
	Burglary rate (5yrs)		.132	.098	.093	.159	.391			.111
Type 6	Sample	66	1176	5013	4201	2070	847	175		
	Burglary rate (5yrs)	.18	.111	.116	.107	.117	.165	.231		.120
Type 7	Sample	175	444	1070	1403	296	53	41		
	Burglary rate (5yrs)	.137	.136	.129	.059	.062	.019	.073		.078
Type 8	Sample		237	599	446	37	-	75		
	Burglary rate (5yrs)		.063	.13	.213	.159	-	.393		.193
Type 9	Sample		859	2349	8076	2570	153			
	Burglary rate (5yrs)		.177	.102	.113	.138	.149			.117
Type 10	Sample		493	3268	4268	10819	2529	507		
	Burglary rate (5yrs)		.249	.097	.12	.145	.148	.152		.138
Type 11	Sample		307	1581	1322	969	606	489		
	Burglary rate (5yrs)		.268	.169	.153	.21	.211	.26		.199
Type 12	Sample	5	73	433	276	363	896	1367	17	
	Burglary rate (5yrs)		.151	.113	.120	.209	.169	.169	.235	.166
Type 13	Sample	15	89	436	440	512	67	378	151	
	Burglary rate (5yrs)		.112	.169	.136	.125	.179	.304	.450	.200
Mean	Sample	2253	9613	27265	27706	20578	5836	3218	217	101849
	Burglary rate (5yrs)	.101	.109	.102	.109	.140	.157	.208	.530	.123

Key

- Type 1 – very tall blocks, point block slabs .084
- Type 2 – tall flats 6-15 storeys .046
- Type 3 – medium height flats 5-6 storeys - .109
- Type 4 – lower 3-4 storey and smaller flats - .084
- Type 5 – low terraces with small T - .111
- Type 6 – low terraces with large T – 120
- Type 7 – linked and step-linked 2-3 storeys and mixed - .078
- Type 8 – tall terraces, 3-4 storeys - .193
- Type 9 - semis in multiples of 4,6,8 - .117
- Type 10 - standard sized semis - .138
- Type 11 - large property semis - .199
- Type 12 -small detached - .199
- Type 13 - large detached - .199

	SINGLE DWELLINGS				MULTIPLE DWELLINGS		
	number of	% risk change	% risk change		number of	% risk change	% risk change
Ward	dwellings	ground+upper	ground only		dwellings	ground+upper	ground only
1	2548	-41.7 (.0001**)	-46.2 (.0001**)		541	+26.1 (.0295**)	+2.4 (.8308)
2	2887	-46.3 (.0001**)	-51.2 (.0001**)		507	+13.7 (.1758)	+11.3 (.3859
3	1574	-25.3 (.0141**)	-44.9 (.0001**)		703	+15.7 (.0446*)	-31.2 (.0005**)
4	2702	-55.9 (.0001**)	-61.8 (.0001**)		367	-.098 (.3059)	-24.1 (.0217**)
5	2734	-42.4 (.0001**)	-49.7 (.0001**)		829	-25.7 (.0002**)	-32.8 (.0001**)
6	2711	-32.6 (.0315**)	-35.6 (.0001**)		580	+4.2 (.7254)	-25.9 (.0049**)
7	1363	-27.6 (.0073**)	-45.3 (.0001**)		1699	-19.9 (.0010**)	-34.3 (.0001**)
8	1762	-30.7 (.0001**)	-34.6 (.0001**)		1544	-30.6 (.0001**)	-35.8 (.0001**)
9	3072	-13.0 (.3102)	-17.1 (.2586)		314	+3.4 (.8245)	-.4.9 (.7575)
10	789	-14.3 (.3308)	-46.4 (.0011**)		1343	+15.6 (.0033**)	-29.8 (.0001**)
11	1295	-28.7 (.0029**)	-59.6 (.0001**)		1305	+7.8 (.2471)	-20.0 (.0071**)
12	2785	-25.2 (.0452**)	-23.2 (.0884*)		334	-30.9 (.0049**)	30.2 (.0094**)
13	3026	-38.7 (.0003**)	-41.1 (.0002**)		439	-11.7 (.2455)	-14.6 (.1381)
14	1945	-19.5 (.0790*)	-38.4 (.0031**)		1524	-1.5 (.8559)	-24.5 (.0007**)
15	3445	-3.7 (.8003)	-.02 (.9925)		332	+9.4 (.4907)	-7.2 (.5820)
16	2228	-45.3 (.0001**)	-55.3 (.0001**)		688	+2.2 (.7090)	-35.9 (.0001**)
17	2578	-53.9 (.0001**)	-57.8 (.0001**)		609	+22.8 (.0391**)	-1.8 (.8657)
18	2784	-24.9 (.0739*)	-43.3 (.0013**)		434	+1.2 (.3545)	-7.6 (.4878)
19	2758	-28.0 (.0062**)	-24.7 (.0247**)		787	+1.6 (.8666)	-11.4 (.2932)
20	2208	-24.4 (.0234**)	-46.4 (.0001**)		648	+8.1 (.4437)	+3.6 (.6886)
21	1155	-27.0 (.0161**)	-33.2 (.0050**)		1547	-21.8 (.0002**)	-23.0 (.0001)
ALL	48350	-27.7 (.0001**)	-38.9 (.0001**)		17103	2.2 (0.1784)	-16.0 .0001

The effect of building-centred density on burglary risk by ward.

Logistic Model Coefficients Table for Burgled_L
Split By: LUandRU=1then1else0
Cell: 1.000

	Coef	Std. Error	Coef/SE	Chi-Square	P-Value	Exp(Coef)	95% Lower	95% Upper
1: constant	-1.140	.175	-6.522	42.539	<.0001	.320	.227	.450
TOmovCITYscale	.171	.020	8.402	70.596	<.0001	1.187	1.140	1.235
THRUmovCITYscale	.097	.013	7.237	52.379	<.0001	1.102	1.073	1.131
Tomov300m	.003	.001	2.716	7.376	.0066	1.003	1.001	1.005
THRUmov300m	-.166	.045	-3.681	13.552	.0002	.847	.775	.925

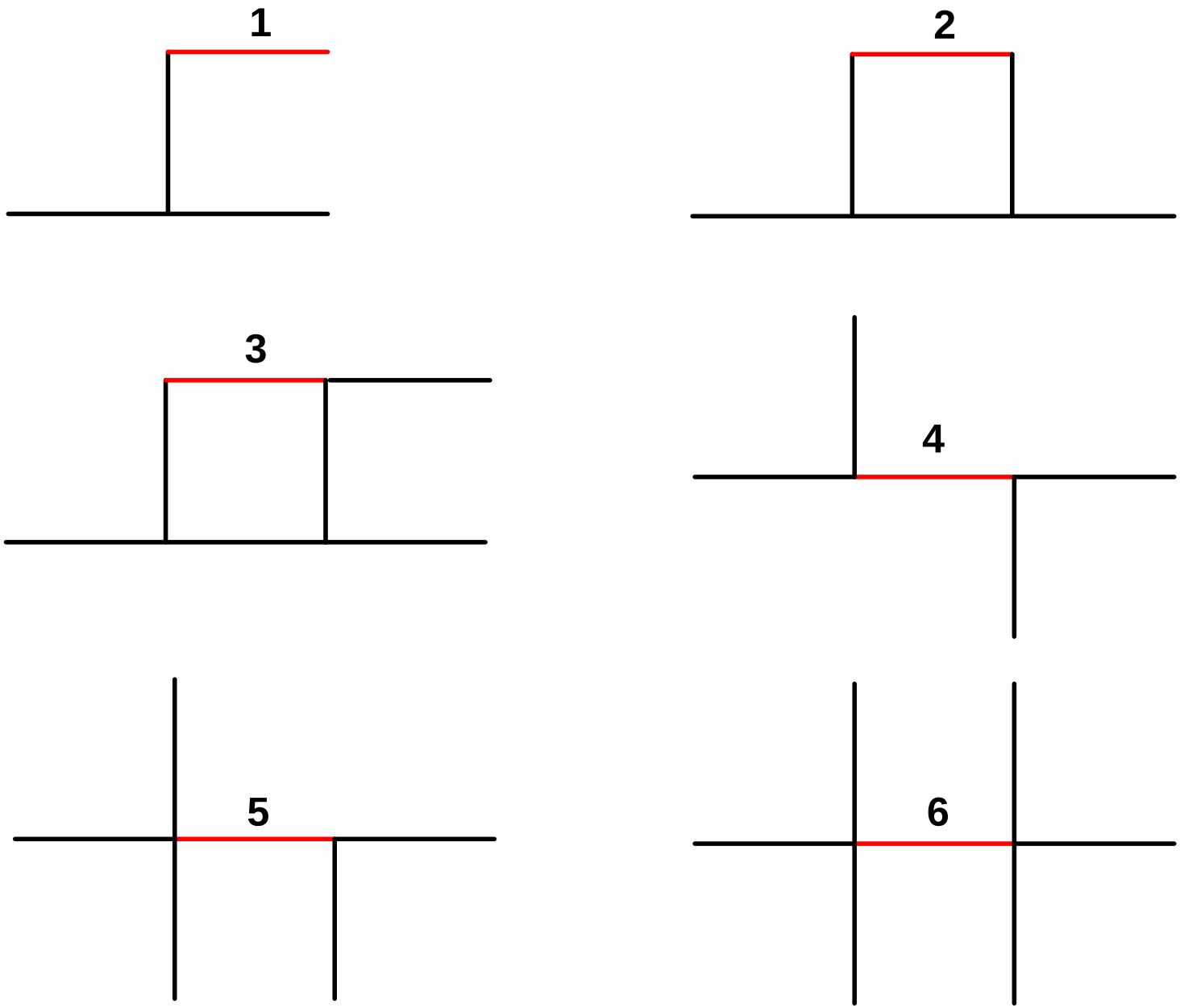
Logistic Model Coefficients Table for Burgled_L
Split By: LUandRU=1then1else0
Cell: 0.000

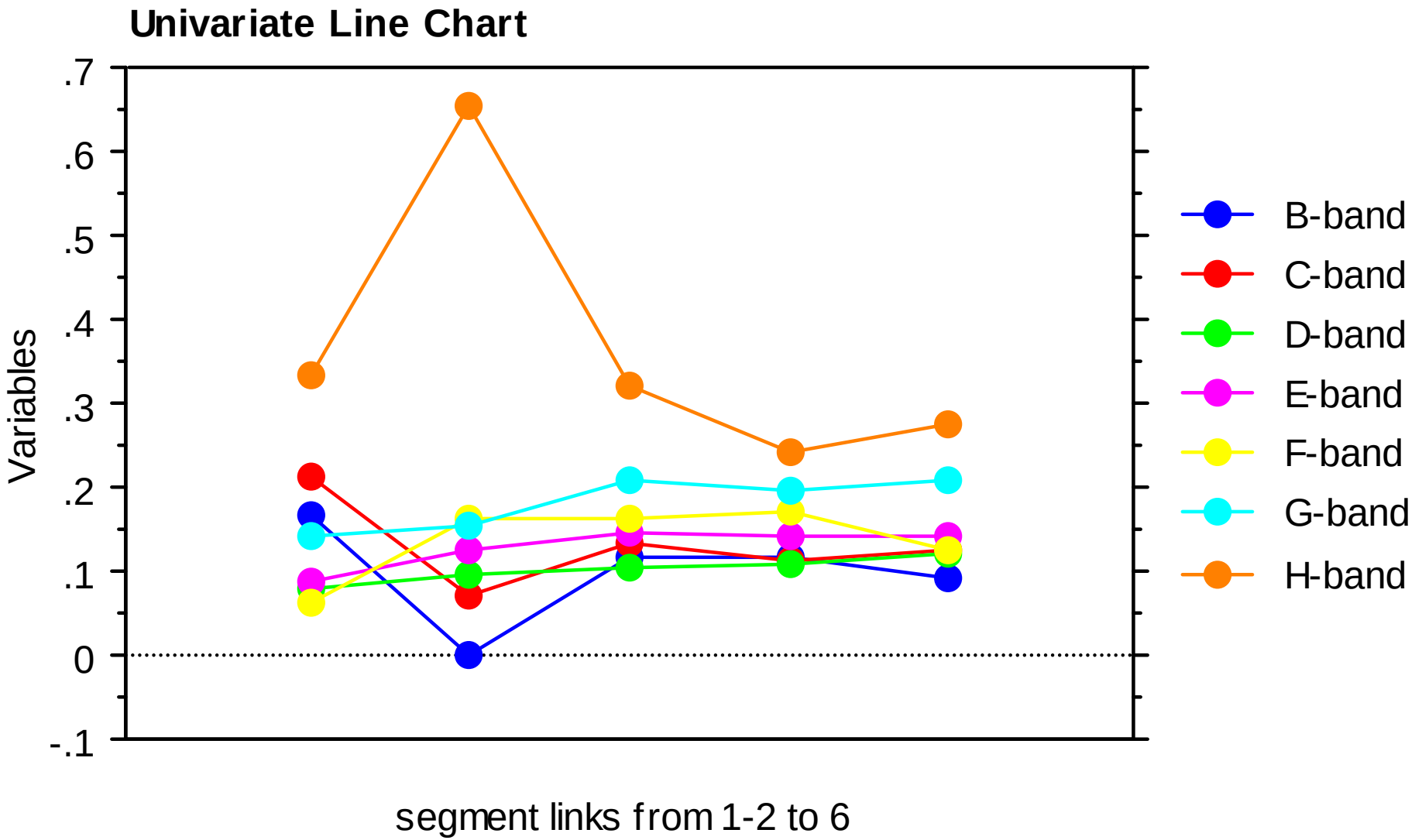
	Coef	Std. Error	Coef/SE	Chi-Square	P-Value	Exp(Coef)	95% Lower	95% Upper
1: constant	-1.139	.233	-4.898	23.990	<.0001	.320	.203	.505
TOmovCITYscale	.061	.028	2.192	4.805	.0284	1.063	1.006	1.122
THRUmovCITYscale	.039	.018	2.222	4.937	.0263	1.040	1.005	1.076
Tomov300m	.010	.001	8.276	68.486	<.0001	1.010	1.007	1.012
THRUmov300m	-.129	.055	-2.347	5.510	.0189	.879	.790	.979

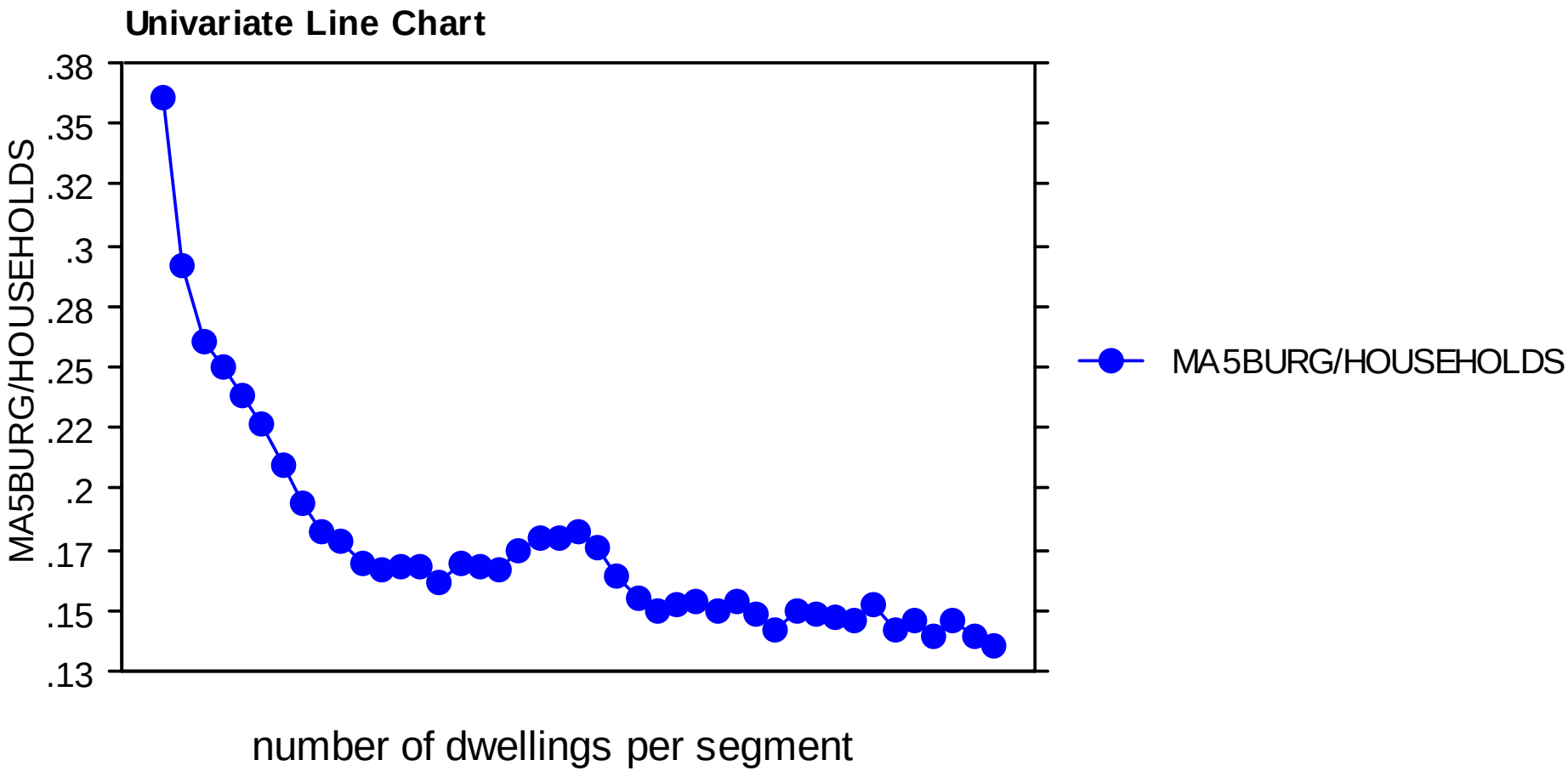
Logistic Model Coefficients Table for Burgled_L

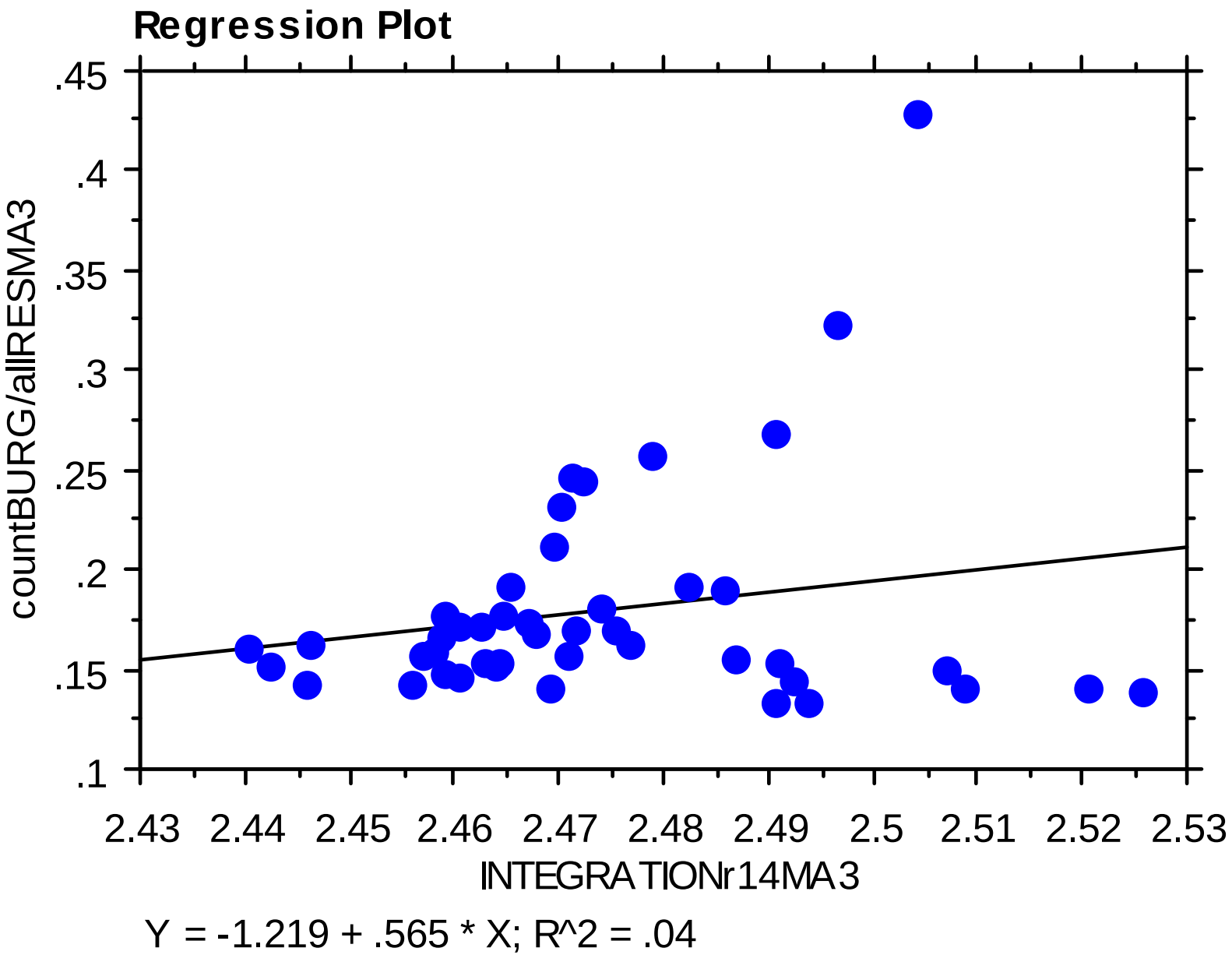
	Coef	Std. Error	Coef/SE	Chi-Square	P-Value	Exp(Coef)	95% Lower	95% Upper
1: constant	-.392	.144	-2.722	7.410	.0065	.676	.509	.896
TOmovCITYscale	.225	.016	13.980	195.442	<.0001	1.253	1.214	1.293
Tomov300m	.009	.001	10.556	111.427	<.0001	1.009	1.007	1.010
THRUmovCITYscale	.062	.011	5.824	33.913	<.0001	1.064	1.042	1.087
THRUmov300m	-.149	.036	-4.157	17.278	<.0001	.862	.804	.925
SEGMENTlinks	-.037	.014	-2.607	6.797	.0091	.963	.937	.991

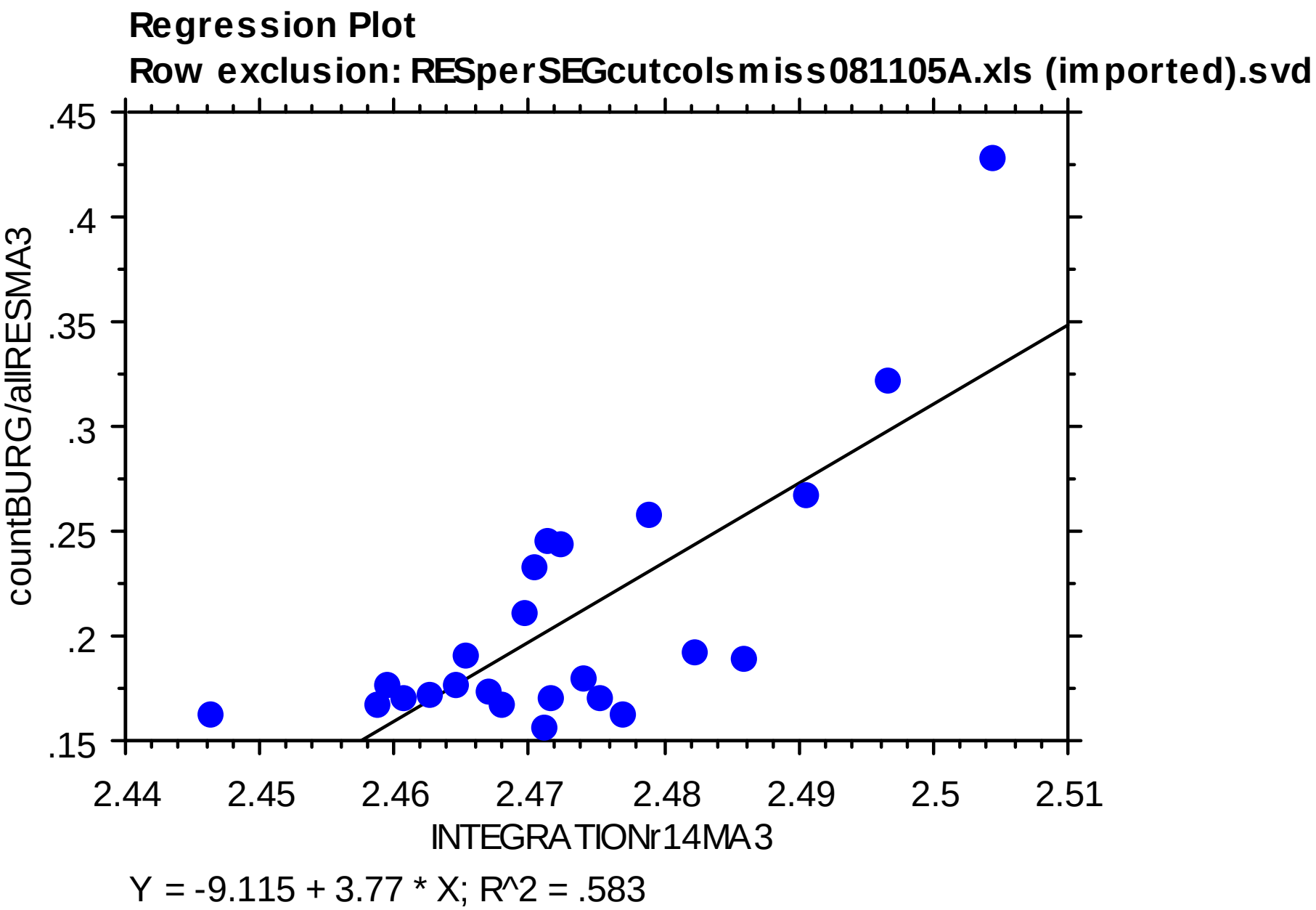
Connectivity of street segments

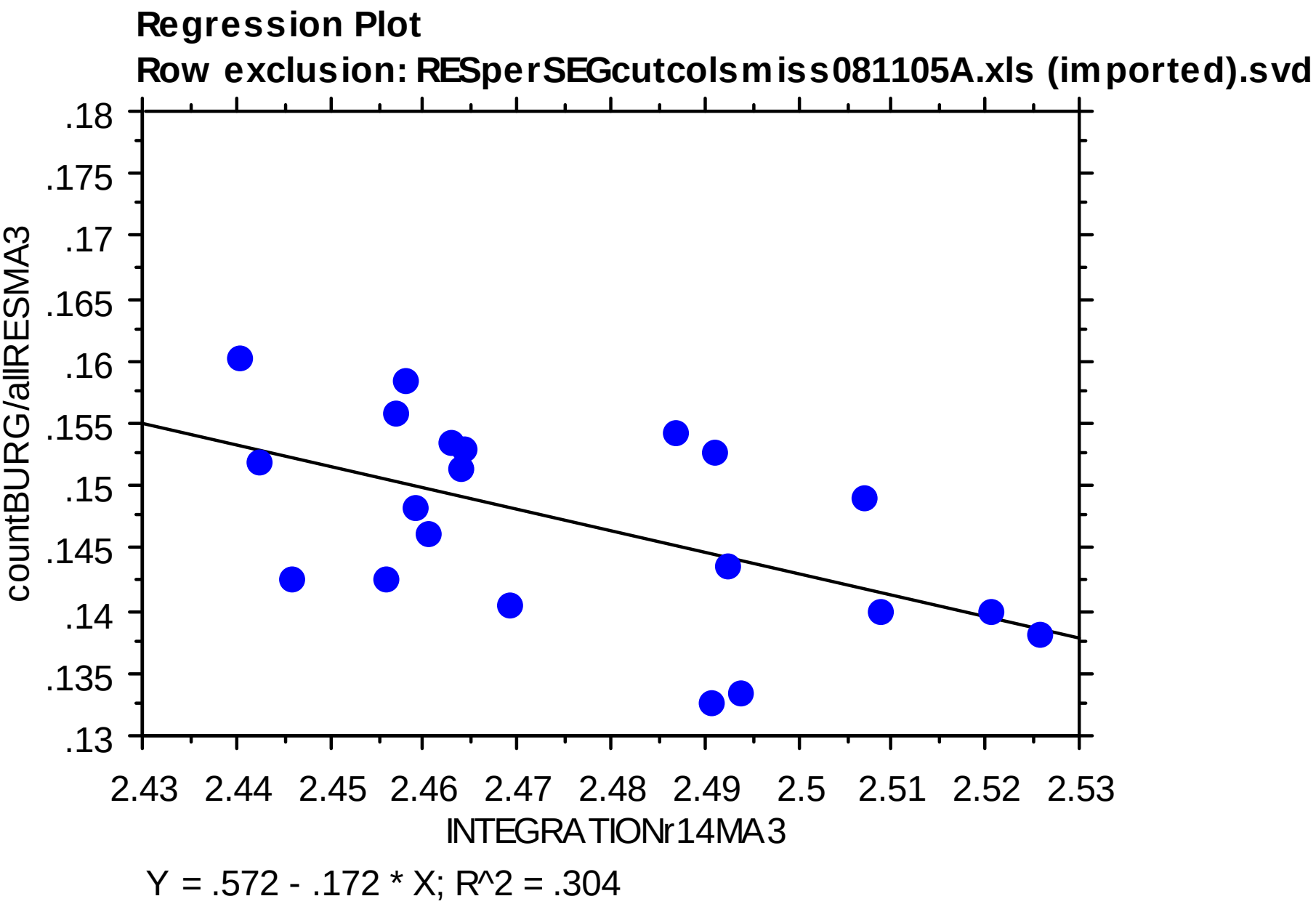


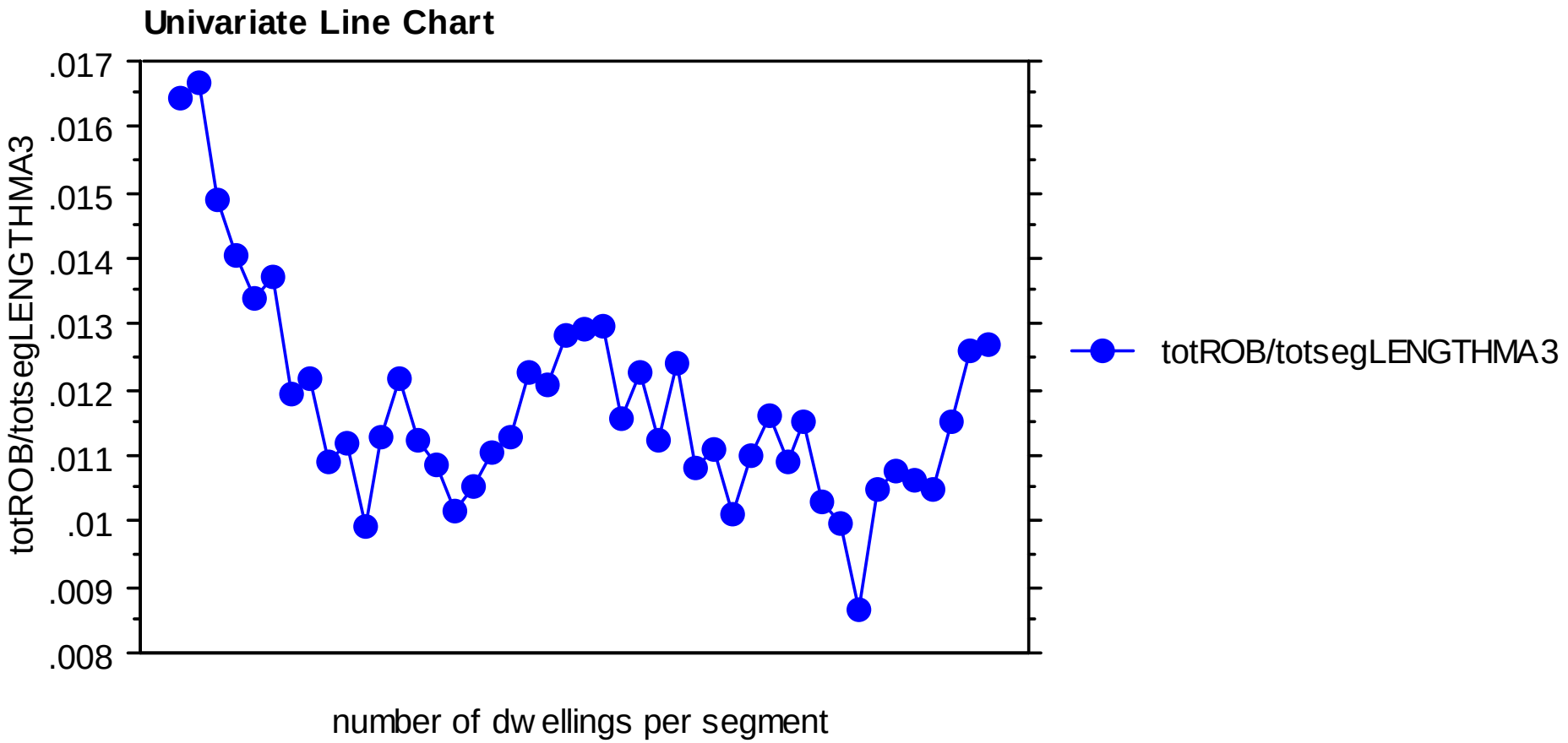

Univariate Line Chart
.7
.6
.5
.4
.3
.2
.1
0
-.1
Variables
segment links from 1-2 to 6
B-band
C-band
D-band
E-band
F-band
G-band
H-band

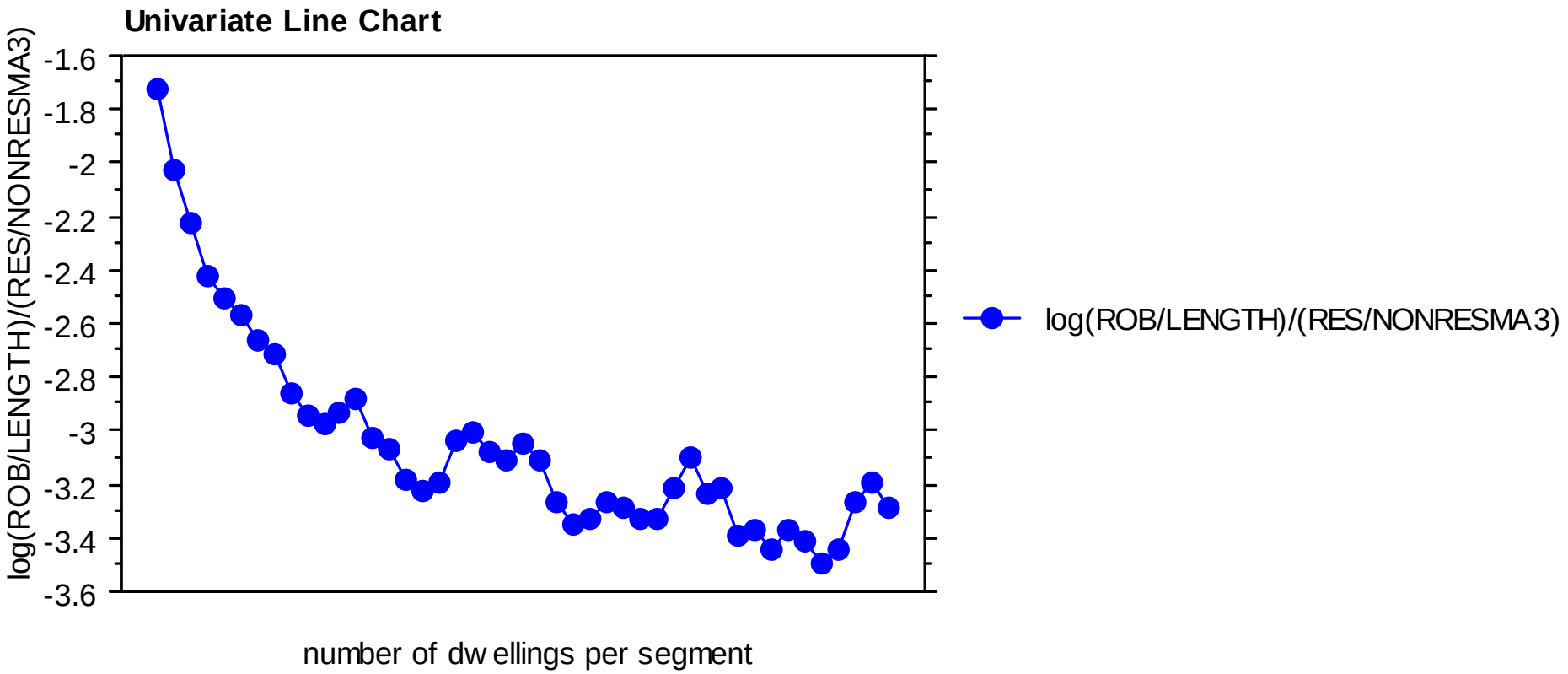

Univariate Line Chart
MA5BURG/HOUSEHOLDS
.38
.35
.32
.3
.28
.25
.22
.2
.17
.15
.13
number of dwellings per segment
MA5BURG/HOUSEHOLDS

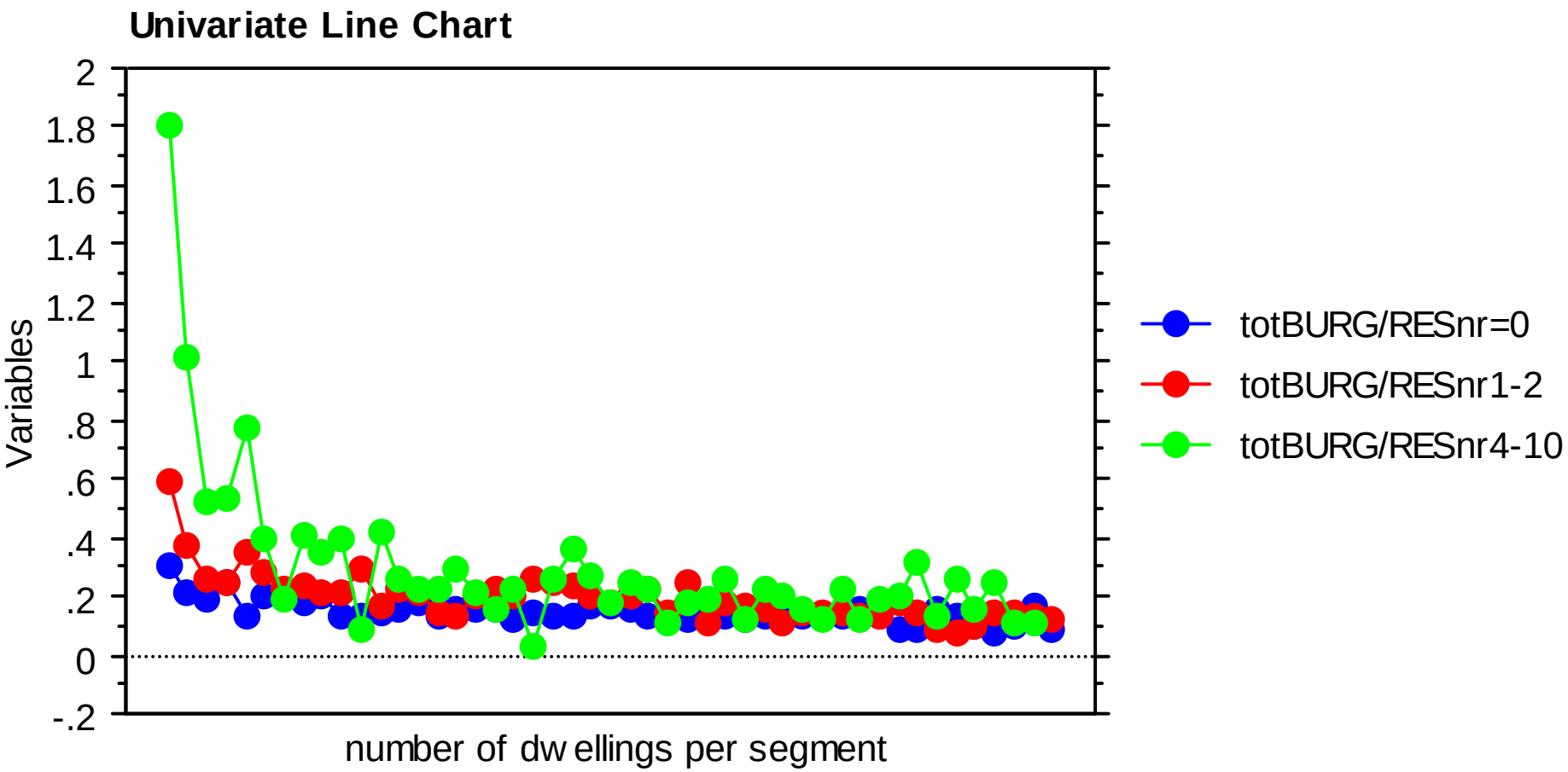

Regression Plot
countBURG/allRESMA3
.45
.4
.35
.3
.25
.2
.15
.1
2.43
2.44
2.45
2.46
2.47
2.48
2.49
2.5
2.51
2.52
2.53
INTEGRATIONr14MA3
Y = -1.219 + .565 * X; R^2 = .04

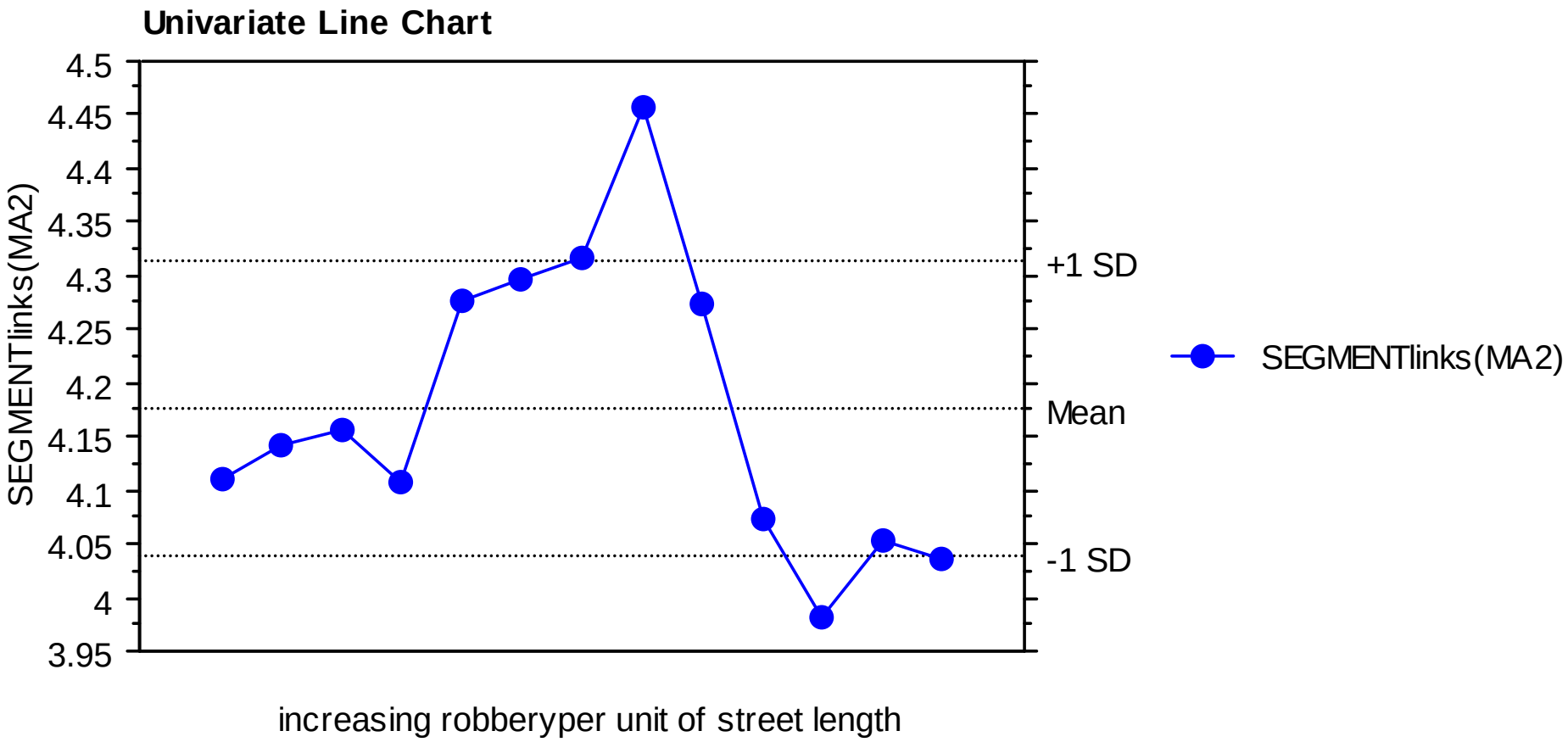

Regression Plot
Row exclusion: RESperSEGcutcolsmiss081105A.xls (imported).svd
countBURG/allRESMA3
.45
.4
.35
.3
.25
.2
.15
2.44
2.45
2.46
2.47
2.48
2.49
2.5
2.51
INTEGRATIONr14MA3
Y = -9.115 + 3.77 * X; R^2 = .583

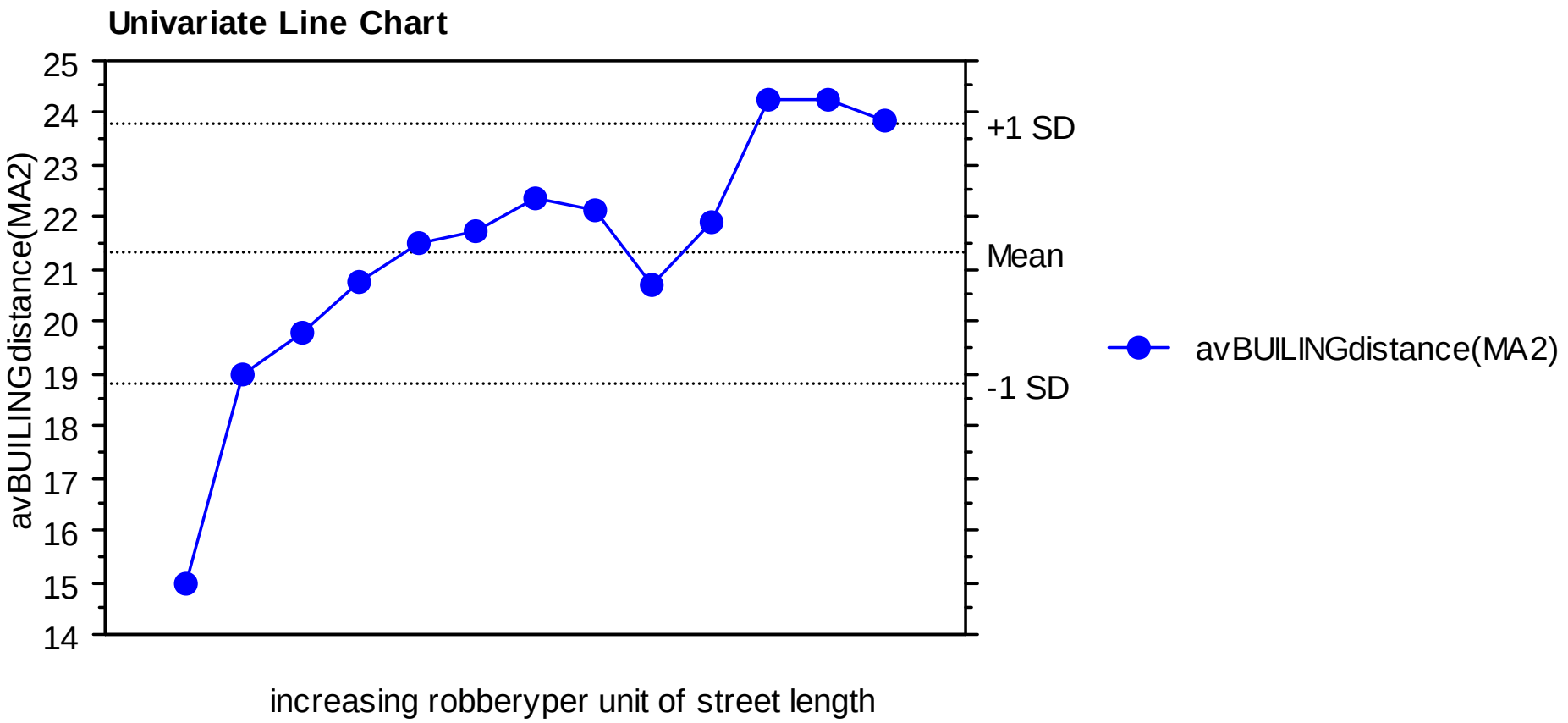

Regression Plot
Row exclusion: RESperSEGcutcolsmiss081105A.xls (imported).svd
.18
.175
.17
.165
.16
.155
.15
.145
.14
.135
.13
countBURG/allRESMA3
2.43
2.44
2.45
2.46
2.47
2.48
2.49
2.5
2.51
2.52
2.53
INTEGRATIONr14MA3
Y = .572 - .172 * X; R^2 = .304

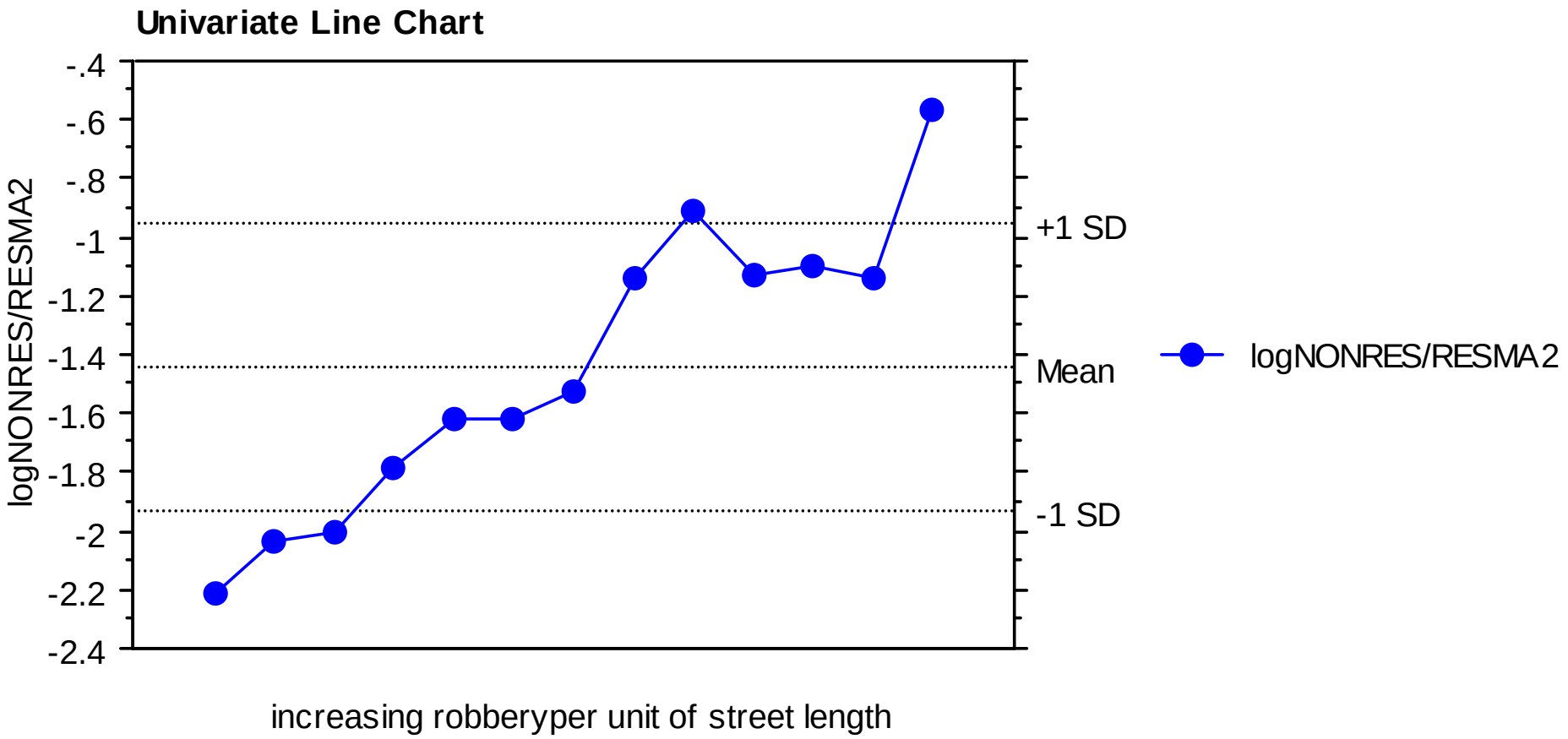

Univariate Line Chart
totROB/totsegLENGTHMA3
.017
.016
.015
.014
.013
.012
.011
.01
.009
.008
number of dwellings per segment
totROB/totsegLENGTHMA3

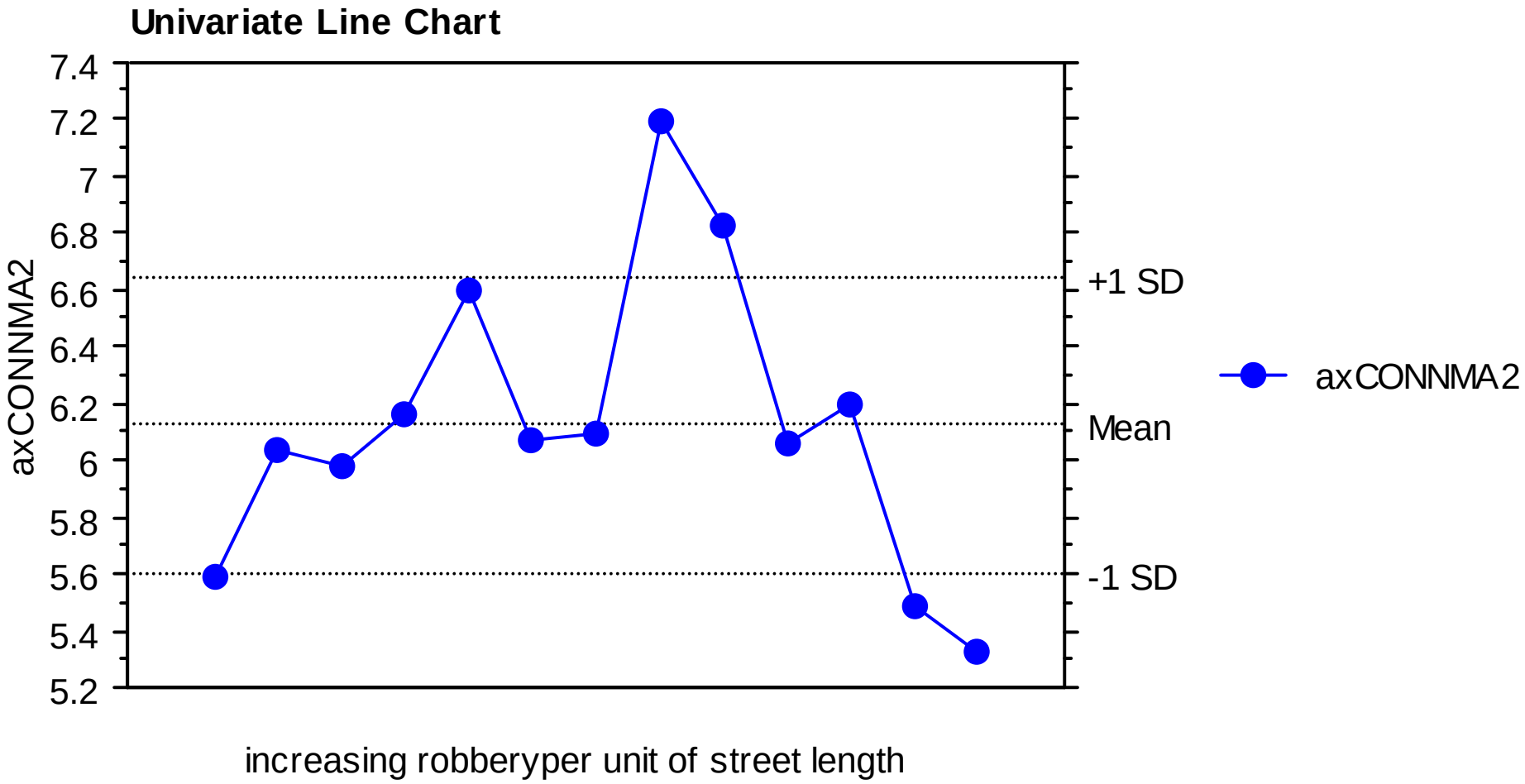

Univariate Line Chart
log(ROB/LENGTH)/(RES/NONRESMA3)
-1.6
-1.8
-2
-2.2
-2.4
-2.6
-2.8
-3
-3.2
-3.4
-3.6
number of dwellings per segment
log(ROB/LENGTH)/(RES/NONRESMA3)

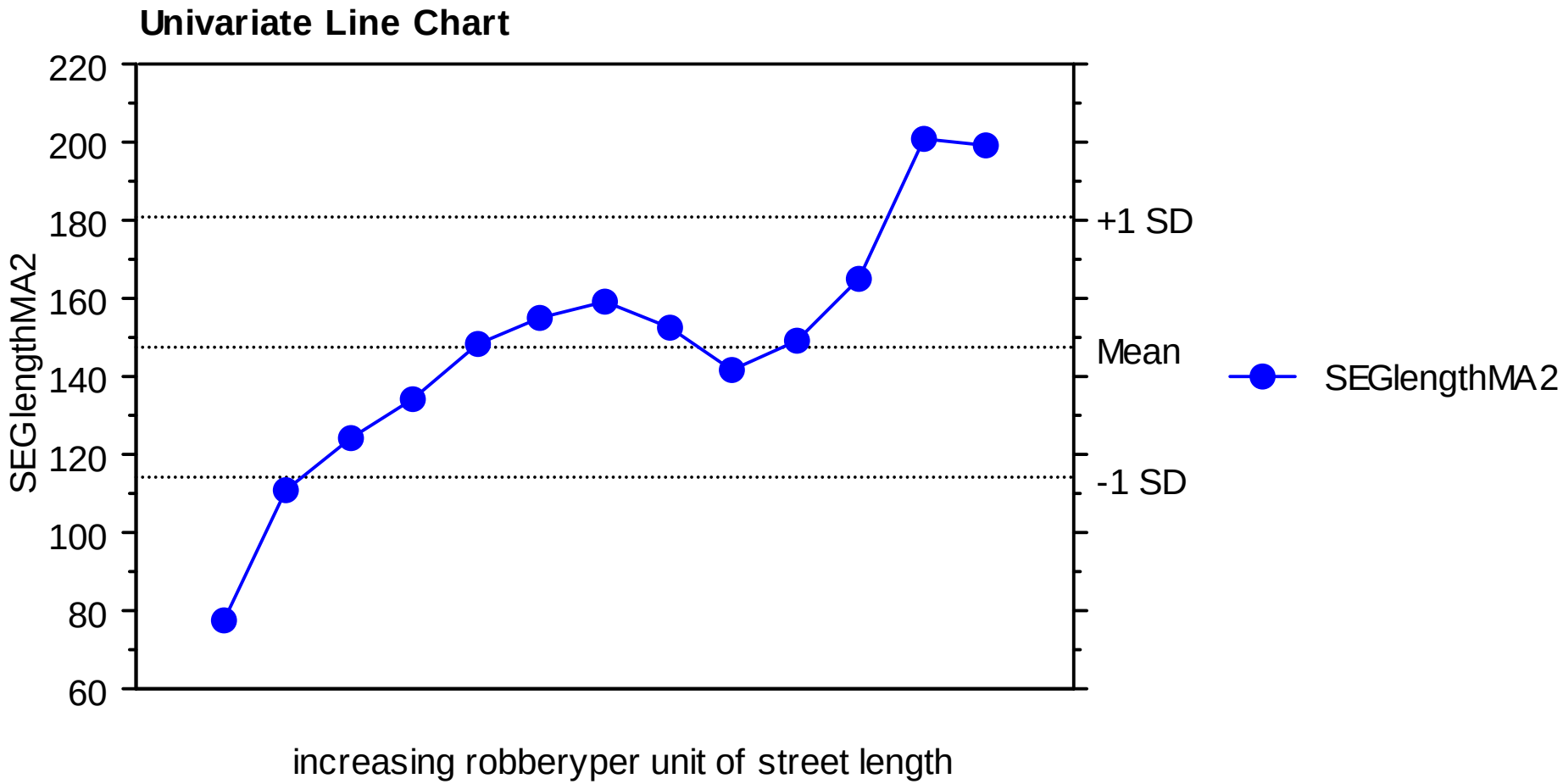

Univariate Line Chart
2
1.8
1.6
1.4
1.2
1
.8
.6
.4
.2
0
-.2
Variables
number of dwellings per segment
totBURG/RESnr=0
totBURG/RESnr1-2
totBURG/RESnr4-10

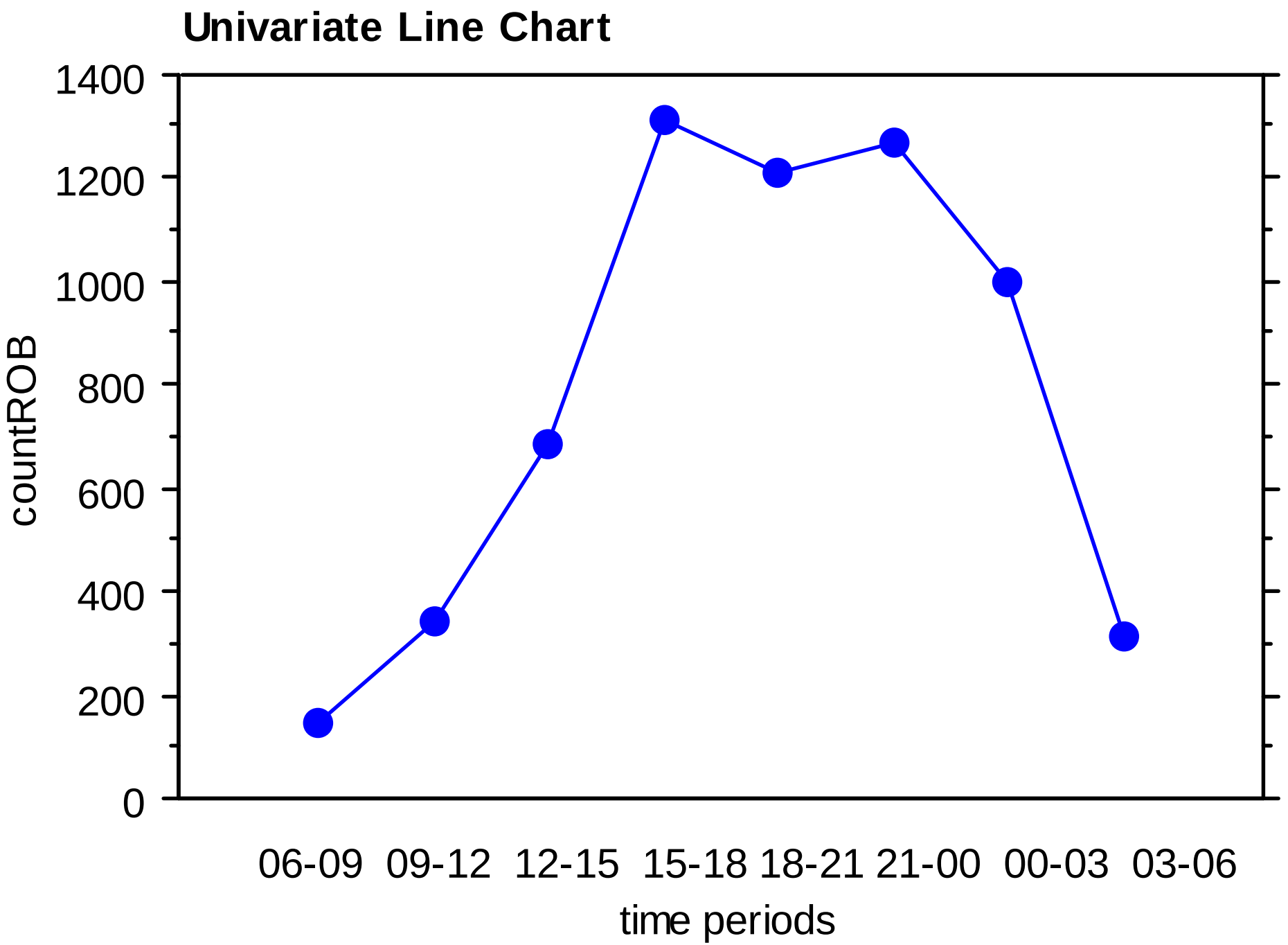

Univariate Line Chart
SEGMENTlinks(MA2)
4.5
4.45
4.4
4.35
4.3
4.25
4.2
4.15
4.1
4.05
4
3.95
+1 SD
Mean
-1 SD
SEGMENTlinks(MA2)
increasing robberyper unit of street length

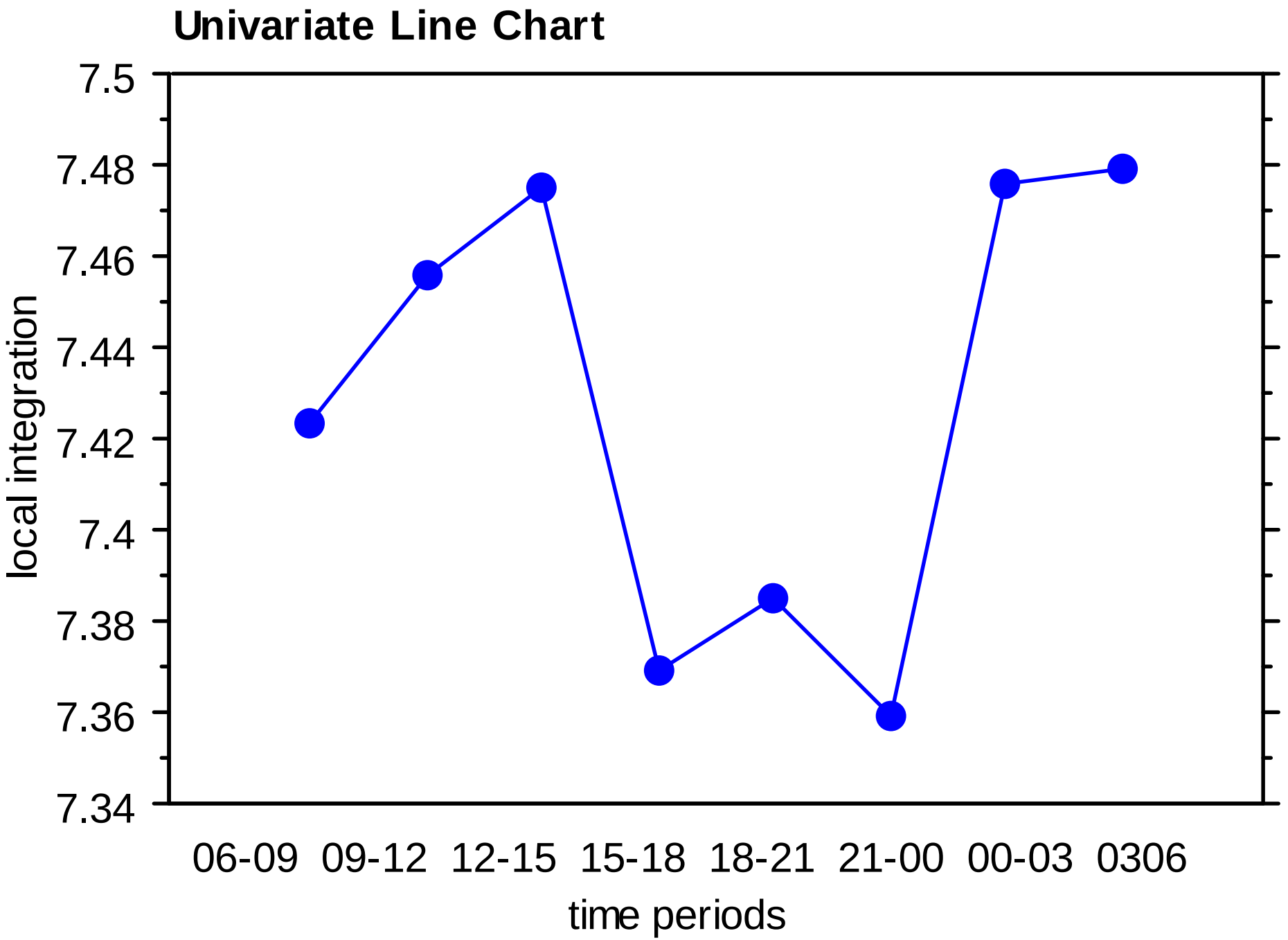

Univariate Line Chart
avBUILINGdistance(MA2)
25
24
23
22
21
20
19
18
17
16
15
14
+1 SD
Mean
-1 SD
avBUILINGdistance(MA2)
increasing robberyper unit of street length


Univariate Line Chart
-.4
-.6
-.8
-1
-1.2
-1.4
-1.6
-1.8
-2
-2.2
-2.4
logNONRES/RESMA2
+1 SD
Mean
-1 SD
logNONRES/RESMA2
increasing robberyper unit of street length


Univariate Line Chart
7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
axCONNMA2
+1 SD
Mean
-1 SD
axCONNMA2
increasing robberyper unit of street length


Univariate Line Chart
220
200
180
160
140
120
100
80
60
SEGlengthMA2
+1 SD
Mean
-1 SD
SEGlengthMA2
increasing robberyper unit of street length


Univariate Line Chart
1400
1200
1000
800
600
400
200
0
countROB
06-09
09-12
12-15
15-18
18-21
21-00
00-03
03-06
time periods


Univariate Line Chart
7.5
7.48
7.46
7.44
7.42
7.4
7.38
7.36
7.34
local integration
06-09
09-12
12-15
15-18
18-21
21-00
00-03
0306
time periods

Are some kinds of dwellings safer than others ?

The **safety of dwellings** is affected by two simple interacting factors:

- the number of sides on which the dwelling is exposed to the public realm - so flats have least risk and detached houses most
- the social class of the inhabitants

All classes tend to be safer in flats, but with increasing wealth the advantage of living in a flat rather than a house increase, as does the disadvantage of living in a house - in spite of the extra investment that better off people make in security alarms.

Purpose built flats are much safer than converted flats. The overall advantage of flats is in spite of the high vulnerability of converted flats

Is density good or bad ?

Higher local ground level **densities** of both dwellings and people *reduce* risk, off the ground density less so, but overall density is beneficial.

Does it matter how we group dwellings ?

- The larger the numbers of dwellings on the **street segment** (the section of a street between intersections, and so one face of an urban block) the lower the risk of crime.

- This applies to cul de sacs and to through streets, and has a greater effect than either being in a cul de sac or being on a through street. The more immediate neighbours you have the safer you are.

Are cul de sacs safe or unsafe ?

Simple linear cul de sacs with good numbers of dwellings set into a network of through streets tend to be safe, but this does not extend either to small cul de sacs, or complex hierarchies of cul de sacs.

This interacts with social class. Small numbers of well-off dwellings in cul de sacs are more at high risk than a similar group of poor dwellings, while the opposite is the case in grid like layouts where better off dwellings are less at risk than less advantaged dwellings.

Is movement in your street good or bad ?

- Local movement is beneficial, larger scale movement not so - BUT

- For large scale movement, spatially integrated street segments (more movement potential) are advantageous with a high number of dwellings per segment, but disadvantageous with a low number - one of many flipover effects.

Is mixed use beneficial or not ?

There is greater crime risk on mixed use street segments where residence levels are low, but this extra risk is neutralised with increased residential population.

So small numbers of residents in mixed use areas are at risk, but larger number of residents virtually eliminate this.

Should residential areas be permeable or impermeable ?

- Permeable enough to allow movement in all directions but no more. Poorly used permeability is a crime hazard.

The importance of residential numbers

- All these results point to the link between the strength of residential numbers and low crime. In the past we though this could only be achieved through cul de sacs and ‘defensible space’ which sought security by keeping strangers out.

- Now it is clear that good residential numbers – a residential culture - play a key role in security in all parts of the city, in mixed use areas as much as in residential areas.