UrbanBuzz
Building sustainable communities
i-VALUL

4.2 KIT4
Residential property value

Prof Bill Hillier
UCL

Yolande Barnes
Savills

Are there spatial correlates to residential property values?

4.3 Knowledge Integration KIT4 – Residential property value

- This is an attempt to identify any underlying patterns there may be in the relation between property values and street layout by using Council Tax Band as a proxy for property value. Council tax values were of course originally based on property values, but real values have of course changed considerably. But changes in absolute values will not matter if the underlying *pattern* of values has remained similar, since it is the pattern of values that we consider here.

- I use the database of 65453 residential buildings that was used for the crime work in the proof of concept for crime and urban layout. In a sense, this work can be seen as an extension of the crime work, since, if you recall, residential burglary rates were U-shaped in the borough, in that they were higher for low and high council tax values and lower in the middle. So looking more closely at the relation between council tax values and street layout should also clarify the features of the crime pattern.

- Practically speaking, I am continuing the statistical exploration of the database, but using council tax values as the dependent variable rather than residential burglary or street robbery.

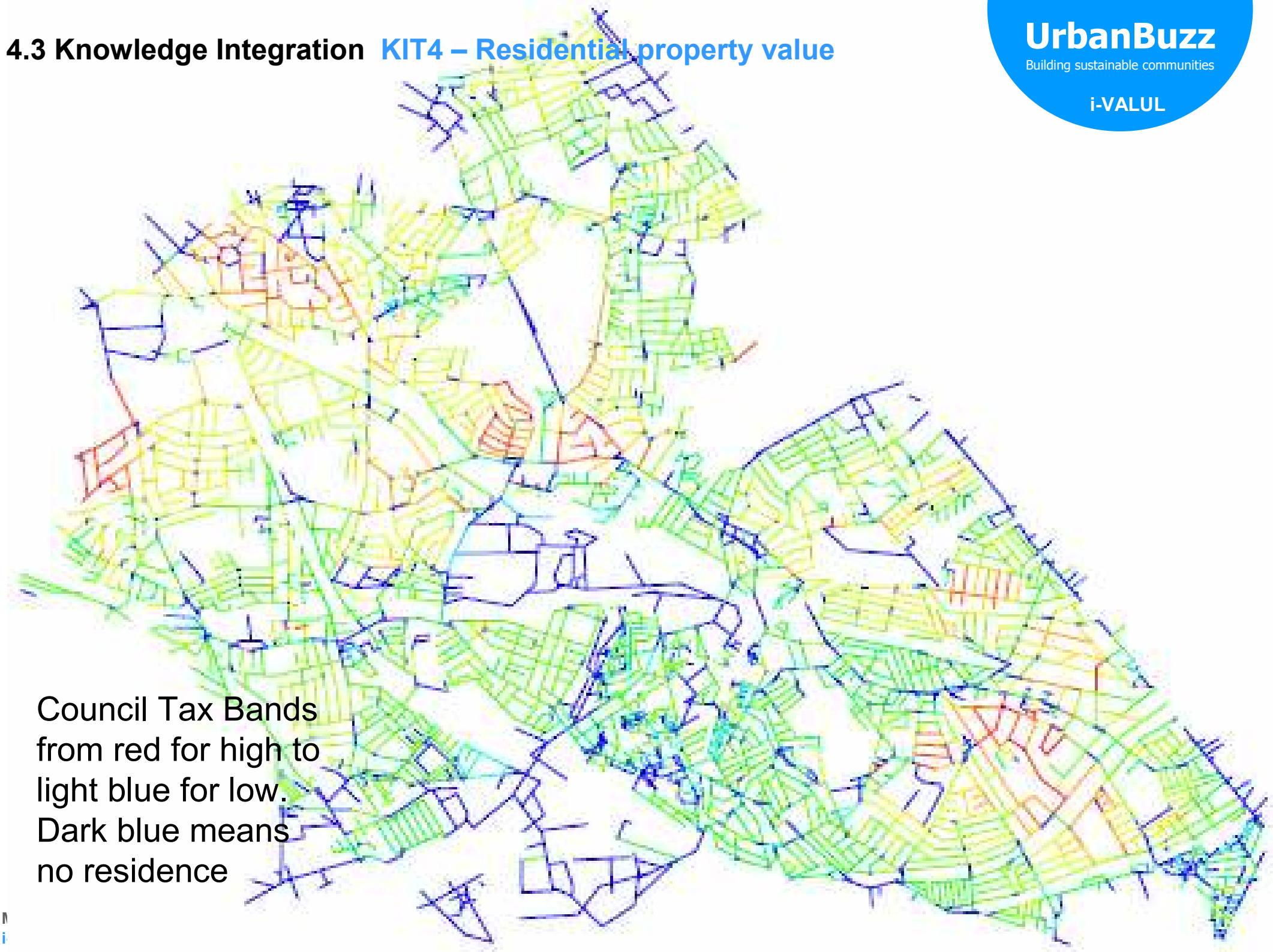
- Can I say at the outset that I am as surprised by the results as I suspect you may be, and even more I am surprised by their clarity.

UrbanBuzz
Building sustainable communities
i-VALUL

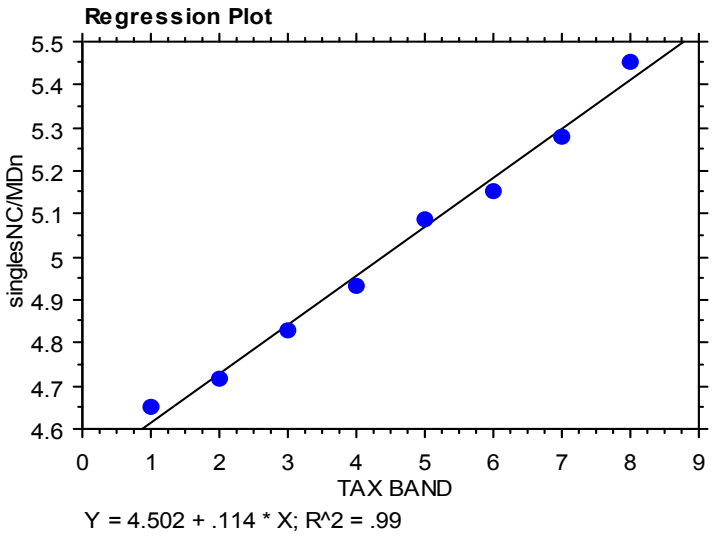
Tax band	single	multiple
1	17	158
2	143	2070
3	1518	8693
4	18423	3649
5	18599	823
6	5515	184
7	3115	113
8	215	10

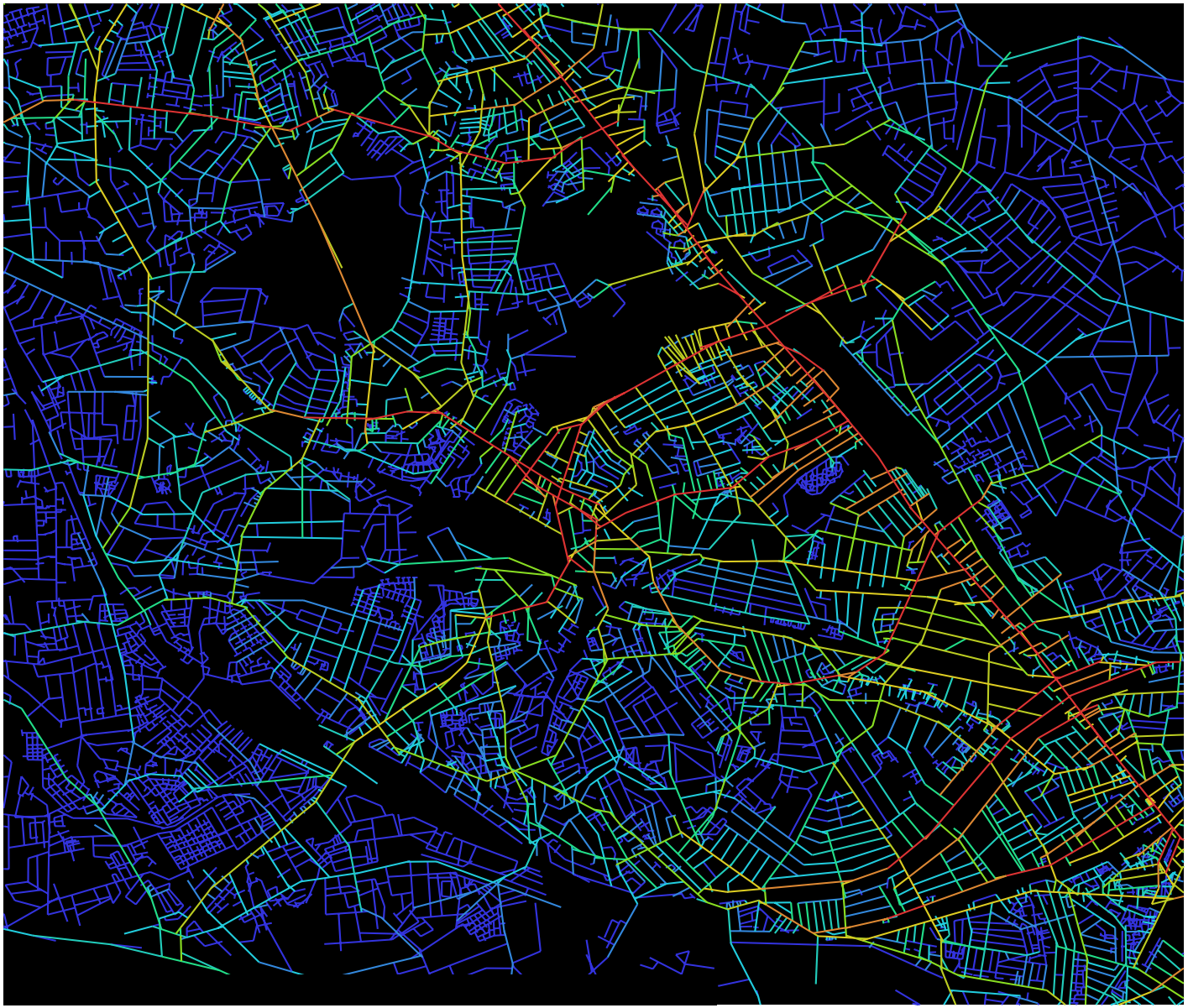
- 65453 residential buildings with 101849 dwellings

4.3 Knowledge Integration KIT4 – Residential property value

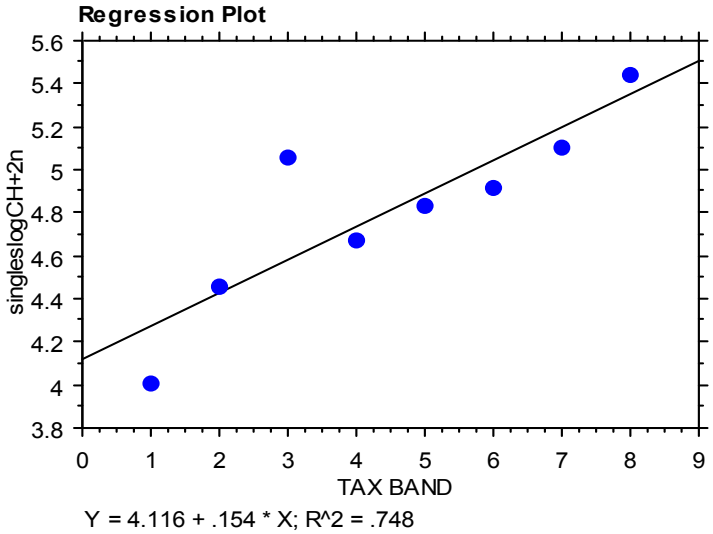


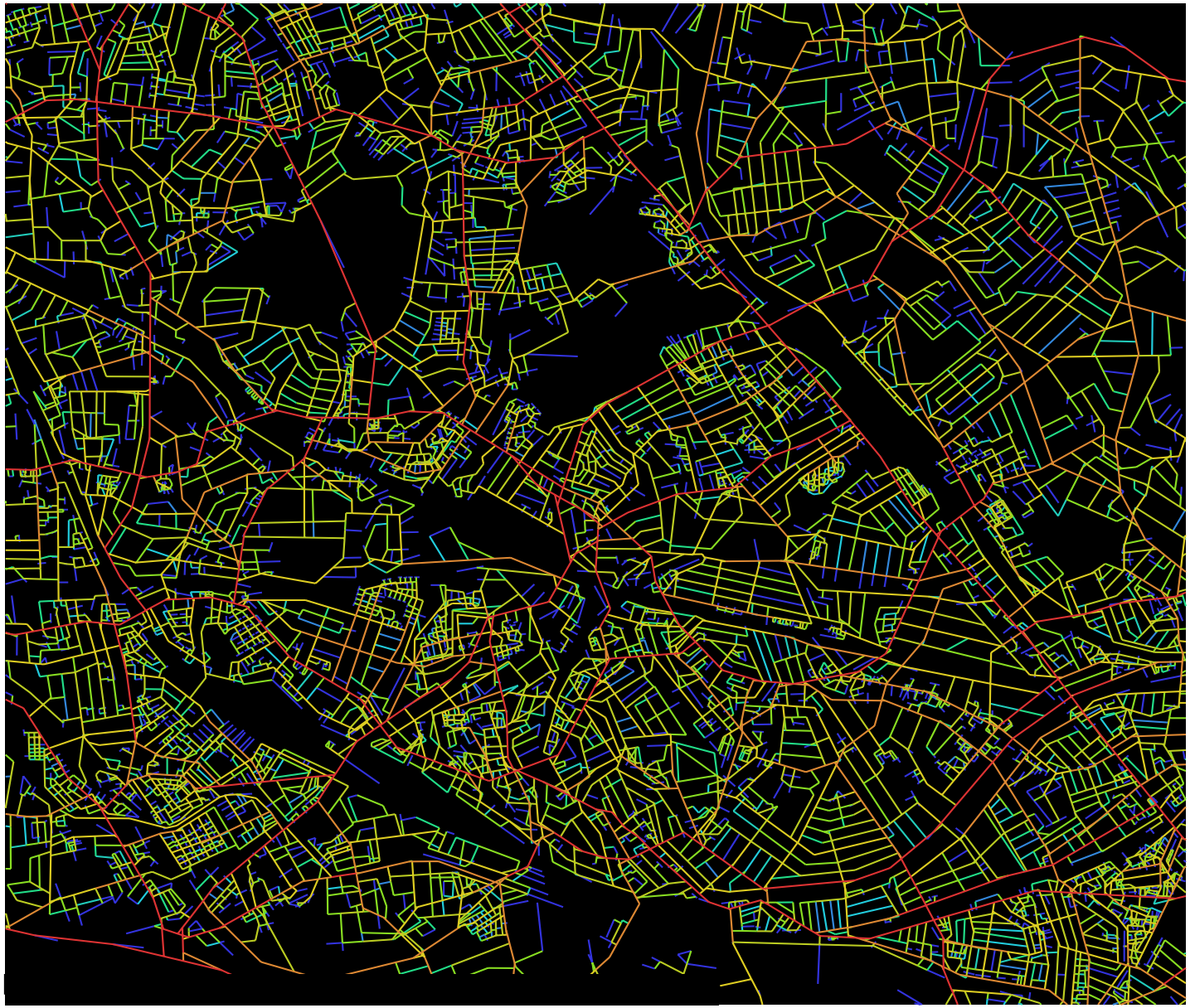
Council Tax Bands from red for high to light blue for low. Dark blue means no residence



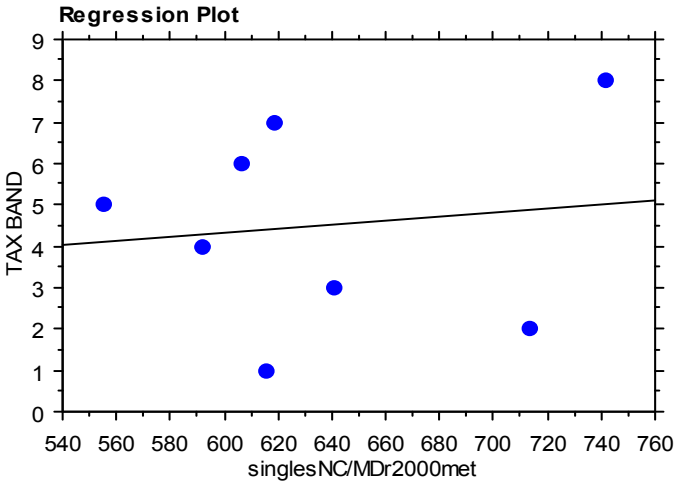


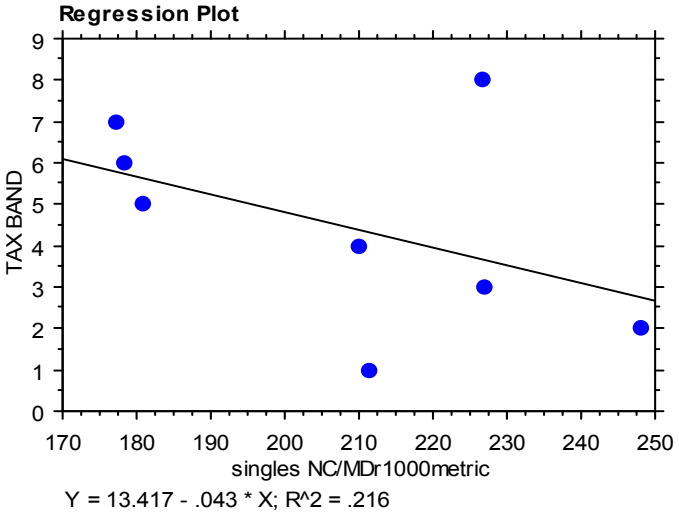
On the right is the pattern of global integration pattern for the 7000+ segments of Ludstown, plotted from red for high through to blue for low. On the left the correlation between the mean integration of the tax bands and the tax bands rising form left to right. The correlation is almost perfect with an r-square of .99. This means that the historic London principle through which the most advantaged people occupied the most strategic streets still holds even though most of the area was built in the nineteenth and twentieth centuries. This does not mean living on the main road, since as we saw there is little residence on large parts of these. It is the next level down which seems critical.

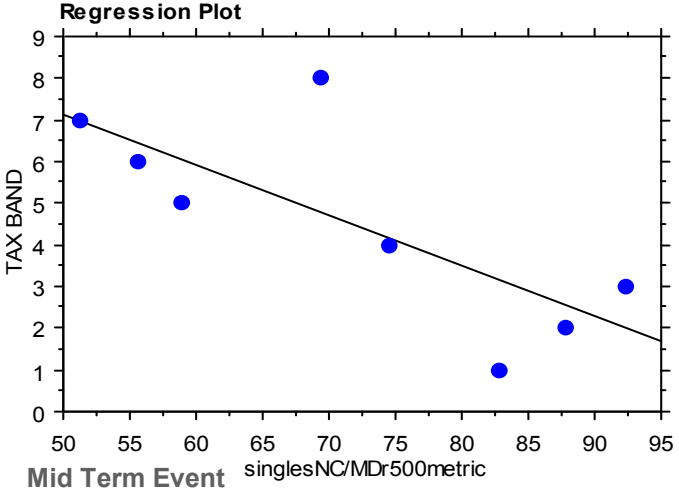


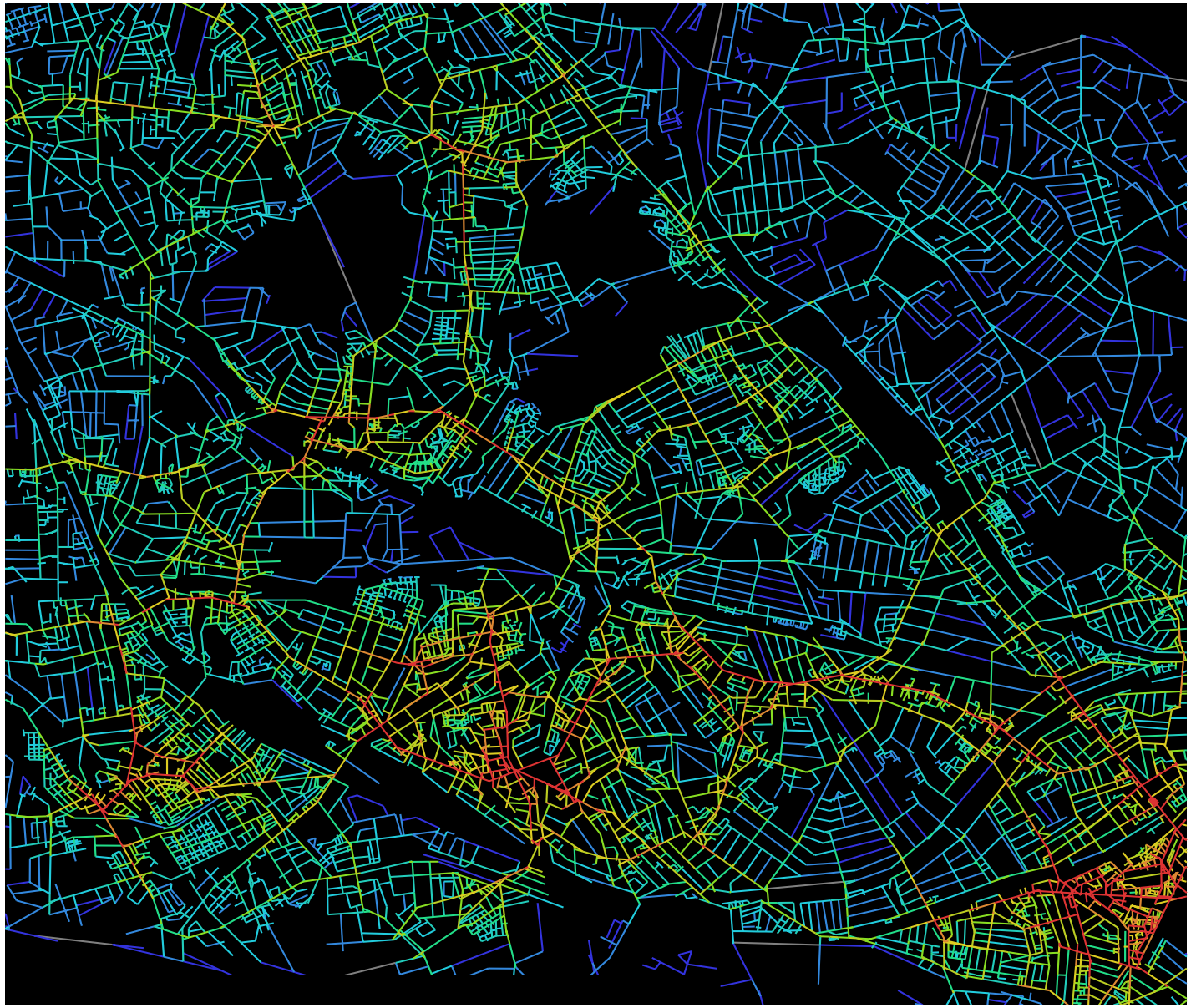


We find a similar, though less perfect effect for the *choice* or *through-movement* measure (sometimes called path overlap).

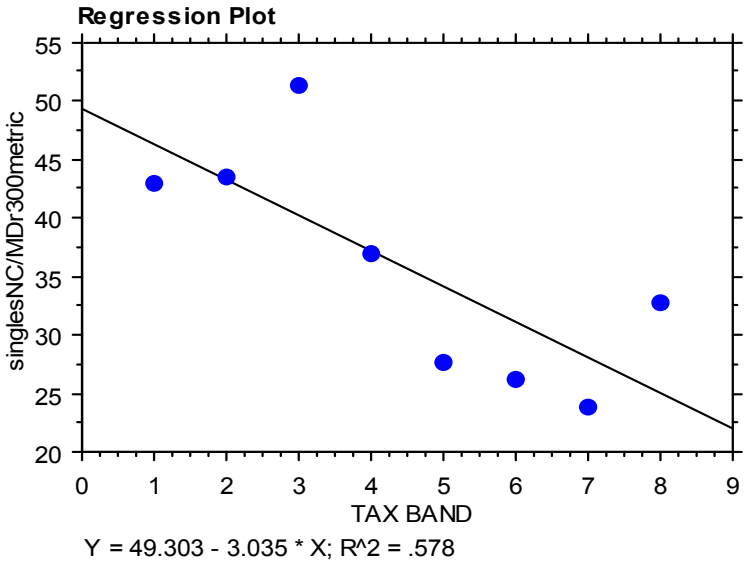


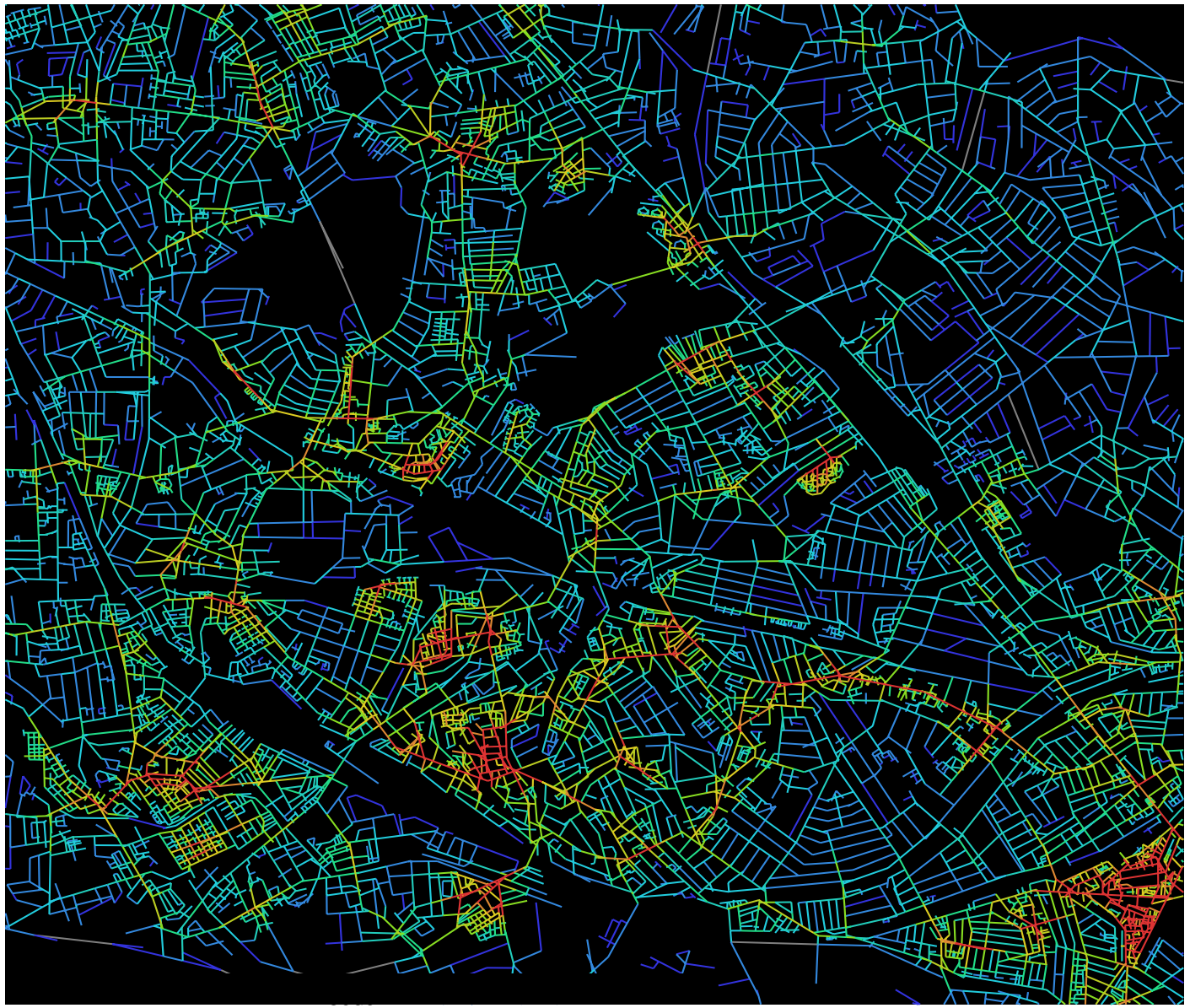




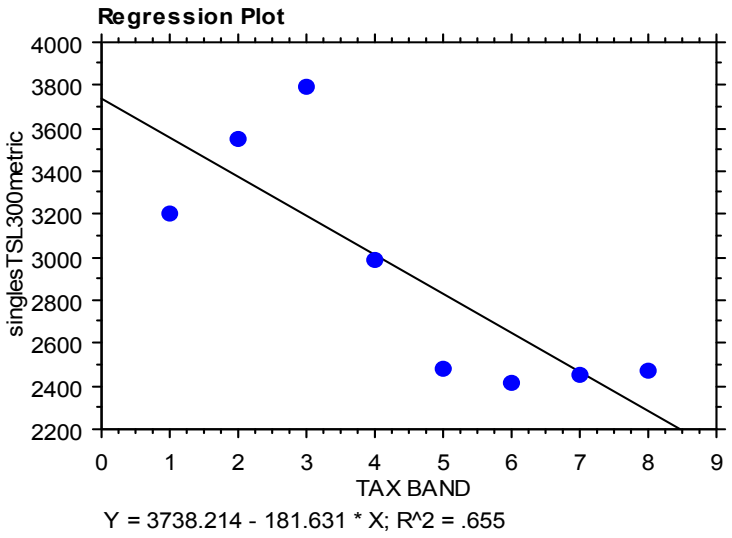


But as we reduce the radius of our *integration* or *to-movement* measure to 2000, 1000 and 500 metres - so answering the question *how accessible are you from and to all points within so many metres real walking distance ?* – we find the effect gradually *reverses*.

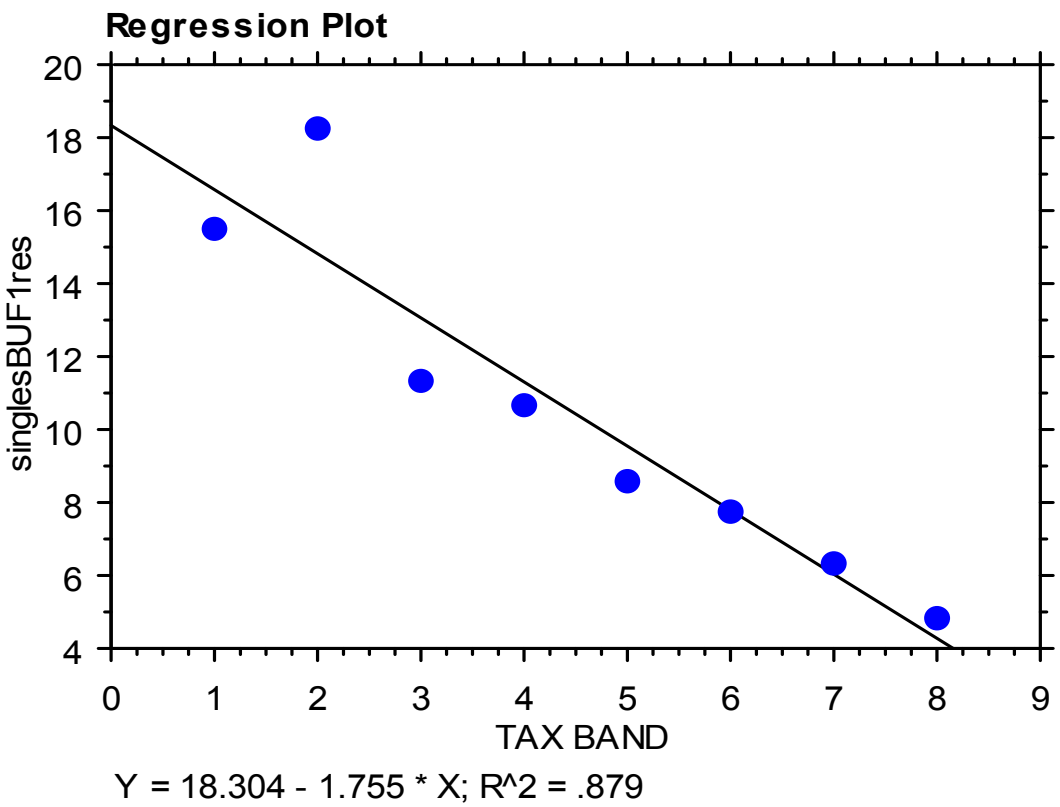


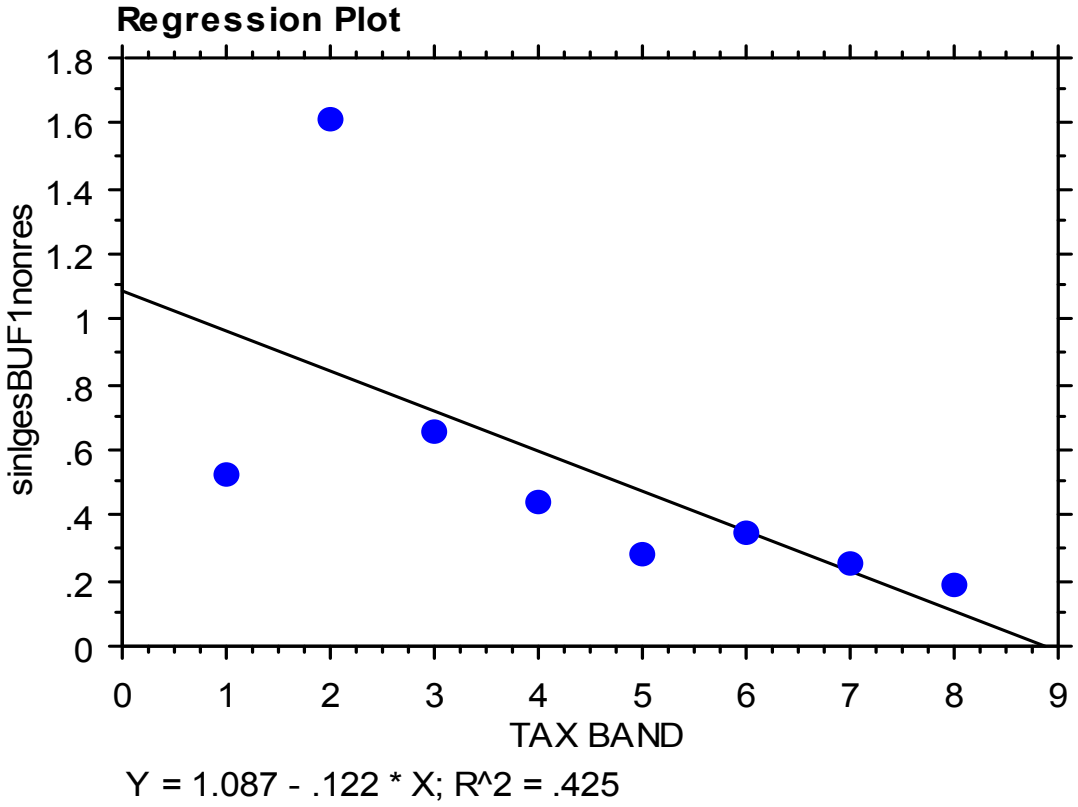


- By 300 metres the effect is reversed. High tax properties have *less* local accessibility than low tax properties. There is clearly a threshold above which high tax properties are well connected into the surrounding system and below which they are not.

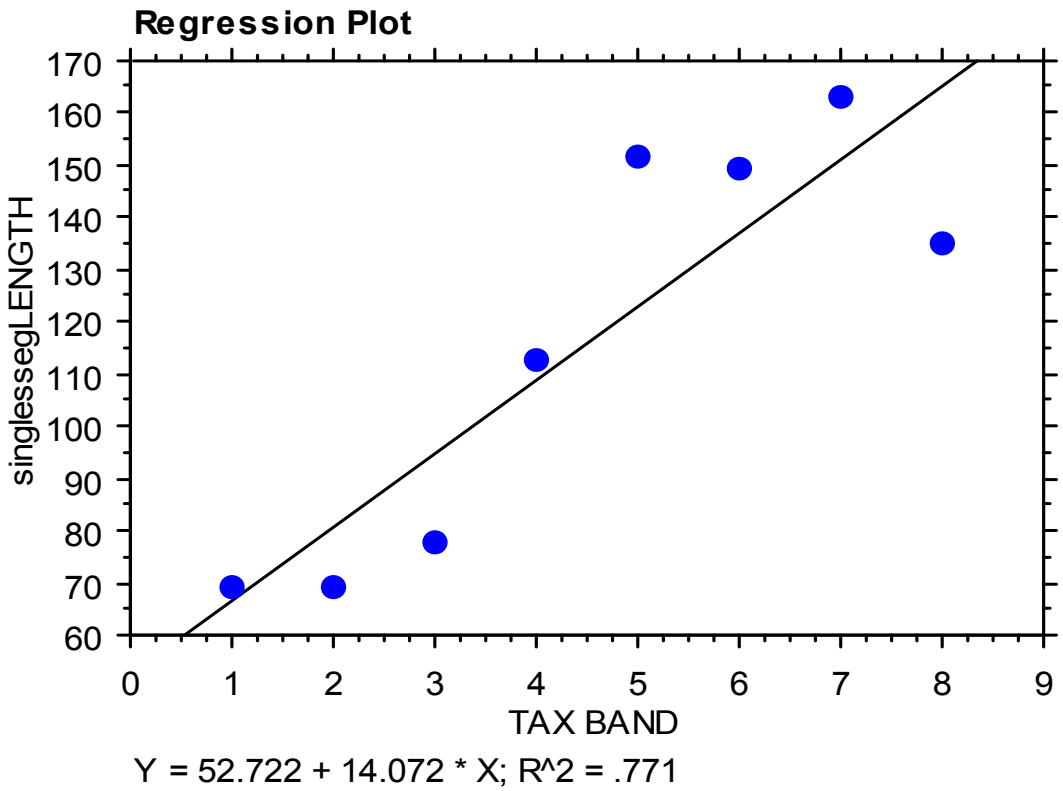


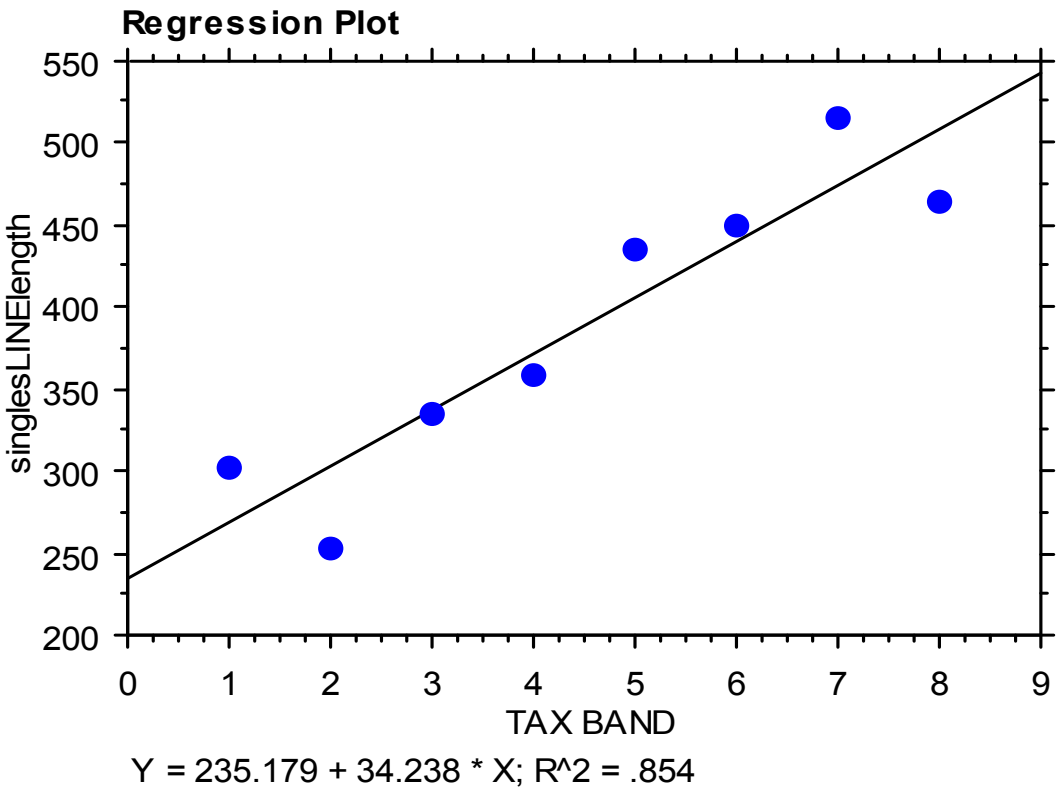
- We find a very similar result by calculating the total street length available within 300 metres walking distance, perhaps a more easy to intuit version of the measure.





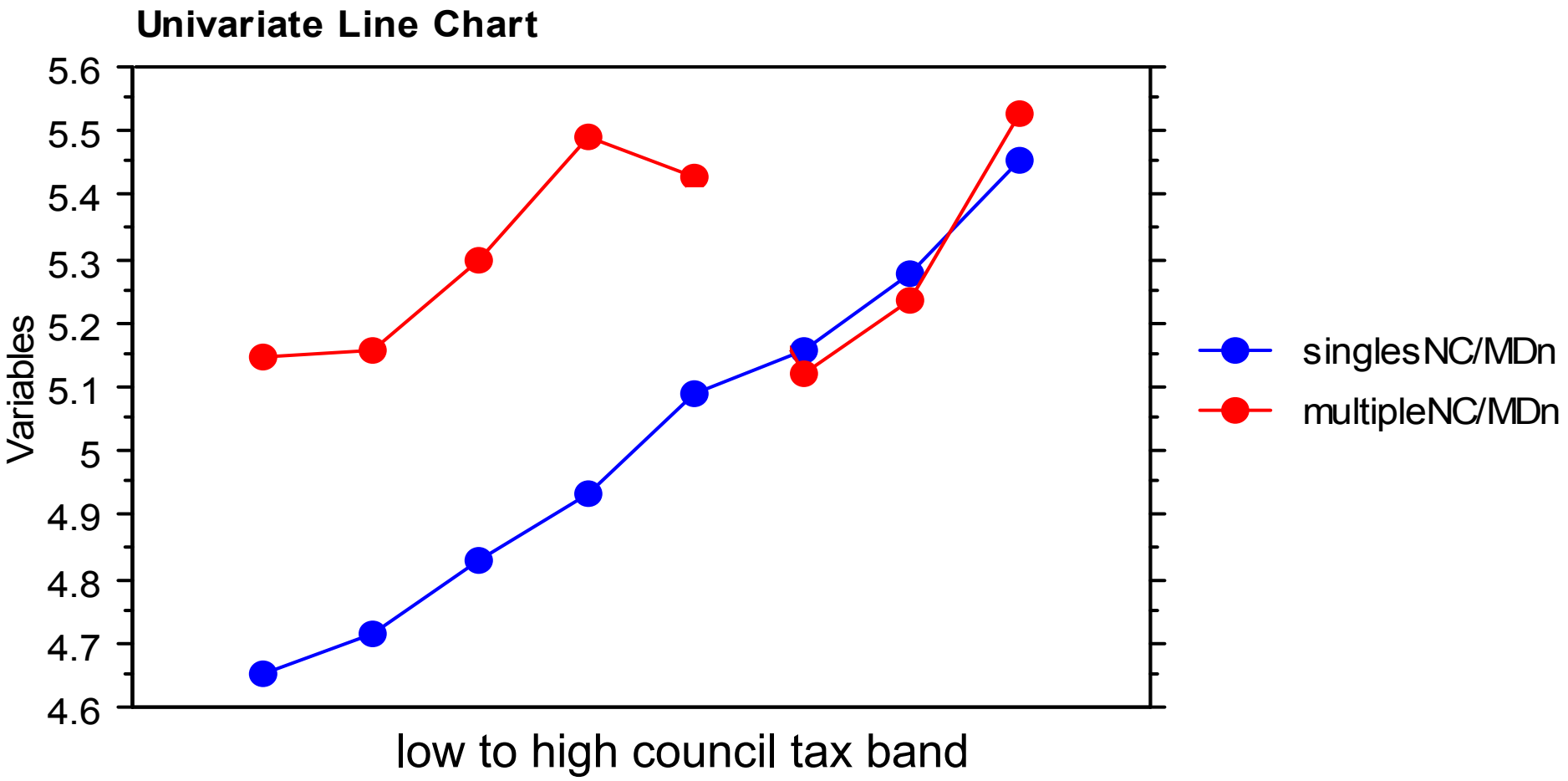
- We also find, not surprisingly, that tax band is inversely correlated with what we call *building centred density* – the number of other dwellings wholly or in part within 30 metres of each dwelling. We also find ont the right that higher tax bands also thin out the non-resdiential uses in their close vicinity.



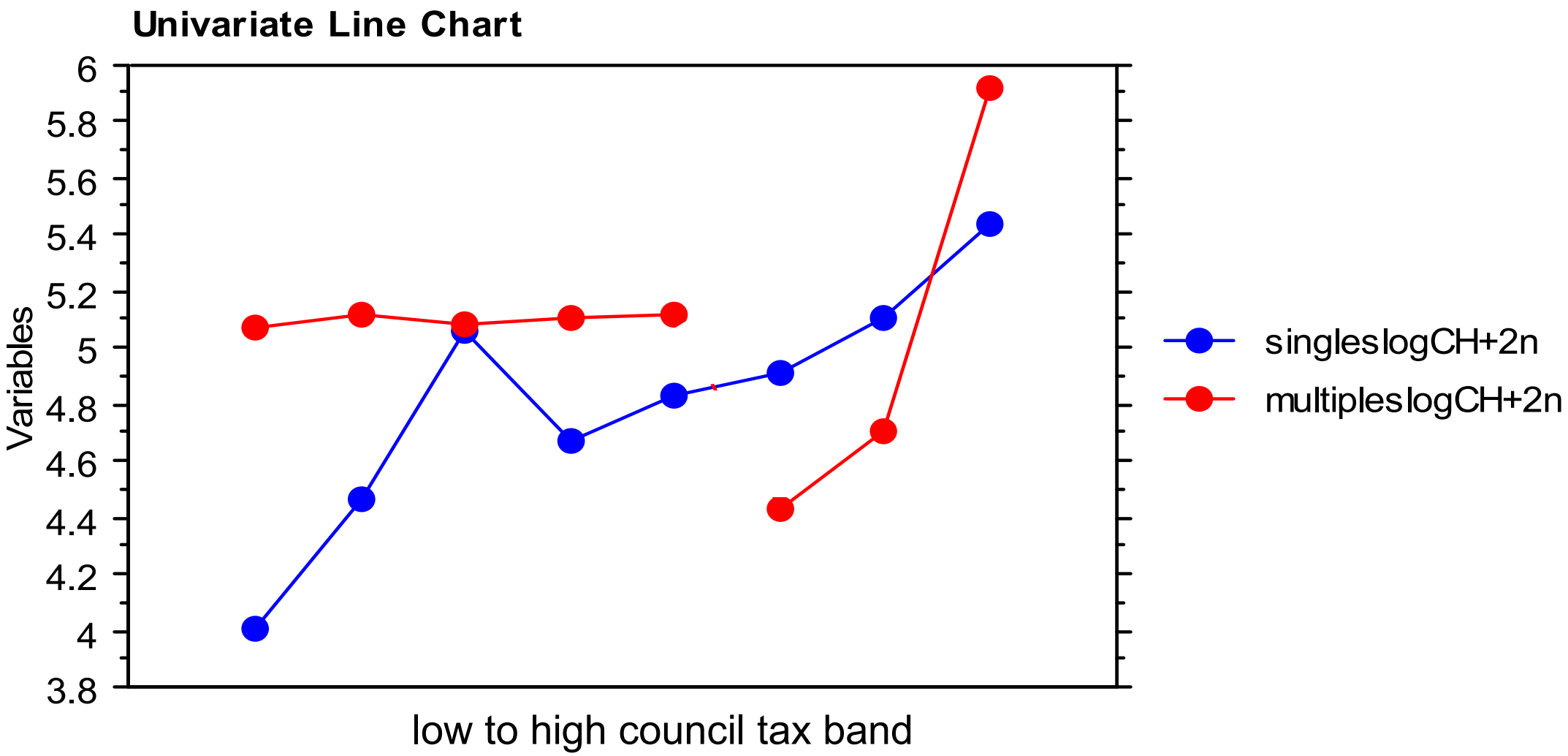


- We also see – left above - that higher tax bands are associated with increased length of street segments between junctions. This means that high tax properties tend to form part of larger urban blocks than low tax properties.

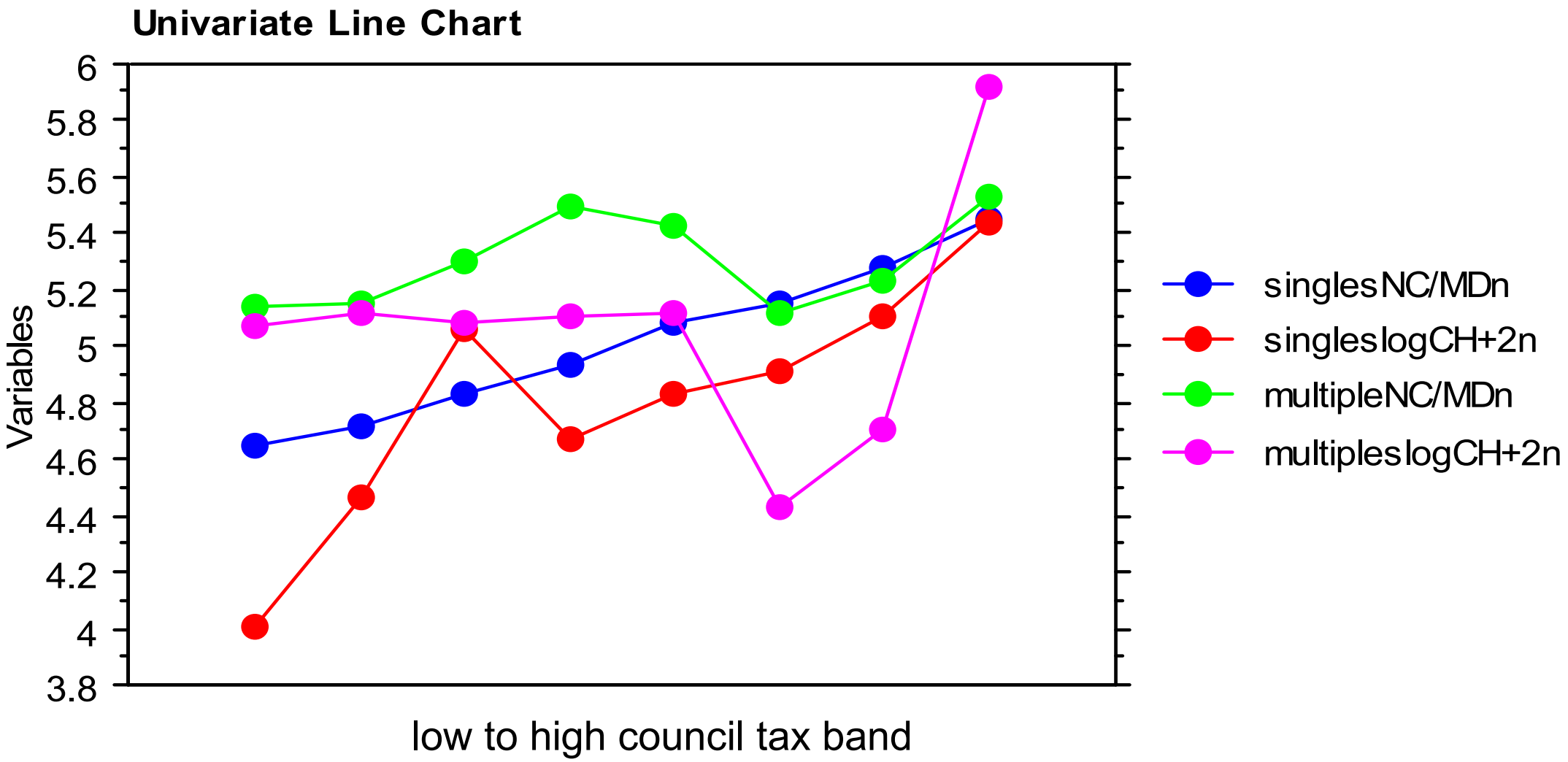
- Above right we see they are also associated with longer lines of sight along the street (without regard for the number of junctions). You see a larger scale of urban environment from a high tax dwelling. Or, putting it the other way round, high tax properties are more visually prominent in the urban environment.



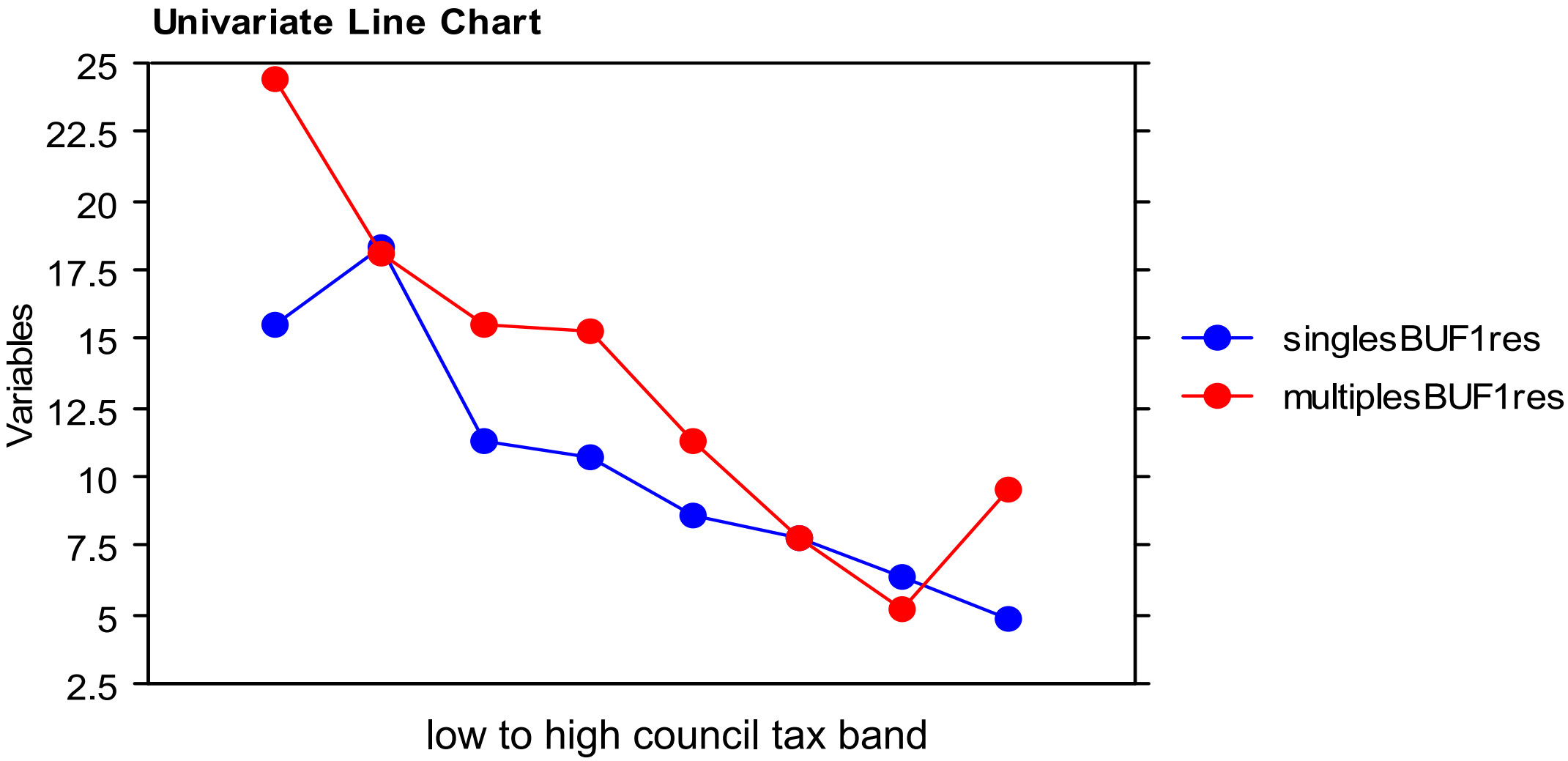
- All the results we have seen so far are for the 48000+ single dwellings i.e. houses. But it is also useful to compare these with residential buildings with multiple dwellings. Here we compare the upward rise of the single houses curve with the more complex curve for multiples. There may be two patterns for multiples, with the lower tax bans dominated by social housing and the higher by private apartments or converted houses. But is it notable that low tax multiples are substantially more integrated than single houses, but high tax multiples are very similar to single houses.



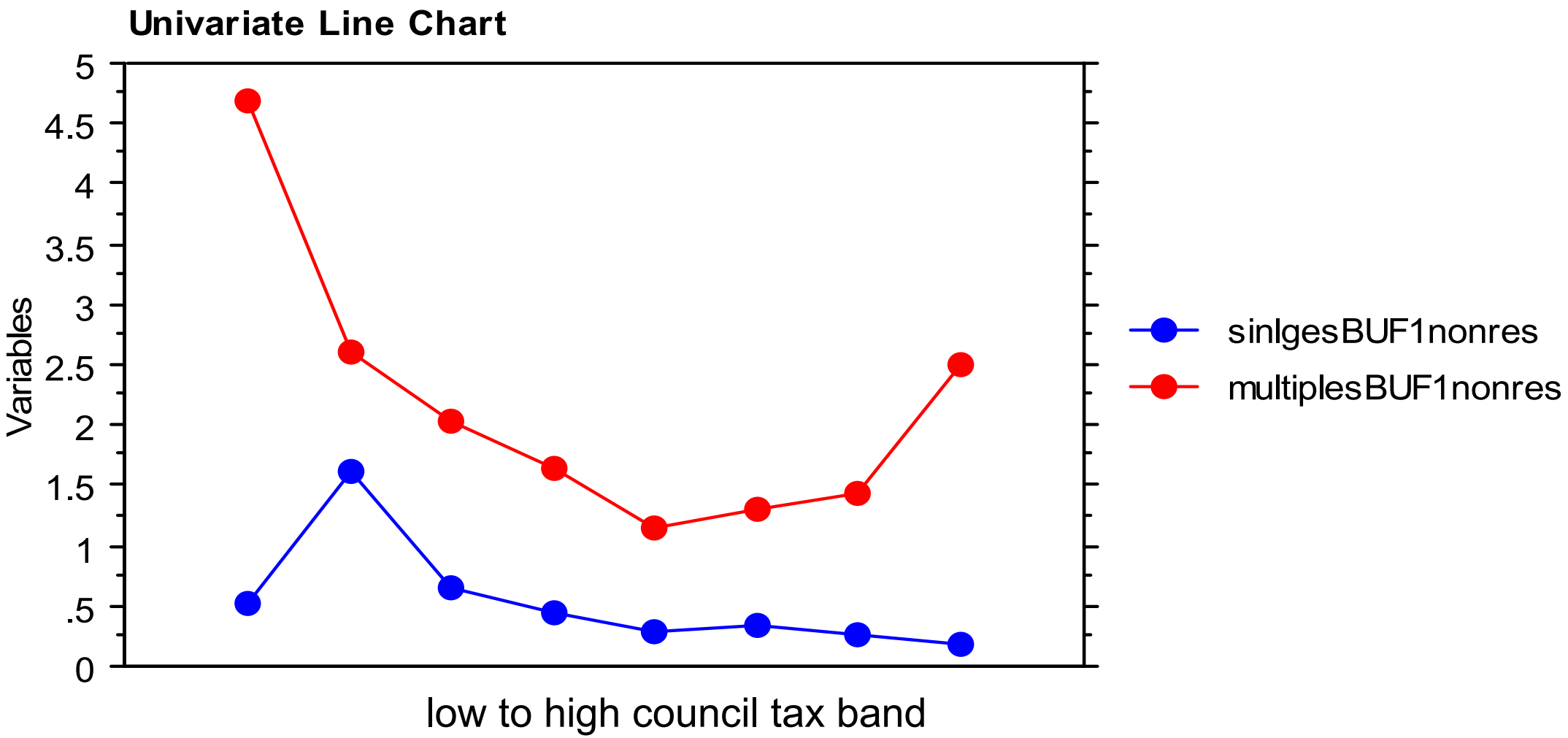
- A similar pattern is found for the *choice* or *through-movement* potential measure.



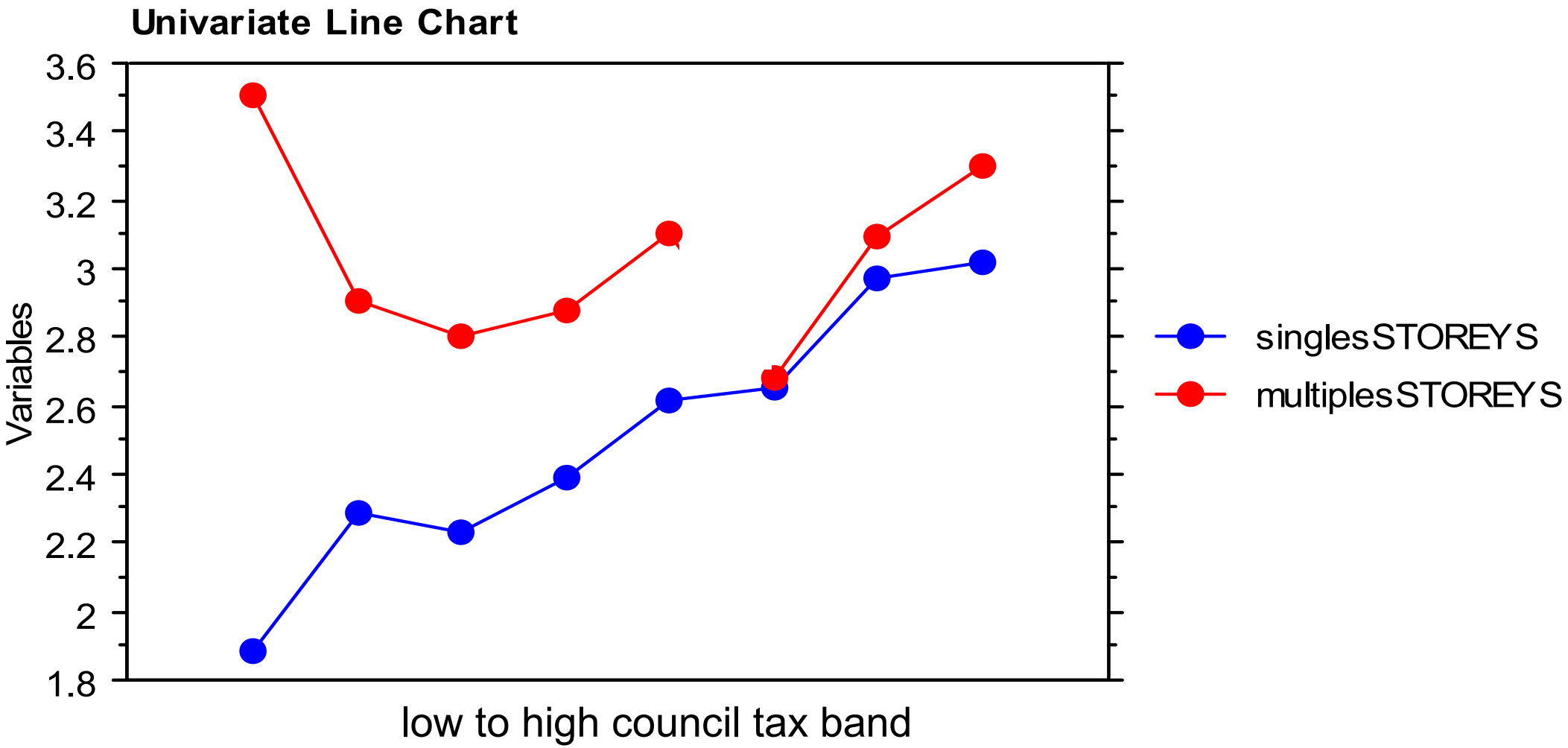
- Here we see both types of dwelling on both variables. We must take care not to make too many inferences from the extreme points since there the samples are much smaller – for example, we have only 10 H band flats for the purpose peak top right. But these patterns are telling us a great deal about where we locate different kinds of housing in the urban environment. Some social rule systems, as well as physical constraints, seem to be operating here.



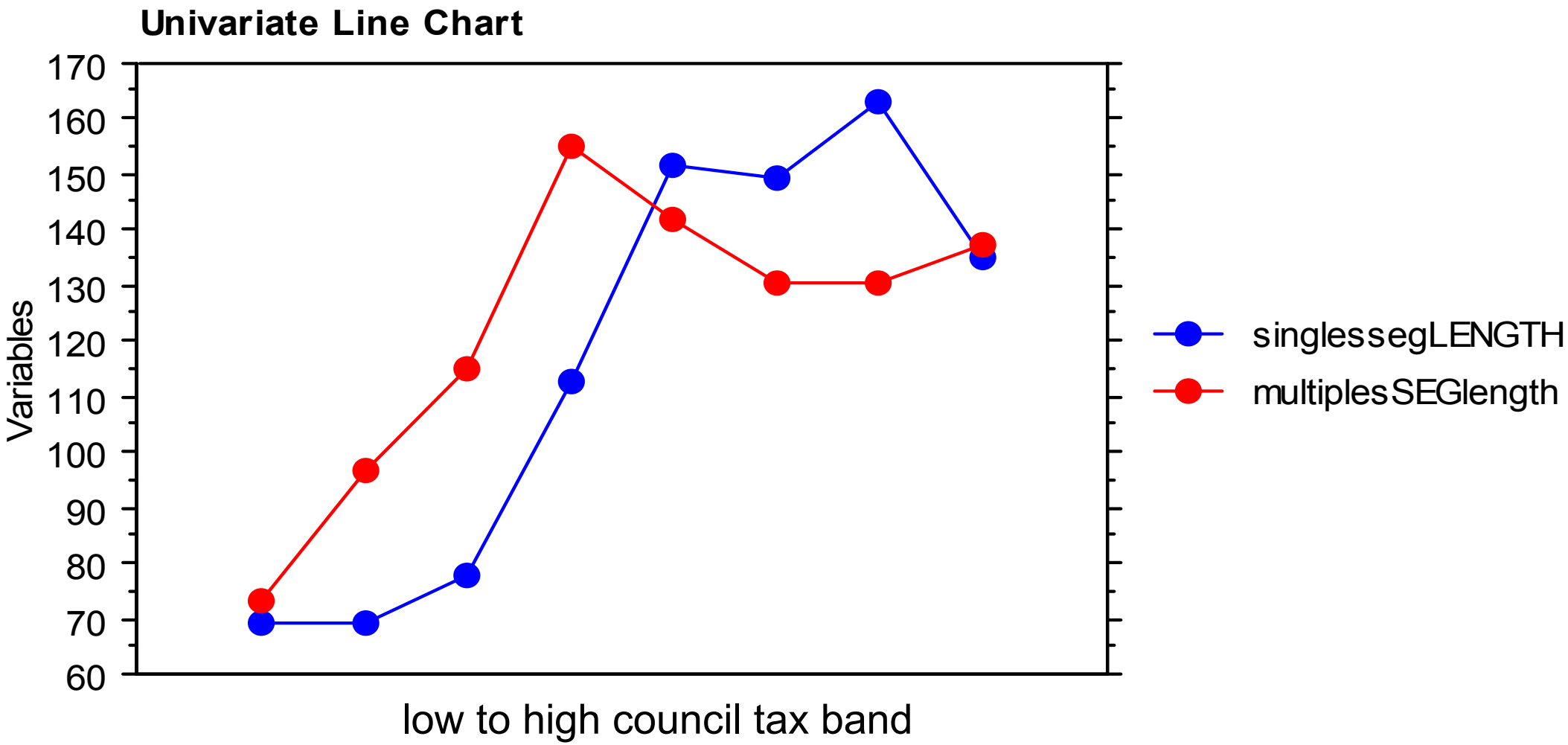
- Here we see the reductions in building centred density for singles and multiples. Both densities fall with increasing tax band, and are in fact very closely comparable.



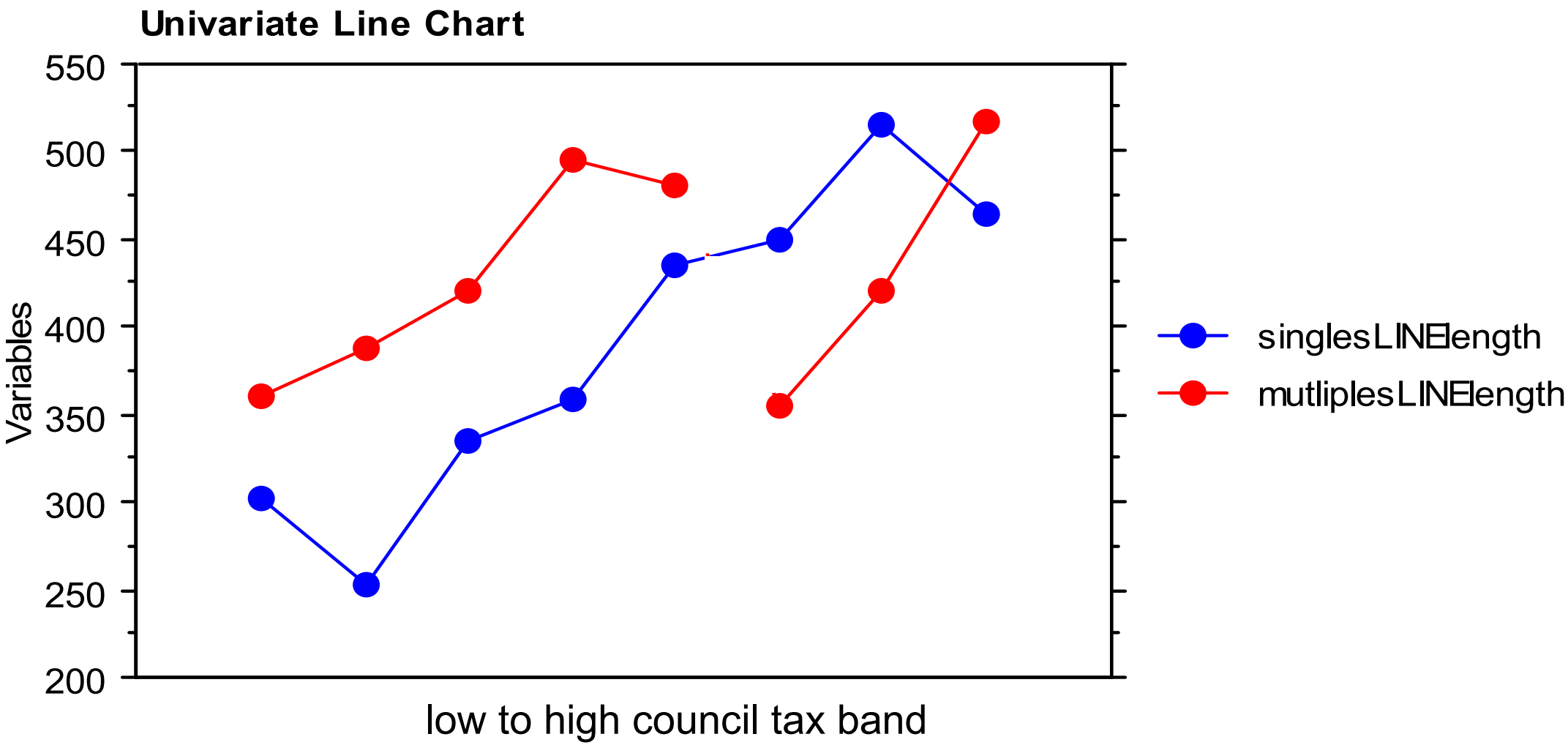
- But if we compare buildings centred densities for non-residential uses, we find that in general multiples are much closer to non-residential uses than houses, and there is a mark upturn for high tax bands. This will be much affected by closeness to shops since this is the most common non-residential use in residential areas.



- We also find that – as we would expect – singles have more storeys with increasing tax band, and that is also the tendency in the upper reaches of the tax band for multiples.



- Here we see that singles and multiples both increase in the length of street segment with increasing tax bands, and so are both part of larger blocks, though there is a fall in the higher tax bands for multiples.



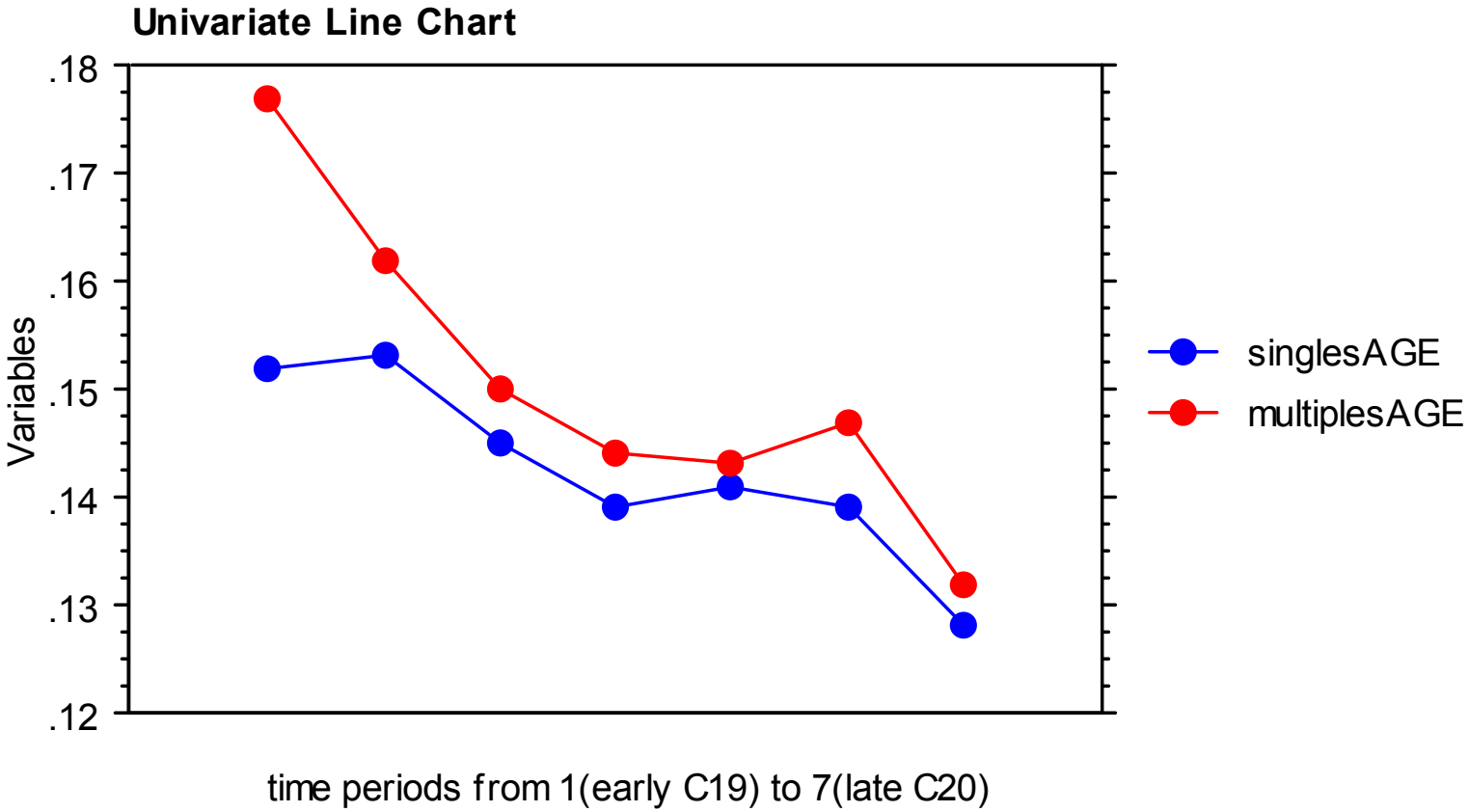
- Here we compare the visual prominence of singles and multiples. While singles increase more or less consistently with higher tax band, multiples first increase strongly in the lower tax range, the fall and climb again in the higher tax range.

- So we see that higher tax single properties:
- - have greater accessibility to the large scale system, but less local accessibility
- - have more passing larger scale movement passing the door, but less local movement
- - are part of larger blocks
- - have greater visual prominence in the ambient environment
- - are farther from non-residential uses
- - are higher buildings

- For multiples we can say:
- - multiples have higher accessibility than singles for low tax band and comparable for high
- - multiples are closer to the shops and other non-residential activity than singles and this gets stronger with higher tax band.
- - densities for multiples are not too different from singles, and particularly close for higher tax bands.
- - like singles, multiples become part of larger blocks with higher tax bands
- - and gain in visual prominence with higher tax bands, though less consistently than single dwellings.

- **Overall, we might say that the higher the tax band of the property the more it is oriented towards the global rather than local system.**

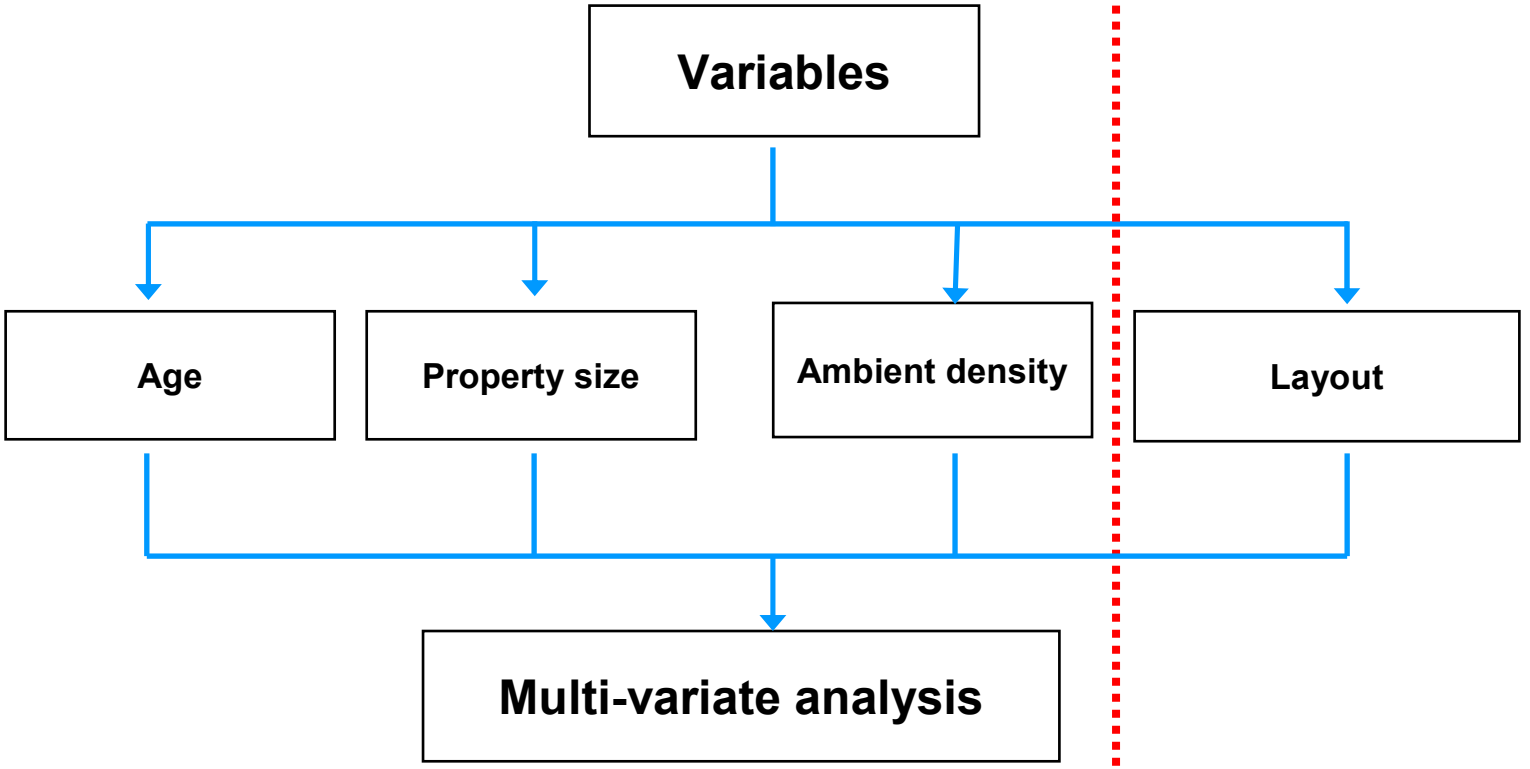
Complex interrelationship between different factors



Questions:

Do the syntactic factors still affect Council Tax Band under multi-variate analysis ?

Complex interrelationship between different factors:



global factor
local factor

find out if syntactical factors are independent: Multi-variate analysis

First step: correlation matrices

Correlation Matrix

	recipMD	TOmov2000m	TOmov500m	THRUmovCITYscale	THRUmov2000m	THRUmov500m
recipMD	1.000	.649	.341	.531	.486	.344
TOmov2000m	.649	1.000	.624	.473	.501	.466
TOmov500m	.341	.624	1.000	.433	.466	.668
THRUmovCITYscale	.531	.473	.433	1.000	.946	.818
THRUmov2000m	.486	.501	.466	.946	1.000	.888
THRUmov500m	.344	.466	.668	.818	.888	1.000

65453 observations were used in this computation.
One case was omitted due to missing values.

Stepwise regression of the syntactical factors show:

Clustering (Integration) is much stronger than path overlap (Choice)

Global integration (street prominence) strongly and positively related with higher tax bands

Local integration is strongly negatively associated with higher tax band.

ANOVA Table
TaxNum vs. 4 Independents
Step: 4
Split By: LUandRU=1then1else0
Cell: 1.000

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Regression	4	6816.283	1704.071	1502.444	<.0001
Residual	48345	54832.863	1.134		
Total	48349	61649.146			

Variables In Model
TaxNum vs. 4 Independents
Step: 4
Split By: LUandRU=1then1else0
Cell: 1.000

	Coefficient	Std. Error	Std. Coeff.	F-to-Remove
Intercept	3.287	.045	3.287	5435.459
TOmovCITYscale(1/MD)	13.795	.349	.208	1558.955
TOmov500m	-.010	2.083E-4	-.303	2340.856
THRUmovCITYscale	.064	.006	.103	134.403
THRUmov500m	-.060	.014	-.043	18.533

Question

Do these effects survive, when we add:

age, property size and ambient density?

Question

Do these effects survive, when we add:

- age,

- property size and

- ambient density?

Variables In Model
TaxNum vs. 7 Independents
Step: 6
Split By: LUandRU=1then1else0
Cell: 1.000

	Coefficient	Std. Error	Std. Coeff.	F-to-Remove
Intercept	-.309	.092	-.309	11.404
TOmovCITYscale(1/MD)	6.322	.288	.093	482.297
TOmov500m	-.006	1.797E-4	-.185	1197.336
THRUmov500m	.036	.008	.025	22.546
log(area*storeys/REScount)	2.781	.031	.391	7837.393
sqrtBUF1grndres	-.540	.009	-.247	3532.312
Age	-.045	.004	-.040	100.197

Variables Not In Model
TaxNum vs. 7 Independents
Step: 6
Split By: LUandRU=1then1else0
Cell: 1.000

	Partial Cor.	F-to-Enter
THRUmovCITYscale	.007	2.345

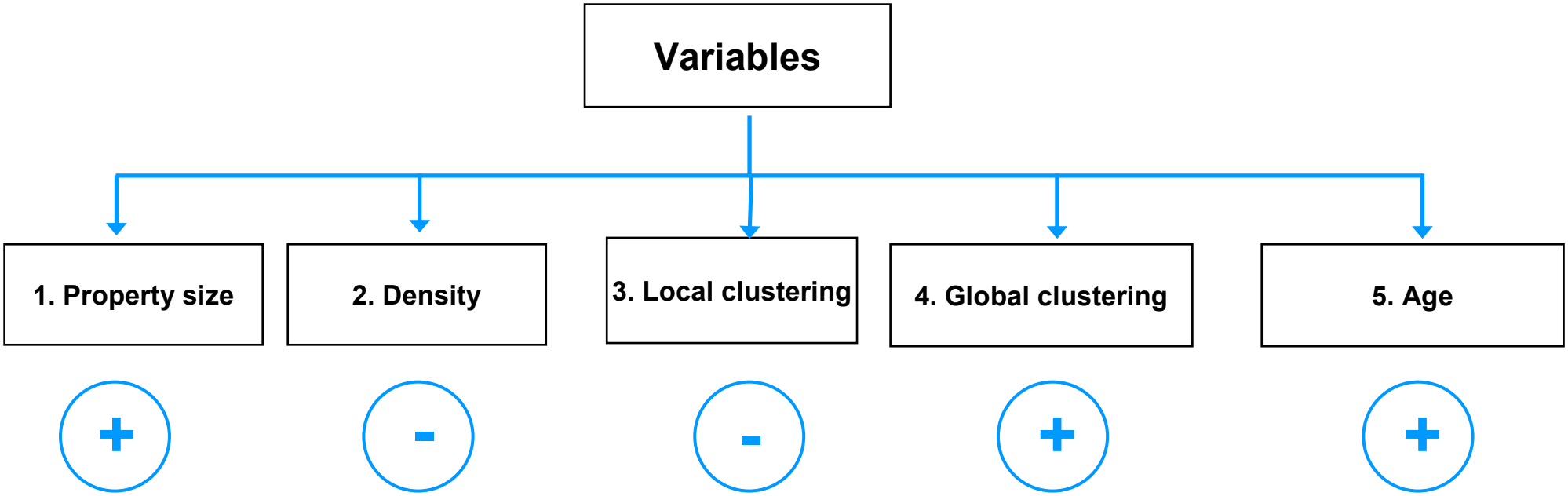
Result

Both locational variables are weakened,
but remain very strong,
so their effects on Council Tax Band are to a considerable degree independent of size, density and scale factors.

In general

- Property size is by far the most important single factor in tax band
- Density is next – lower is higher tax
- Local spatial clustering is next – less means higher tax
- Global spatial clustering is next – more means higher tax
- Age is a positive, but relatively weak – older mean marginally higher tax
- Local path overlap level is weakly beneficial – more means higher tax
- Global path overlap level is immaterial

Importance of the factors



syntactical factors are independent

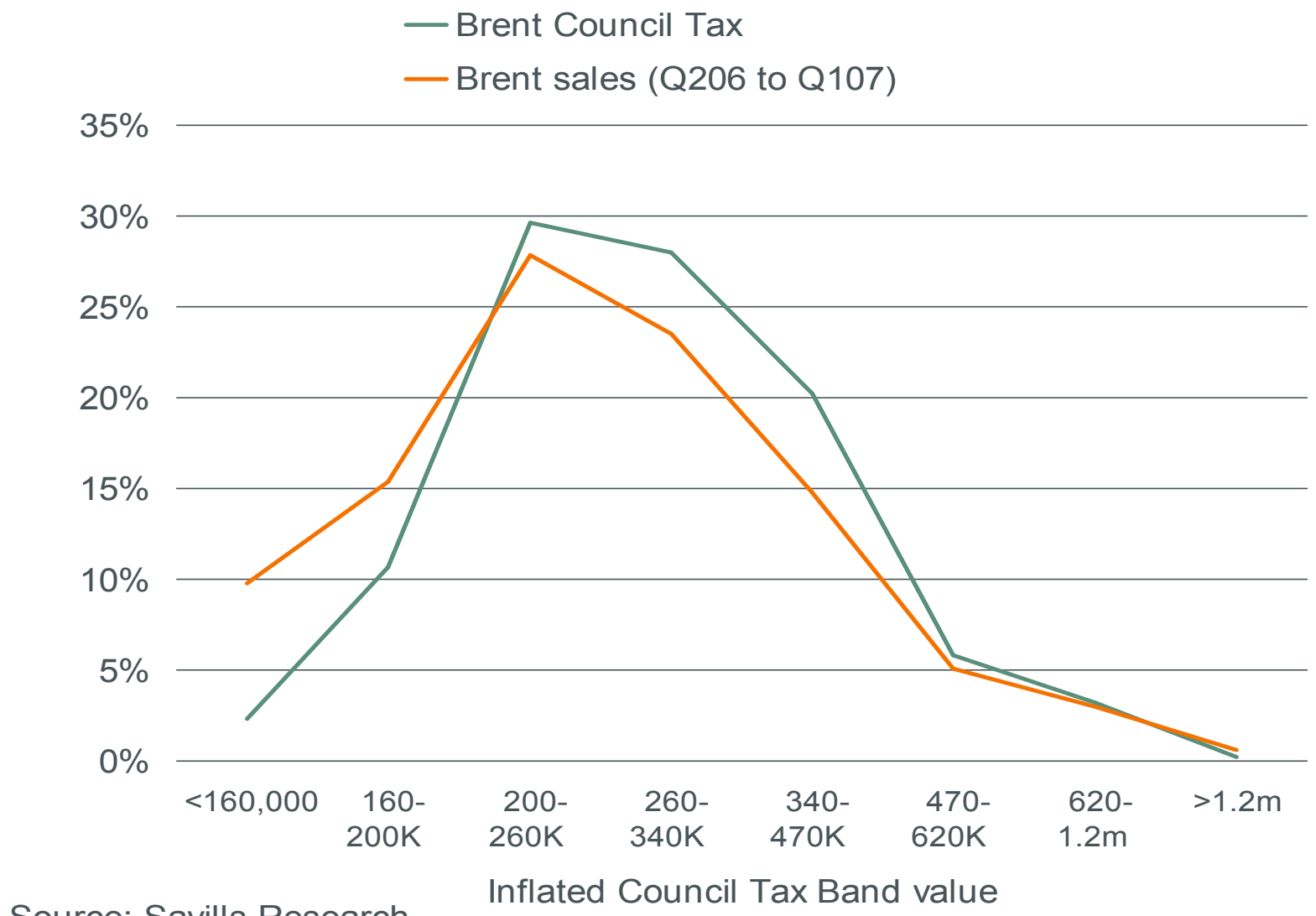
Conclusion

So in spite of the clear inter-relations between our syntactic/locational variables and age, property size and ambient density, we can be confident that the effects we found on council tax banding from the syntactic/locational variables in the banding analysis are statistically independent effects – at least in this borough.

Question

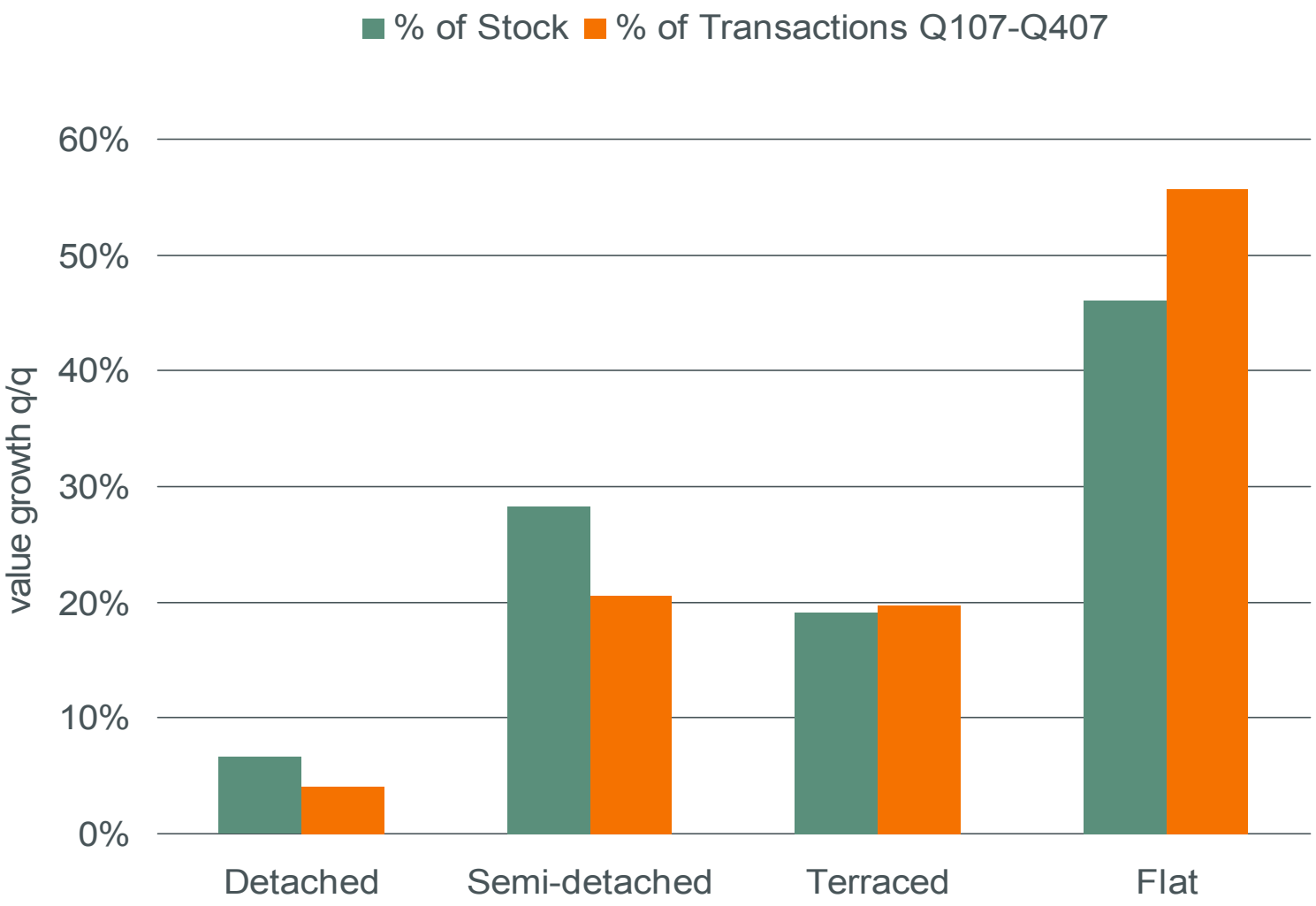
How does council tax band correlate to residential property value?

Brent Value Distribution



Source: Savills Research

Brent Stock & Transactions



Source: ONS & Land Registry

UrbanBuzz
Building sustainable communities
iValul

Department for Innovation, Universities & Skills

HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND hefce

This project was supported by the UCL led UrbanBuzz Programme, within which UEL is a prime partner

UCL

UEL University of East London

presentation end

a.sdfhgsdl@spacesyntax.com

www.spacesyntax.com