

# 4. Knowledge Integration

# 4.1 KIT3

## the value of urban centres

**Prof Bill Hillier**

UCL

**Martin Wedderburn**

Buchanan

# Every Centre has a centre

the space syntax theory of centre formation in cities

### Space Syntax theory of centres

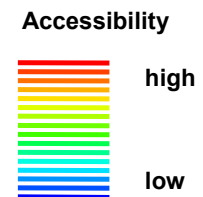
- **Every centre has a centre. It starts with a spatial seed, usually an intersection, but it can be a segment.**
- **The seed of a centre will have *destination* and *route* values at both local and global levels.**
- **Some centres start because they are the focus of a local intensified grid – a local case – other because they are at an important intersection – a global case. Both global and local properties are relevant to how centres form and evolve.**
- **The spatial values of the seed for the centre will establish what we can call a *fading distance* from the seed. Up to what distance from the seed will shops be viable ? This is a function of metric distance from the seed proportionate to the strength of the seed.**

## 4.1 Knowledge integration **KIT3 Centres**



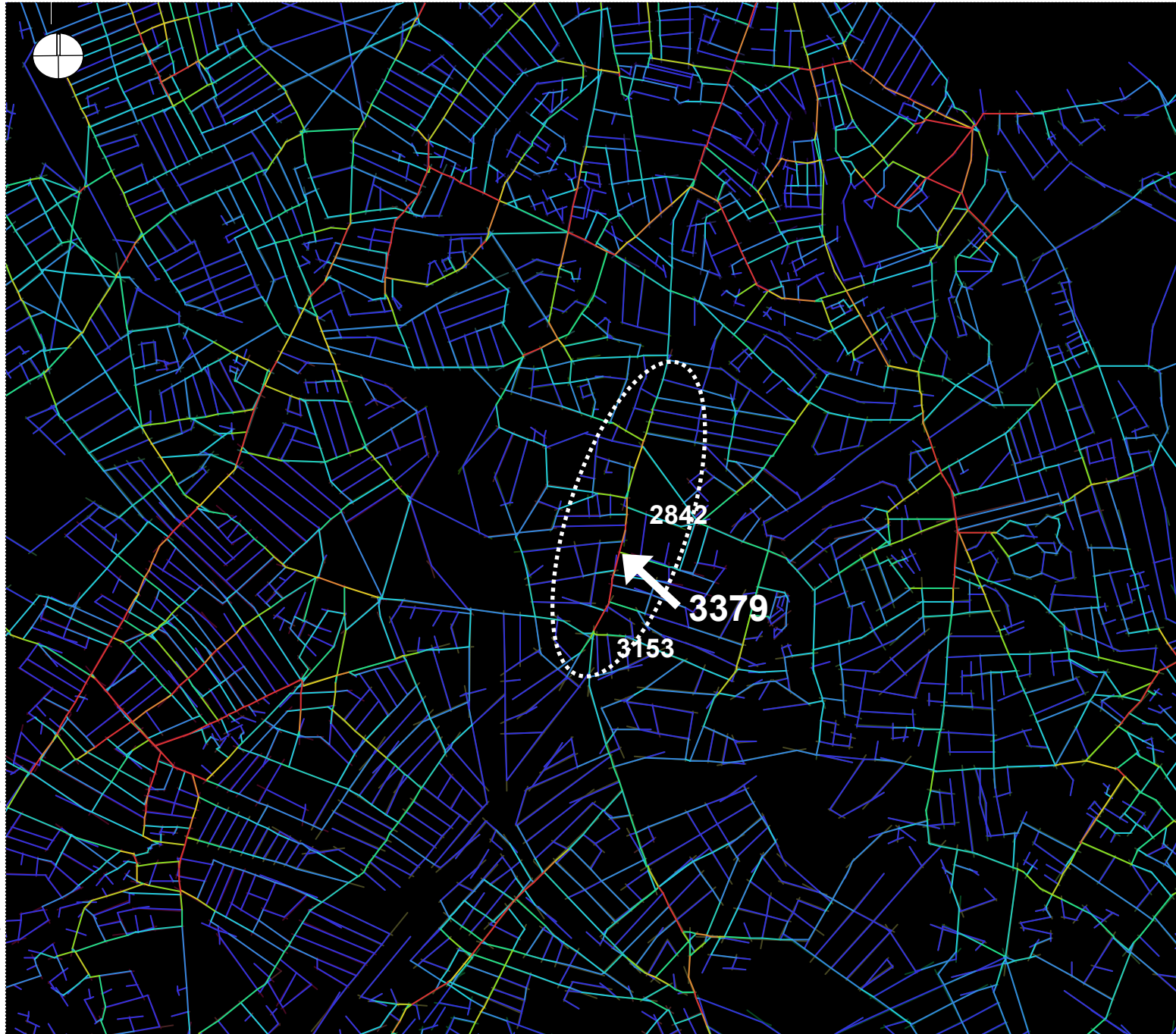
**Local Choice R400**

**Local centre starts at southern end of Streatham High Street.**



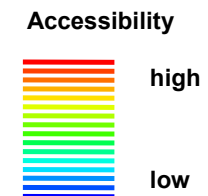
Choice R400 (Streatham model)

## 4.1 London high streets **Streatham High Road** Choice R800



Local centre starts at southern end of Streatham High Street...

.... and shifts gradually to the North towards a more global radius





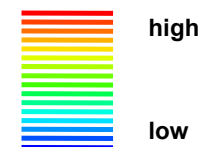
## 4.1 London high streets **Streatham High Road** Choice R1200



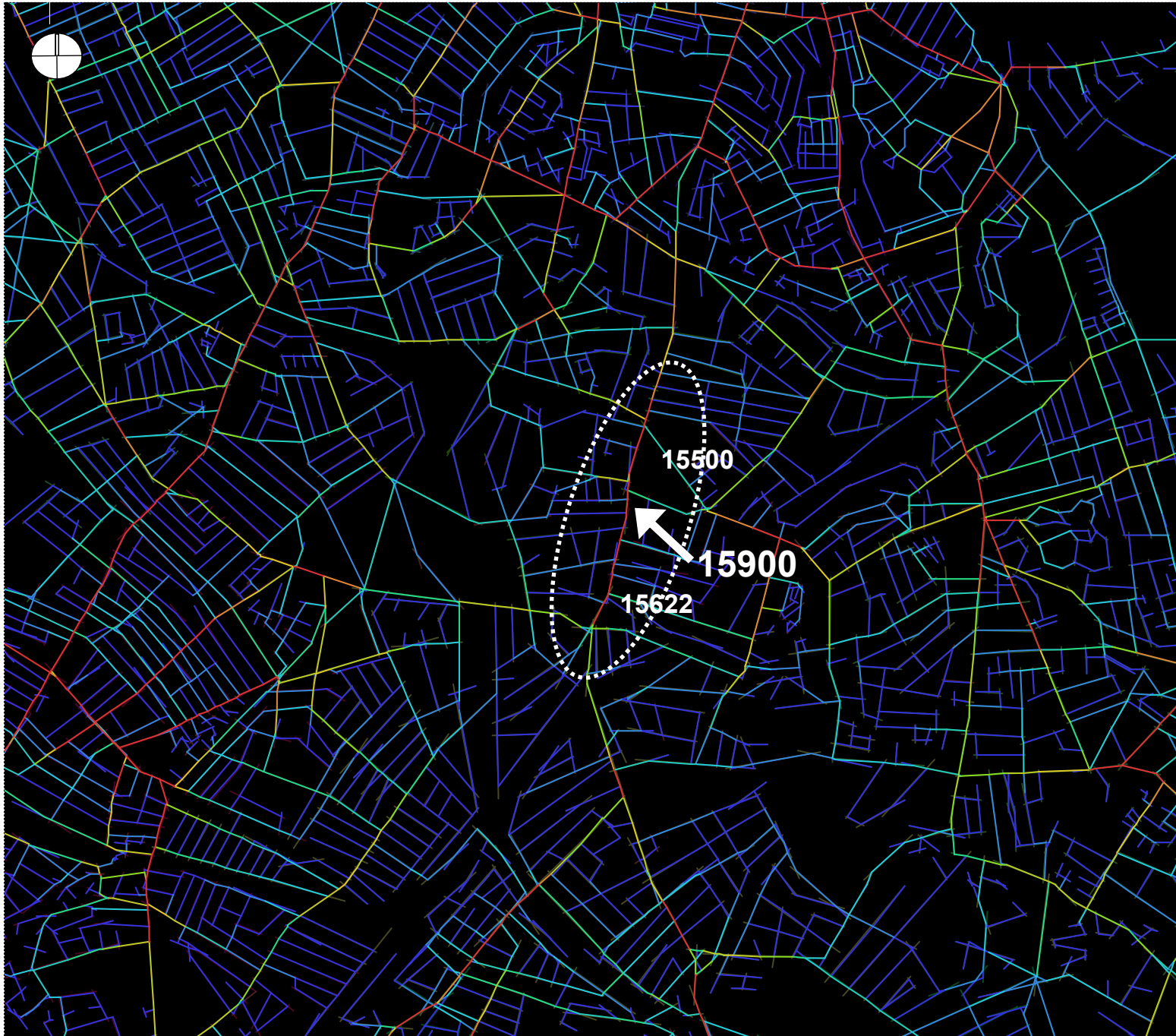
Local centre starts at southern end of Streatham High Street...

.... and shifts gradually to the North towards a more global radius

Accessibility



## 4.1 London high streets **Streatham High Road** Choice R1400



Choice R1400 (Streatham model)

Local centre starts at southern end of Streatham High Street...

.... and shifts gradually to the North towards a more global radius

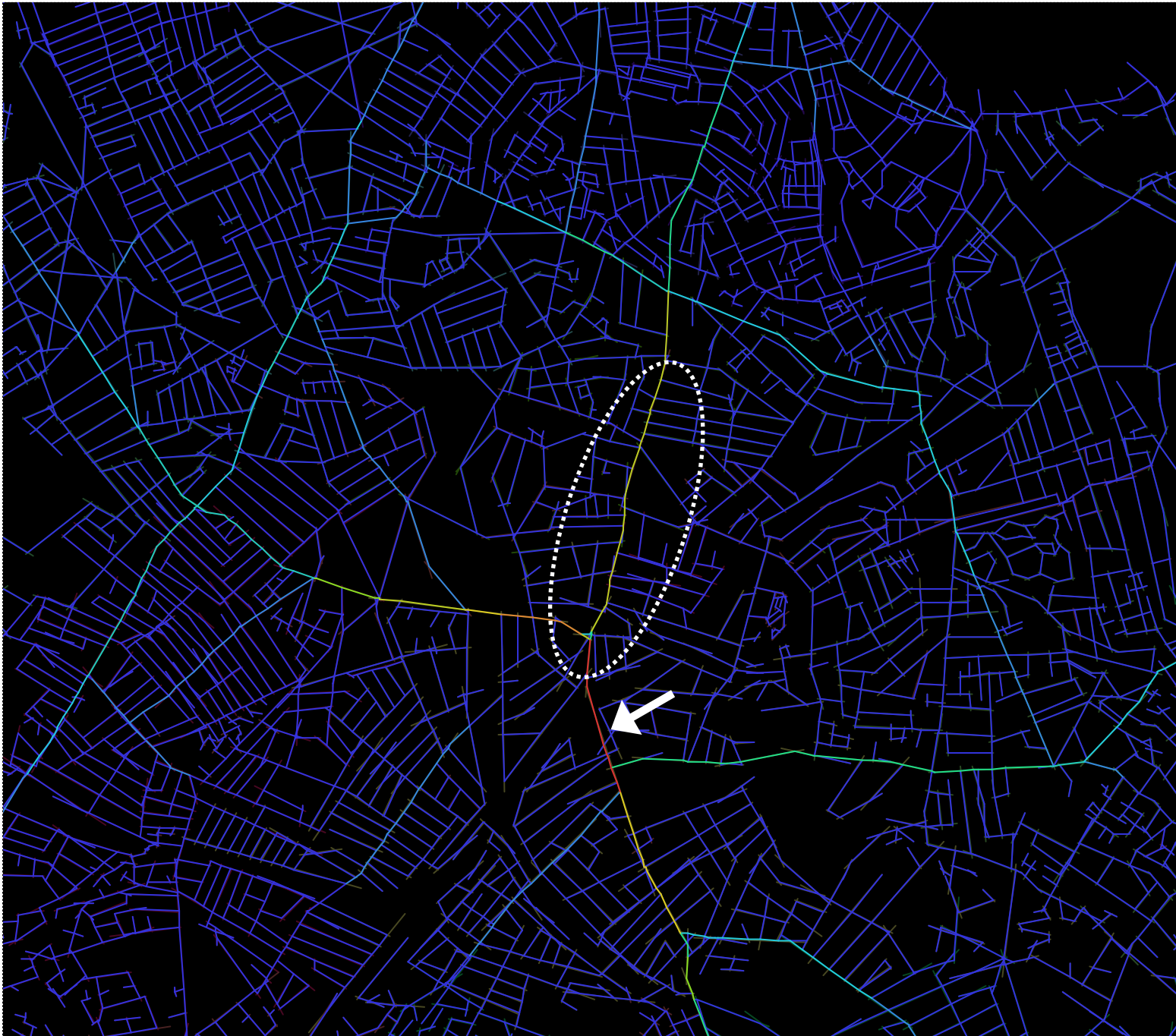
The best fitting radius with the retail definition of the high street is R1400.



## 4.1 London high streets **Streatham High Road** Choice RN

**Streatham High Street**  
not highest global  
choice route in the  
area

Choice RN (Streatham model)

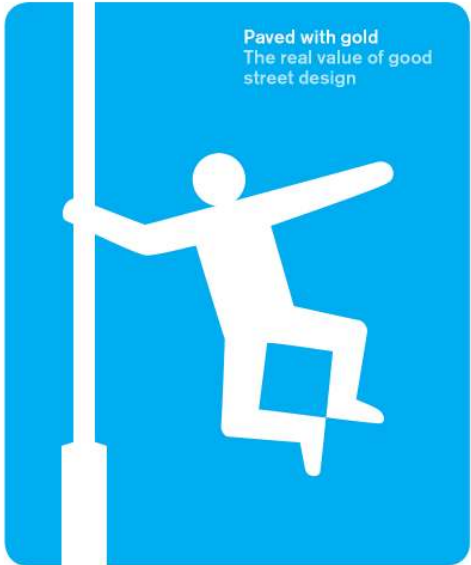
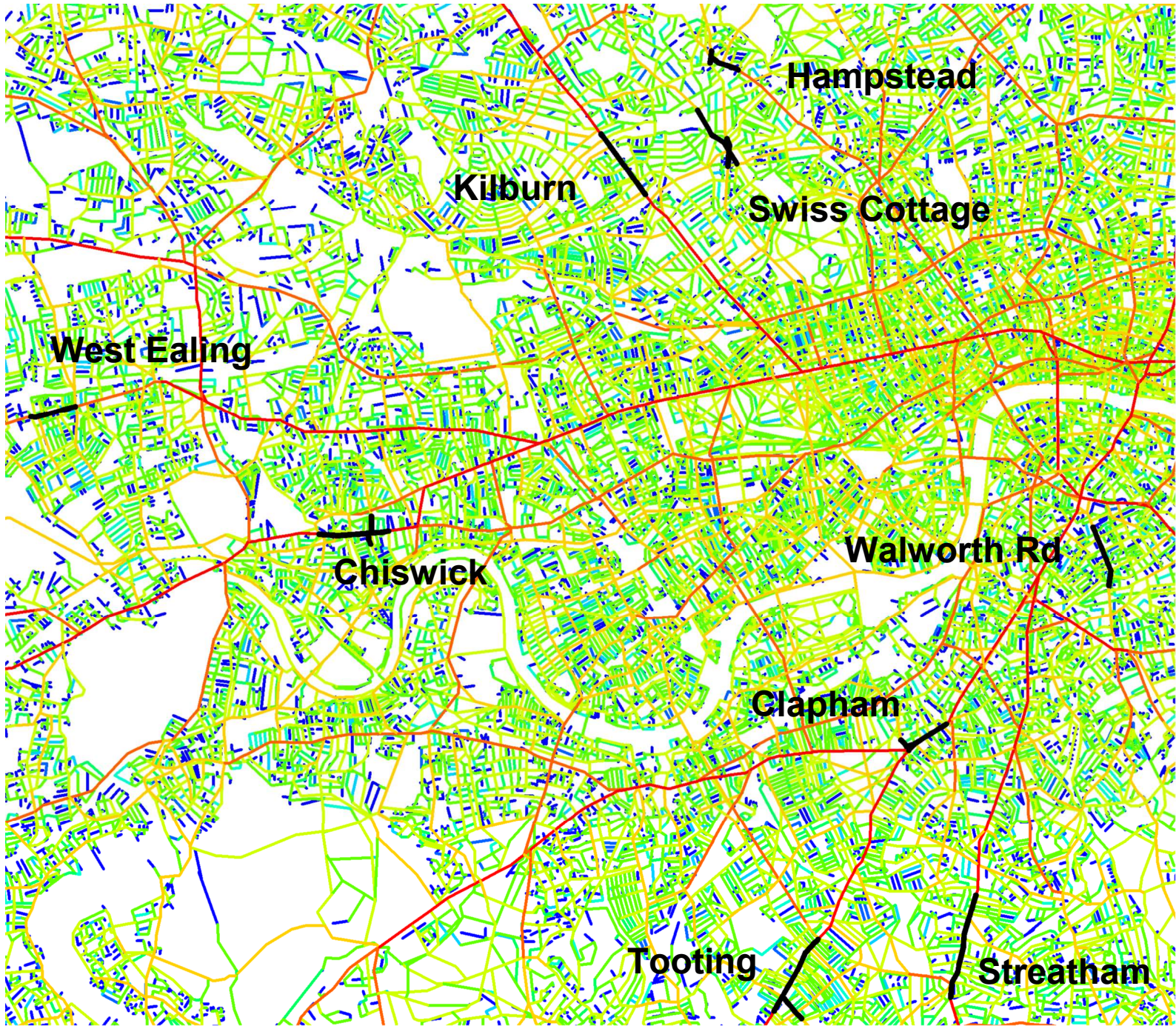


- The centre will grow beyond the fading distance established by the initial seed to the degree that further seeds appear within the fading distance. Again these can be local or global, and stronger or weaker. A centre becomes larger to the degree that it is reinforced by what are in effect new seed which allow the shopping to be continuous.
- Centres expand in two ways:
  - linearly, that is along a single alignment or two intersecting alignments. This is the most common case. Linear expansion occurs when the reinforcers are more or less orthogonal or up to 45 degrees to the original alignment
  - convexly, that is the shopping streets form a localised grid, which is rarer, but great when it occurs. Convex expansion occurs when reinforcers occur on the parallel as well as the orthogonal alignment

- So centres vary in the strength of their local and global properties, and the balance between them will tend to define the nature of the centre. Most centres will tend to be pretty strong both in local and global terms, but differences in the balance will be very influential in generating the scale and character of the centre.
- Centres also grow or fail through interaction with neighbouring centres at different scales, but the way in which the urban grid evolves tends to ensure that seeds for potential centres occur only at certain distances from each other. We need to account for the spatial factors if we are to really understand the ways in which centres interact with each other.
- Apply and verify the Space Syntax theory on a set of well studied centres (CABE/Buchanan 2007, Paved with Gold)



# 4.1 Knowledge Integration KIT3 - Centres



Design better streets

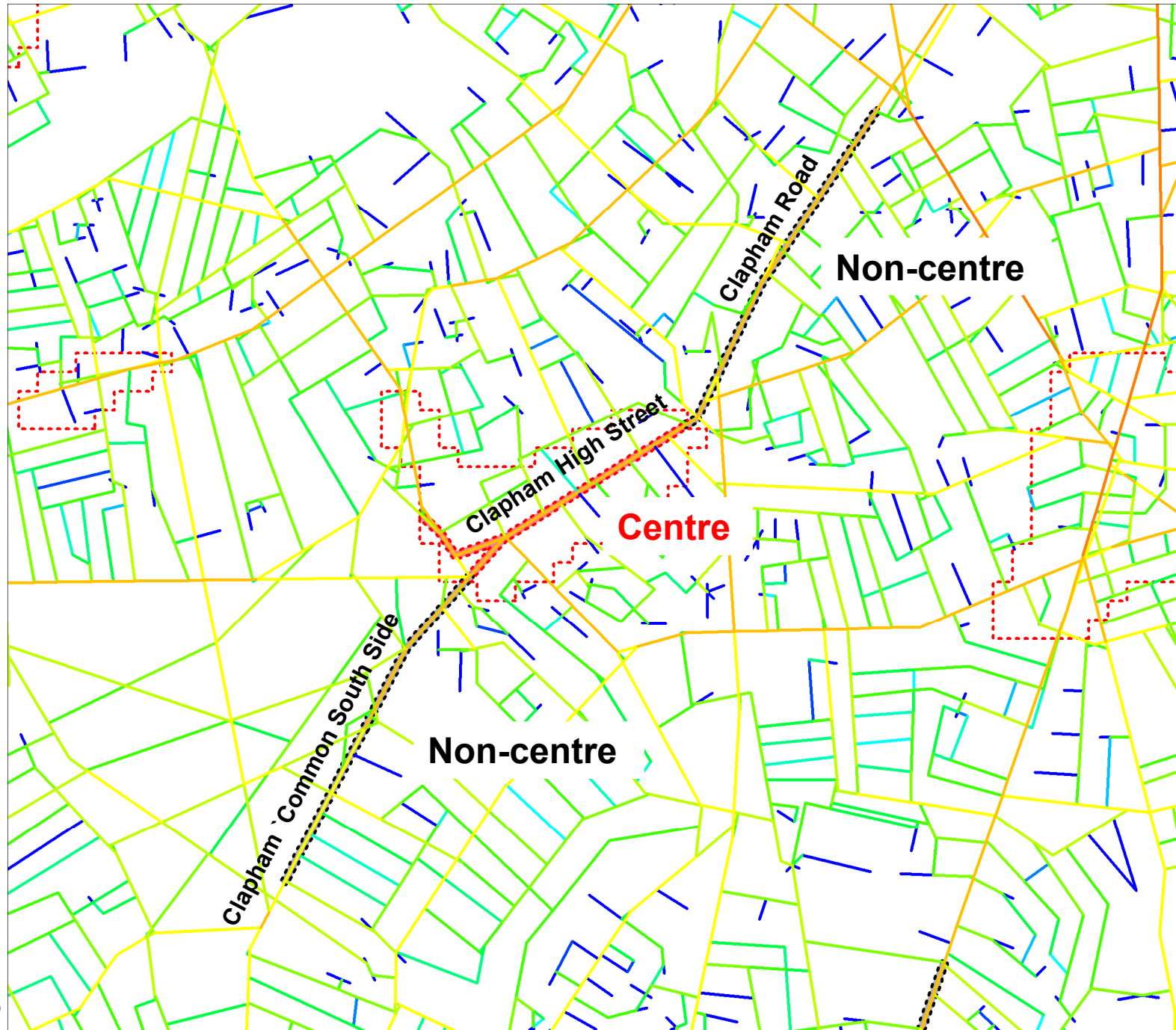




### Key questions:

- A. Are centres spatially distinguishable from non-centres?**
- B. Is there a typology of centres?**
- C. What is the relationship between the centre and its context?**
- D. What spatial factors are a component of the value of centres?**

## 4.1 Knowledge Integration KIT3 - Centres



### A. Centre - non-centre

We take the main high street (**centre**) and compare it with its linear extension to both sides (**non-centre**).

### A. Centre - non-centre

**We compare centres and non-centres on a series of spatial variables.**

**If the theory is right, we would expect that:**

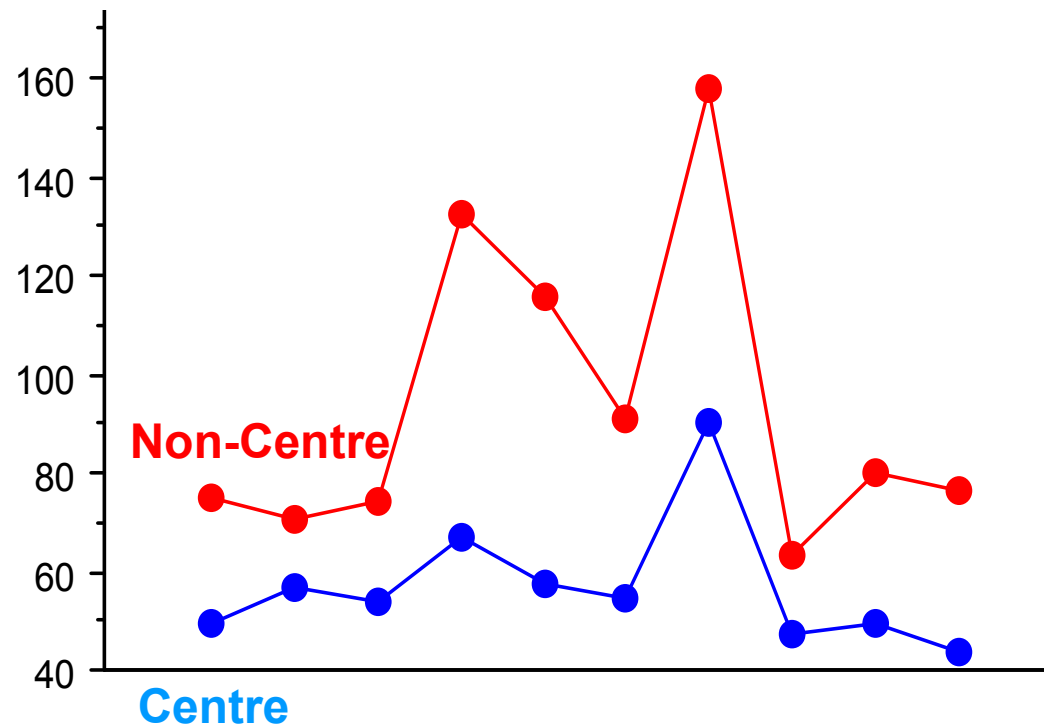
- 1. Centres have shorter segment lengths**
- 2. Centres have higher local choice (path overlap)**
- 3. The differences between centres and non-centres on choice will disappear as we increase the radius from local to global**

# 4.1 Knowledge Integration KIT3 - Centres

## What do we find?

1. In all cases, centres have shorter segment lengths that non-centres, on average by about 40% - a remarkably clear result

Segment Length

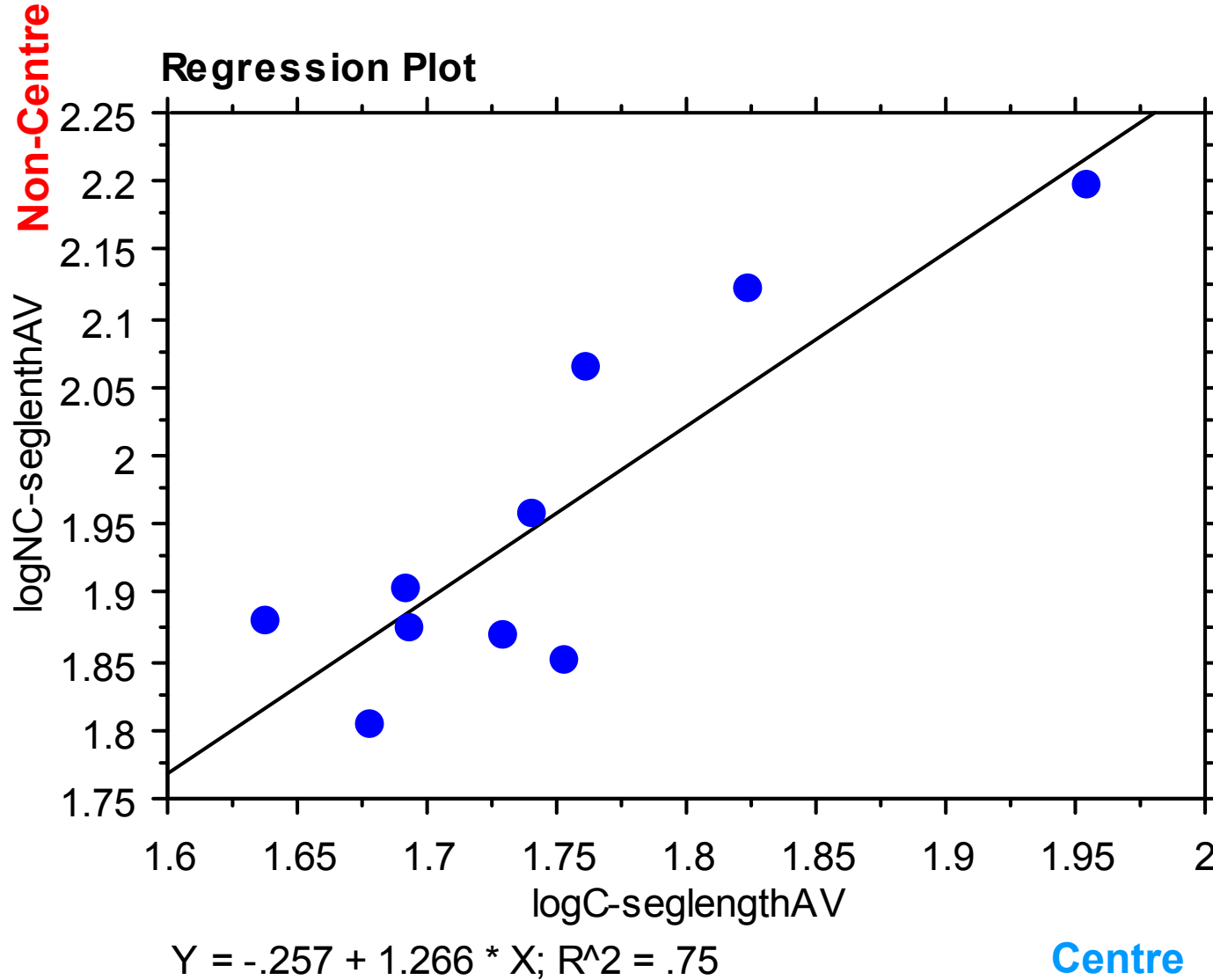


1.

	segL max	segL av	ch300	Ch 400	Ch 800	Ch 2000	Ch10,000	n
<b>Centres</b>	155.9	56.9	156.2	356.7	5632.4	9,3441	31,107,168	2,502,094,571
<b>Non-centres</b>	248.7	93.7	90.6	212.0	4,366.9	8,3634	32522119	2,502,215,728
<b>% difference</b>	-39%	-39%	+72%	+68%	+29%	+12%	-4.5%	0.0%



## 4.1 Knowledge Integration KIT3 - Centres

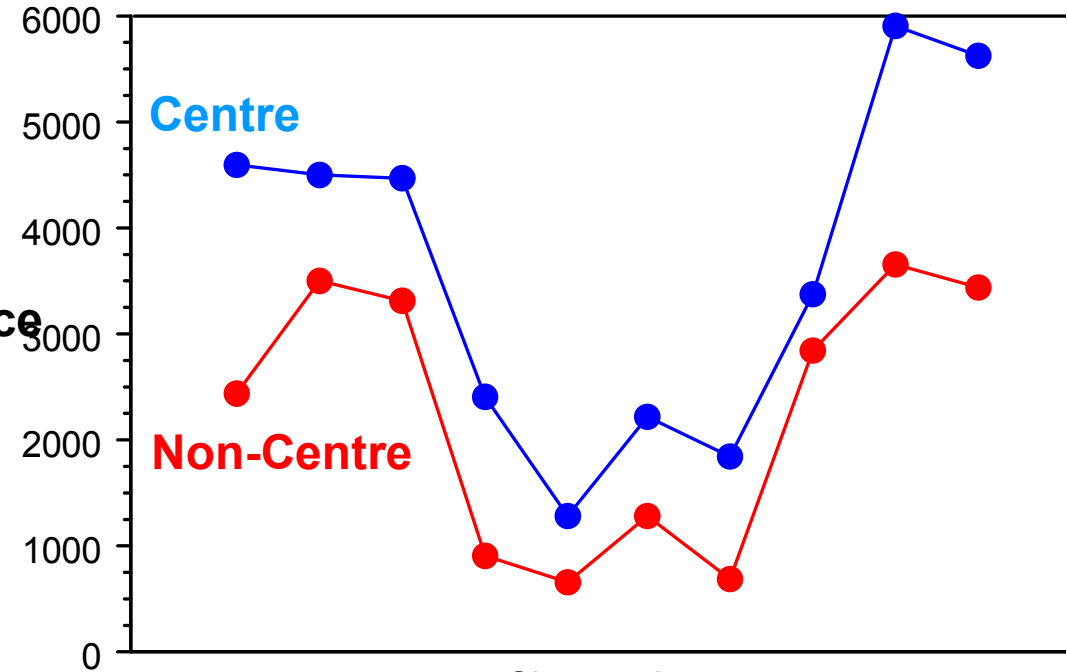


**Segment length for centres against non-centres co-vary, so there is a local segment length context.**

## What do we find?

1. Centres have shorter segment lengths
2. In all cases, centres have higher local choice

Choice 800m

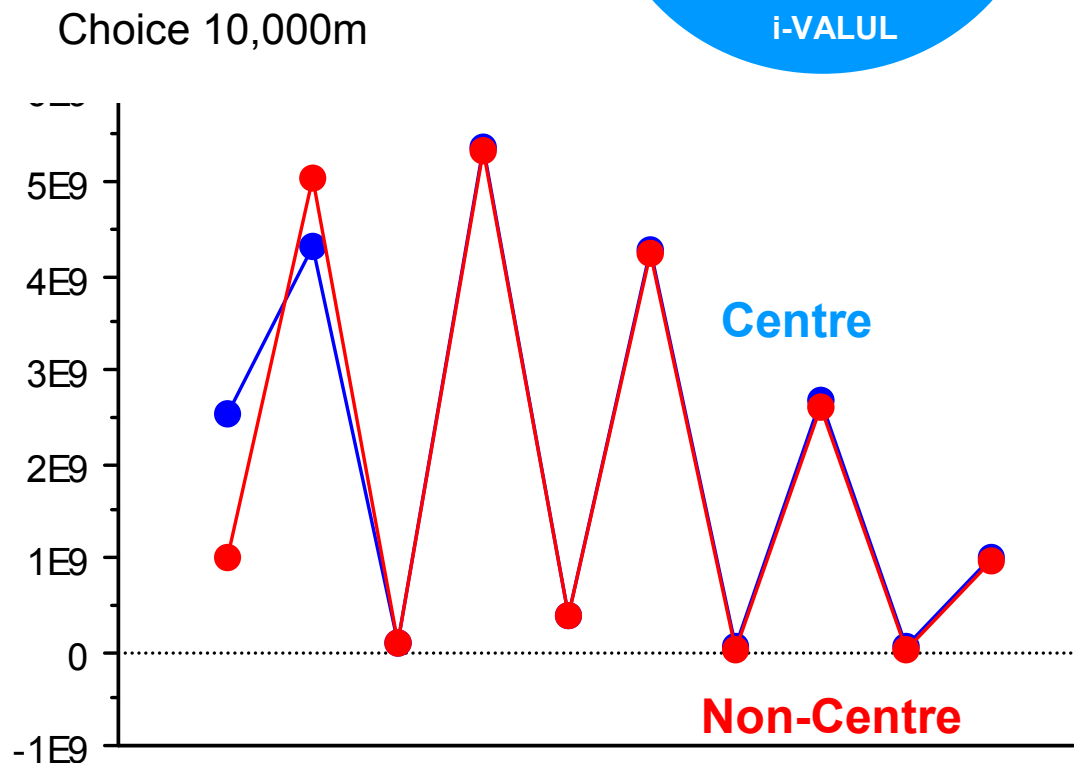


2.

	segL max	segL av	ch300	Ch 400	Ch 800	Ch 2000	Ch10,000	n
<b>Centres</b>	155.9	56.9	156.2	356.7	5632.4	9,3441	31,107,168	2,502,094,571
<b>Non-centres</b>	248.7	93.7	90.6	212.0	4,366.9	8,3634	32522119	2,502,215,728
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## What do we find?

1. Centres have shorter segment lengths
2. Centres have higher local choice
3. But the difference disappears as we increase the radius from local to global)

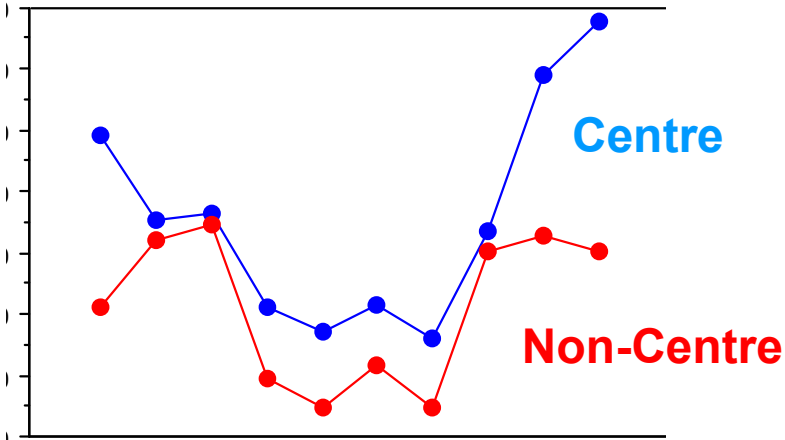


	segL max	segL av	ch300	Ch 400	Ch 800	Ch 2000	Ch10,000	n
Centres	155.9	56.9	156.2	356.7	5632.4	9,3441	31,107,168	2,502,094,571
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% difference	-39%	-39%	+72%	+68%	+29%	+12%	-4.5%	0.0%

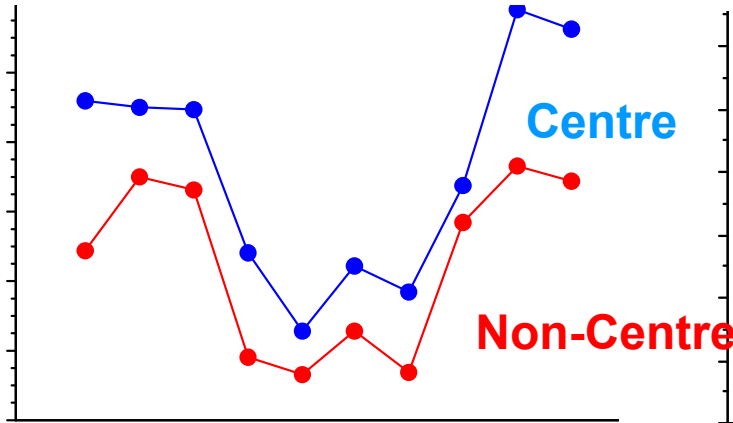
3.

# 4.1 Knowledge Integration KIT3 - Centres

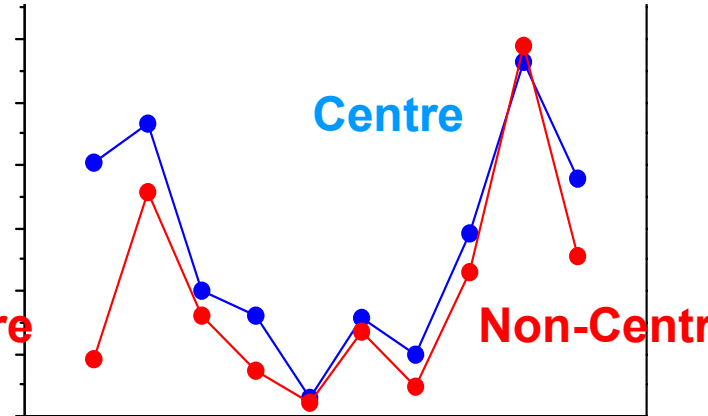
### Choice R400



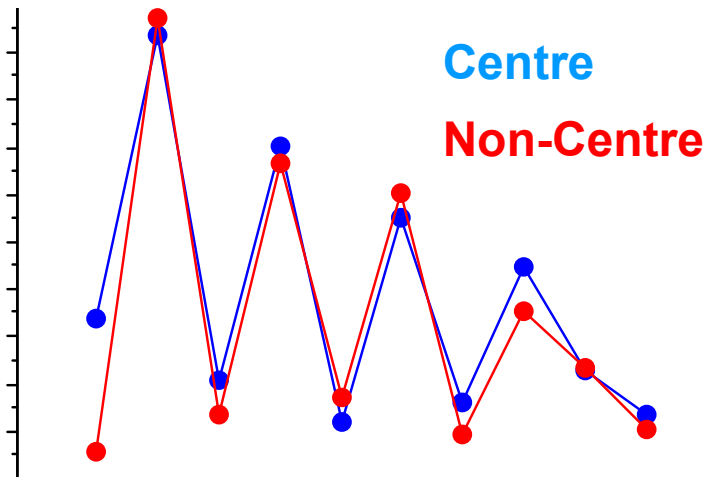
### Choice R800



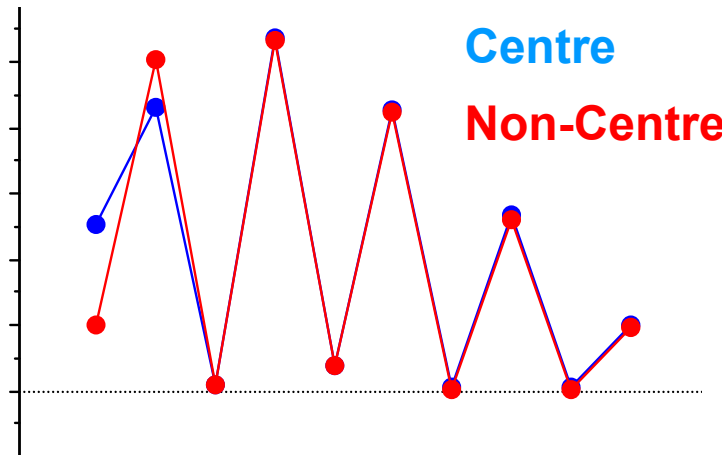
### Choice R2000



### Choice R10000



### Choice RN



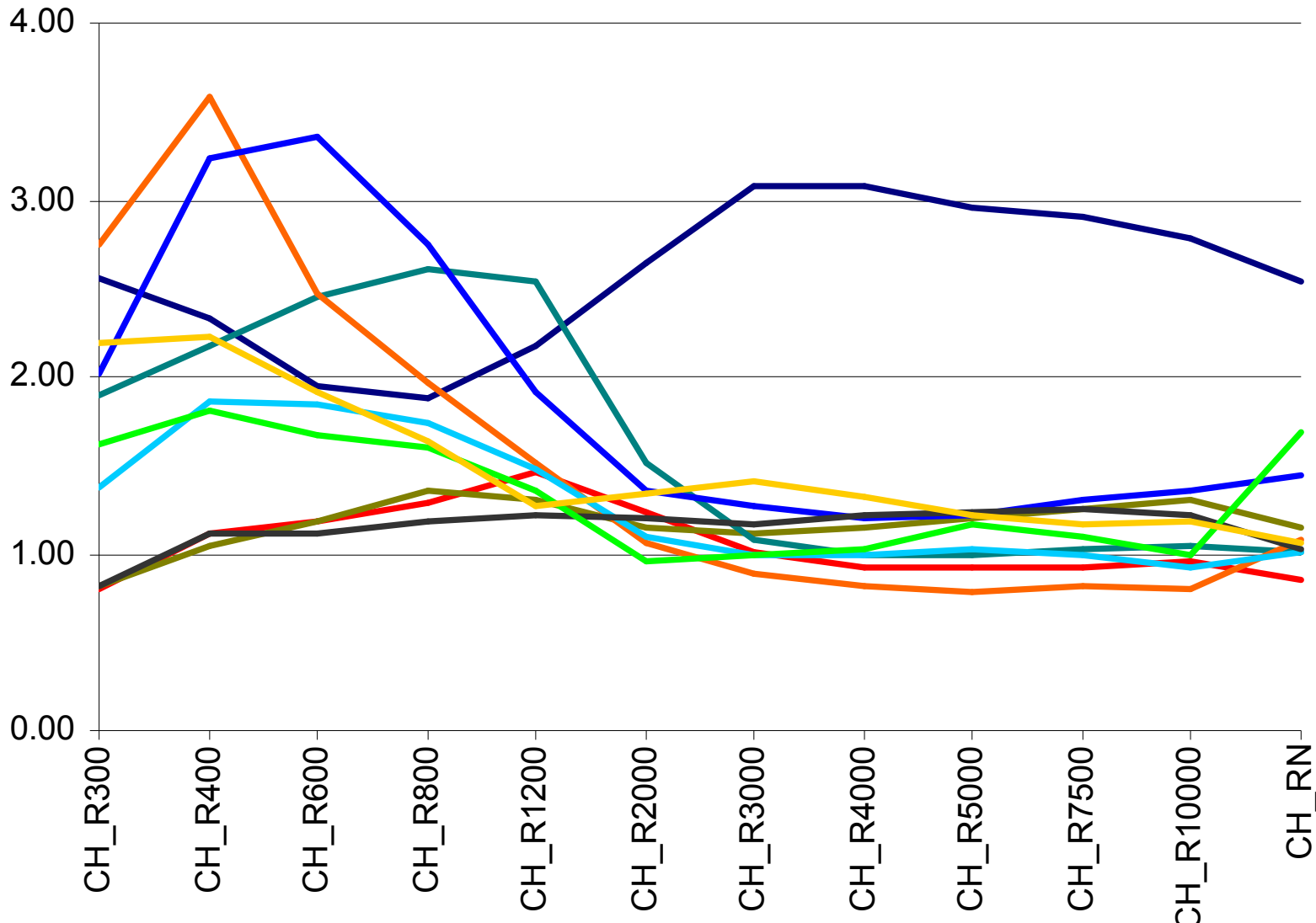


# 4.1 Knowledge Integration KIT3 - Centres



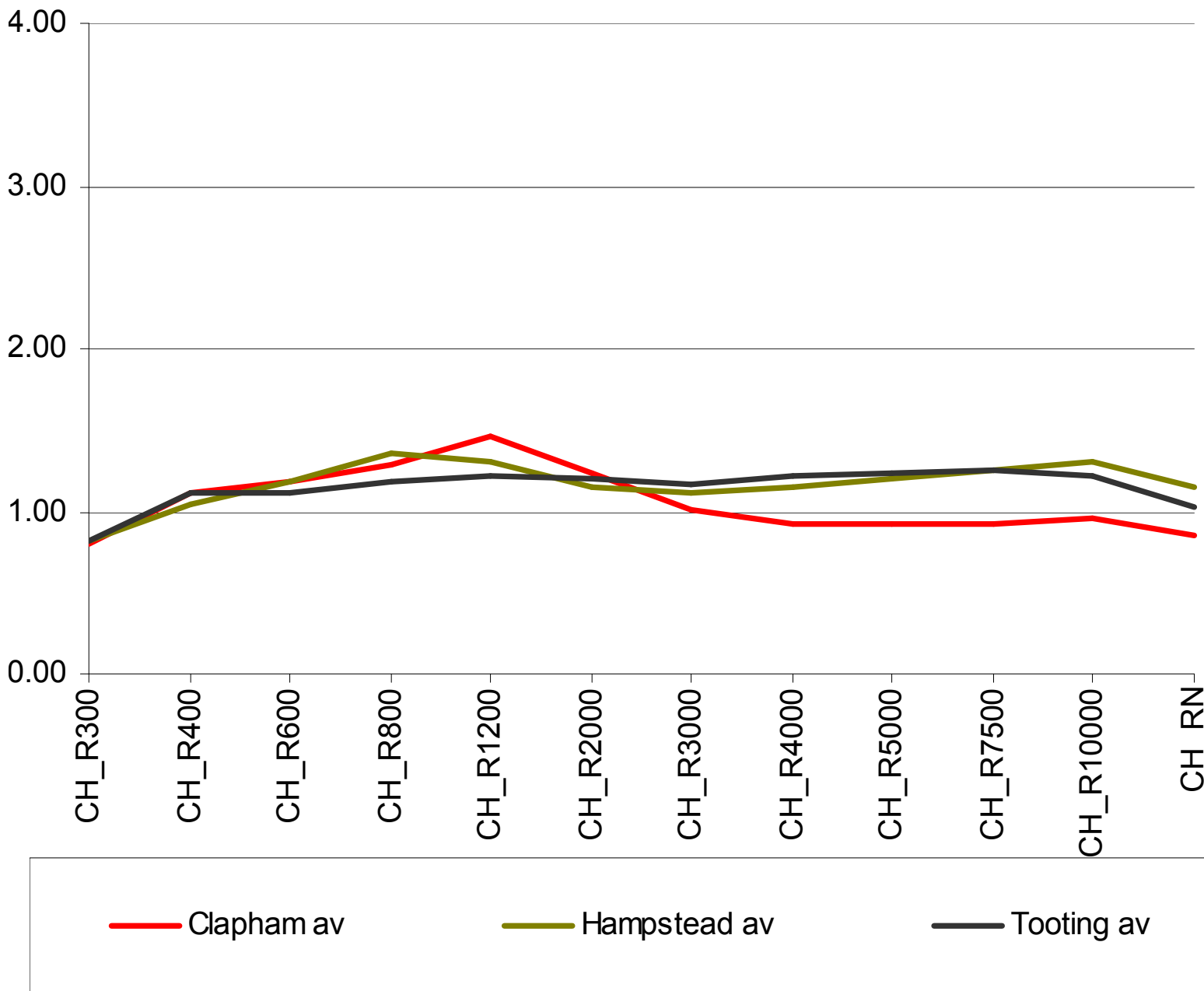
## Centre Groups

**Centre – Non-centre variable for the 10 high streets at different radii. (Average Centre / Average non-centre)**



- Chiswick av
- Clapham av
- Hampstead av
- Kilburn av
- North Finchley av
- Streatham av
- Swiss Cottage av
- Tooting av
- Walworth Road av
- West Ealing av

## 4.1 Knowledge Integration KIT3 - Centres



### Group 1

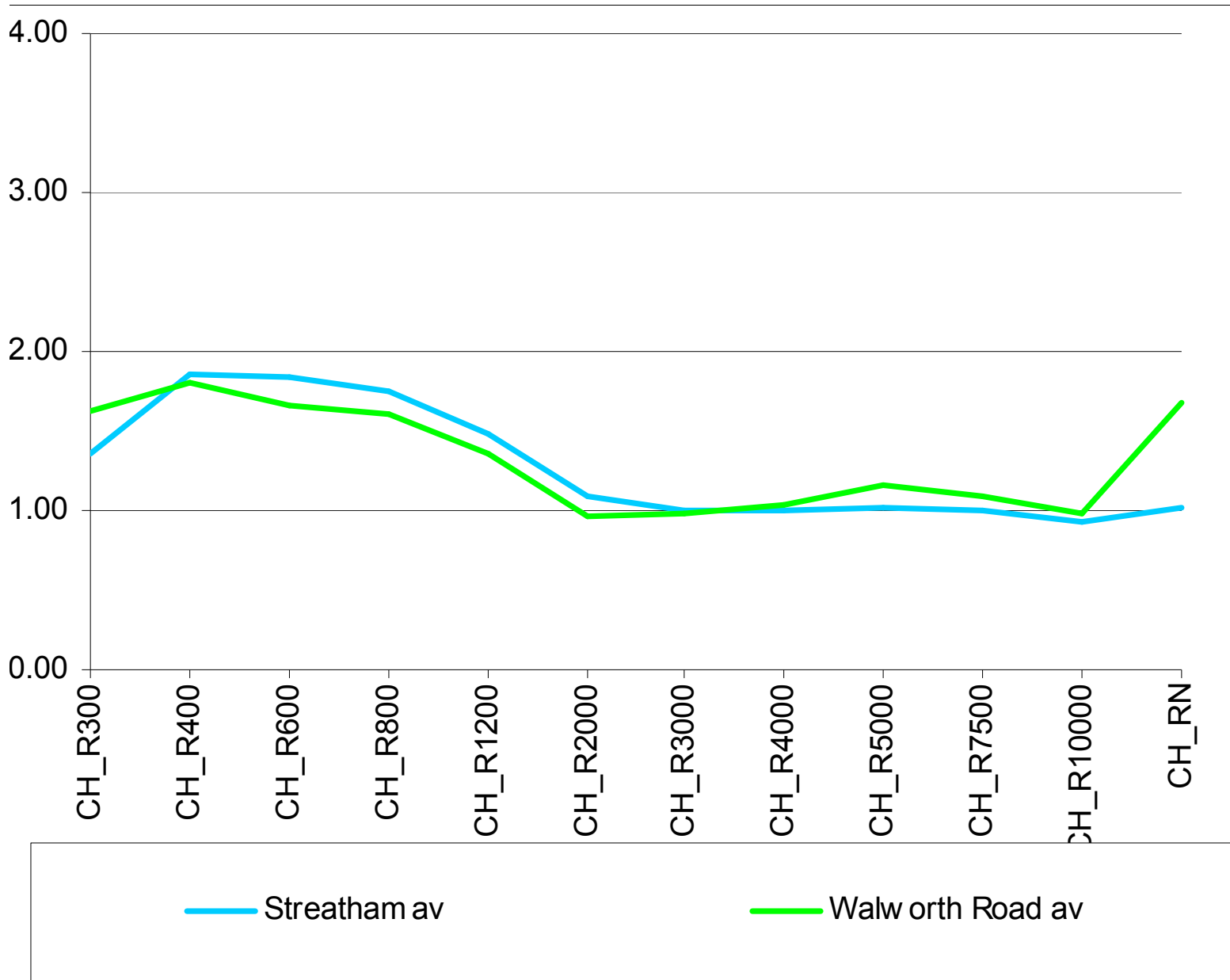
The centre segments have a slightly higher choice values (10-40%) than the non-centre segments from a radius of 400 to 3000m. They peak at 800m (Hampstead) and 1200m (Clapham, Tooting), but this is not significantly higher than the other values. From a radius of 3000, only Hampstead and Tooting show higher values in the centre, while Clapham has higher non-centre values.)

# 4.1 Knowledge Integration KIT3 - Centres



## Group 2

These centres have a small peak at local radius of 400m, stay significantly higher up to 1200m and decrease to similar values as the non-centre segments. (Streatham, Walworth Rd)

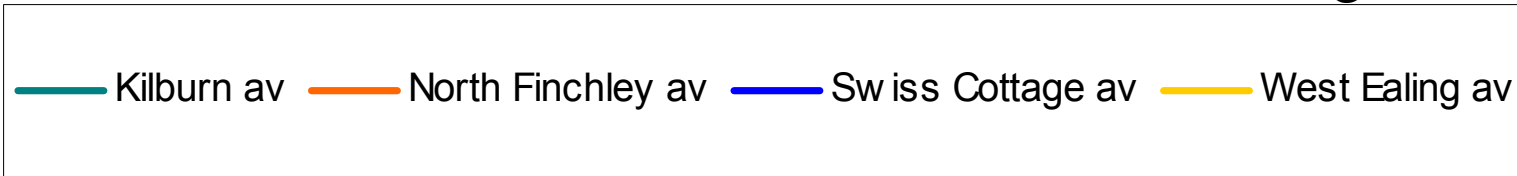
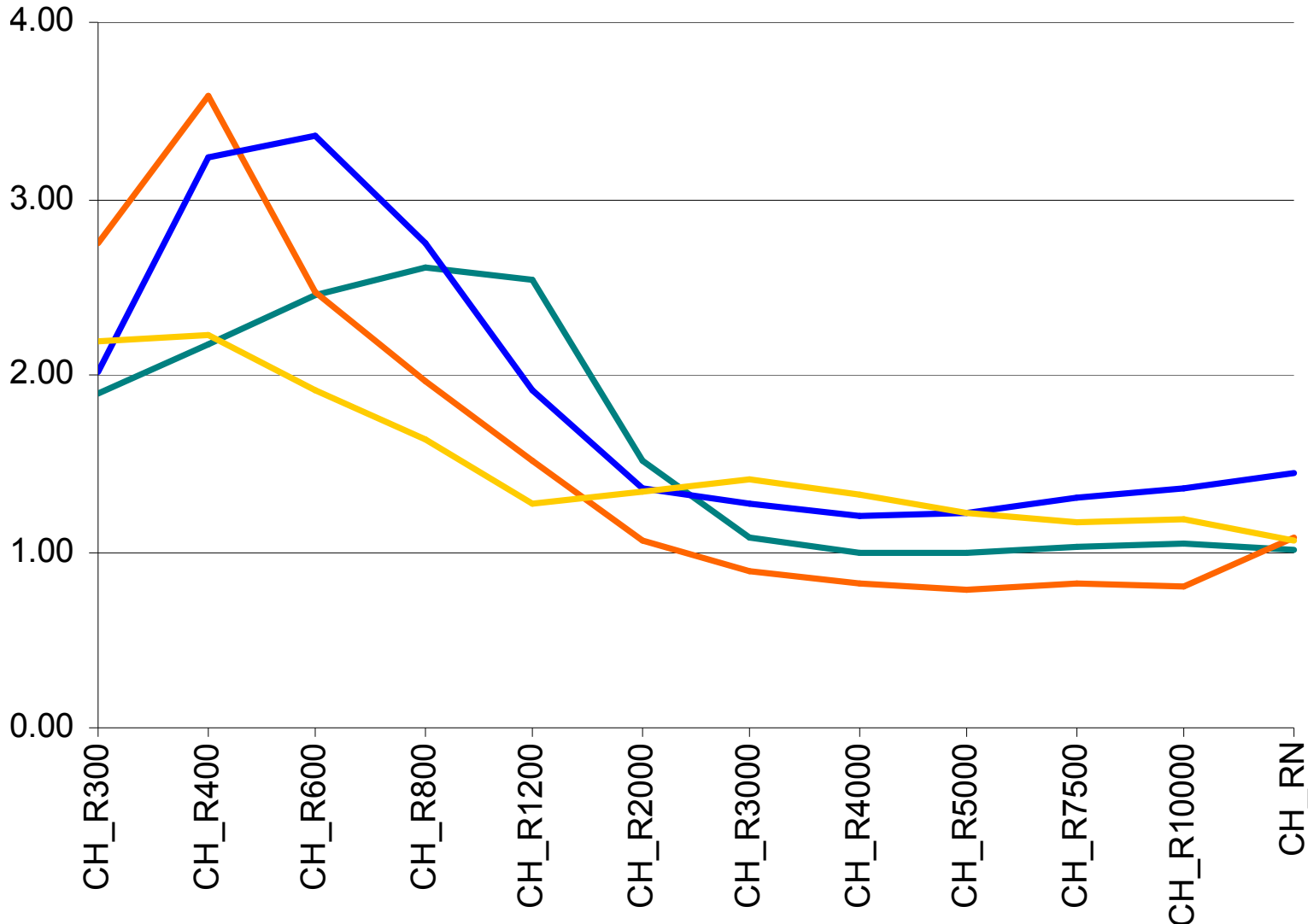


# 4.1 Knowledge Integration KIT3 - Centres



## Group 3

These centres show a high peak (over 2) at a radius between 400m (Clapham, West Ealing), 600m (Swiss Cottage) and 800m (Kilburn) and decrease than to a level of 0.7 to 1.5 at higher radii.

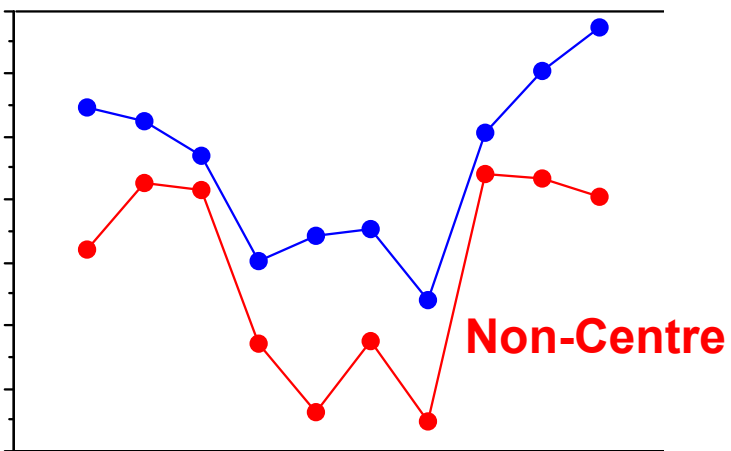




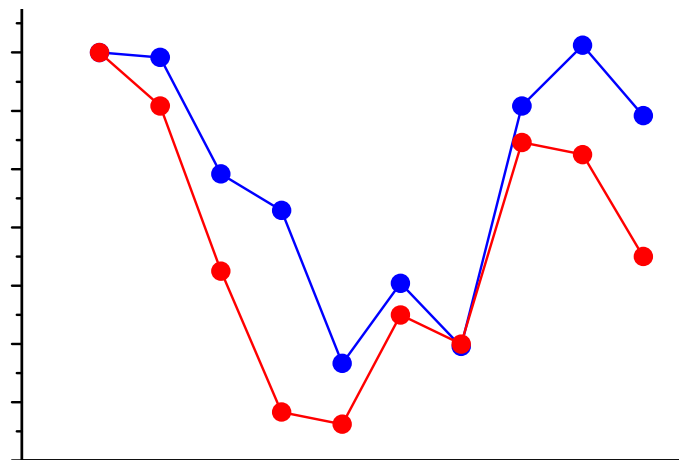
# 4.1 Knowledge Integration KIT3 - Centres

### Integration R400

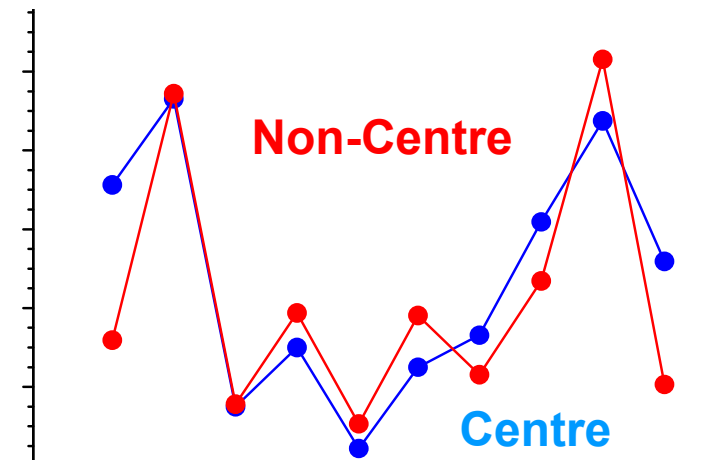
Centre



### Integration R800



### Integration R2000



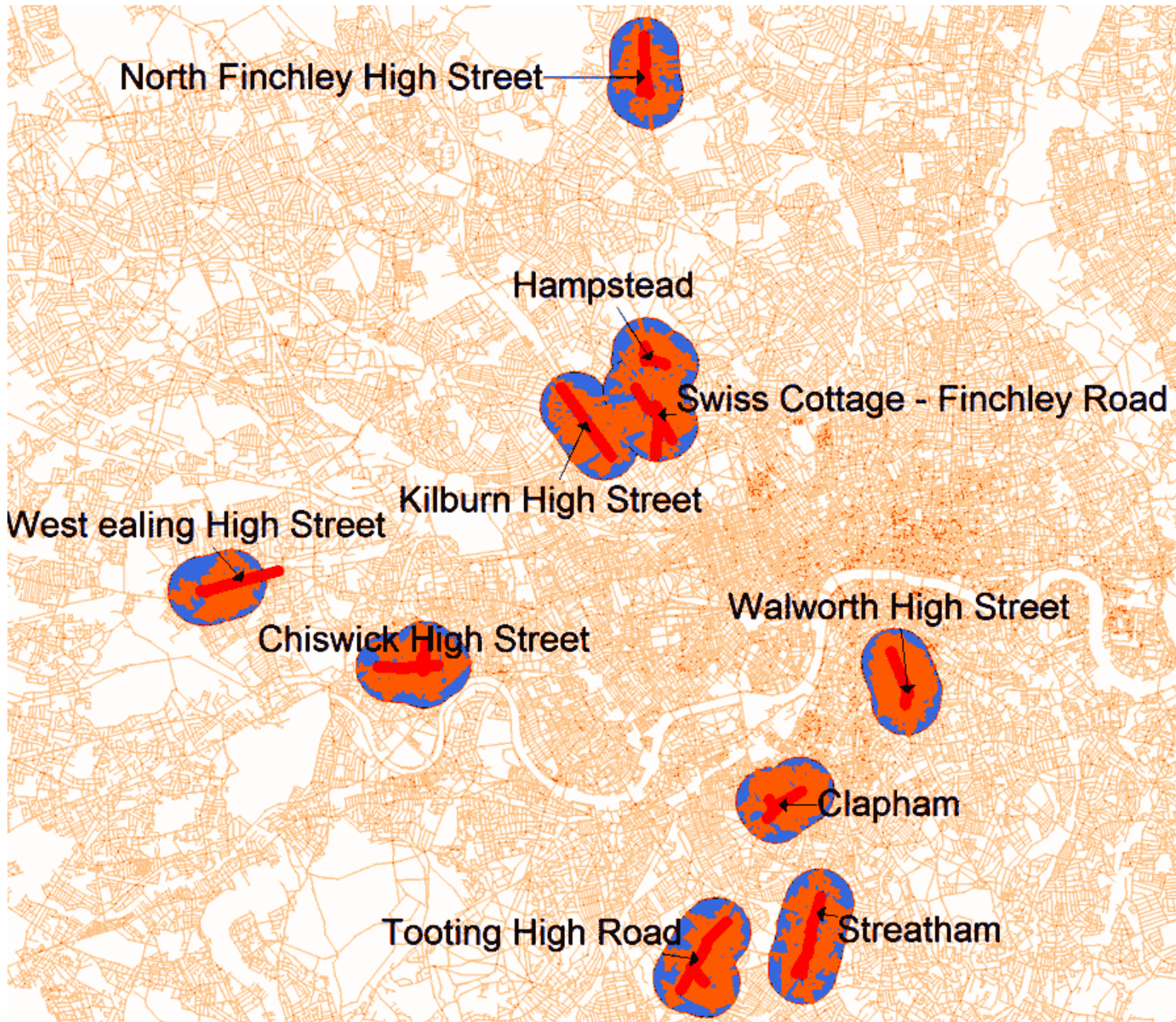
### B. Centre – context

**The relationship between local and global measures is crucial.**

**Different centres behave differently.**

**Let's look at the differences between centres and their context – our second key variable along with centre - non-centre.**

## 4.1 Knowledge Integration KIT3 - Centres



### C. Centre – context

How do centres stand out from their context?

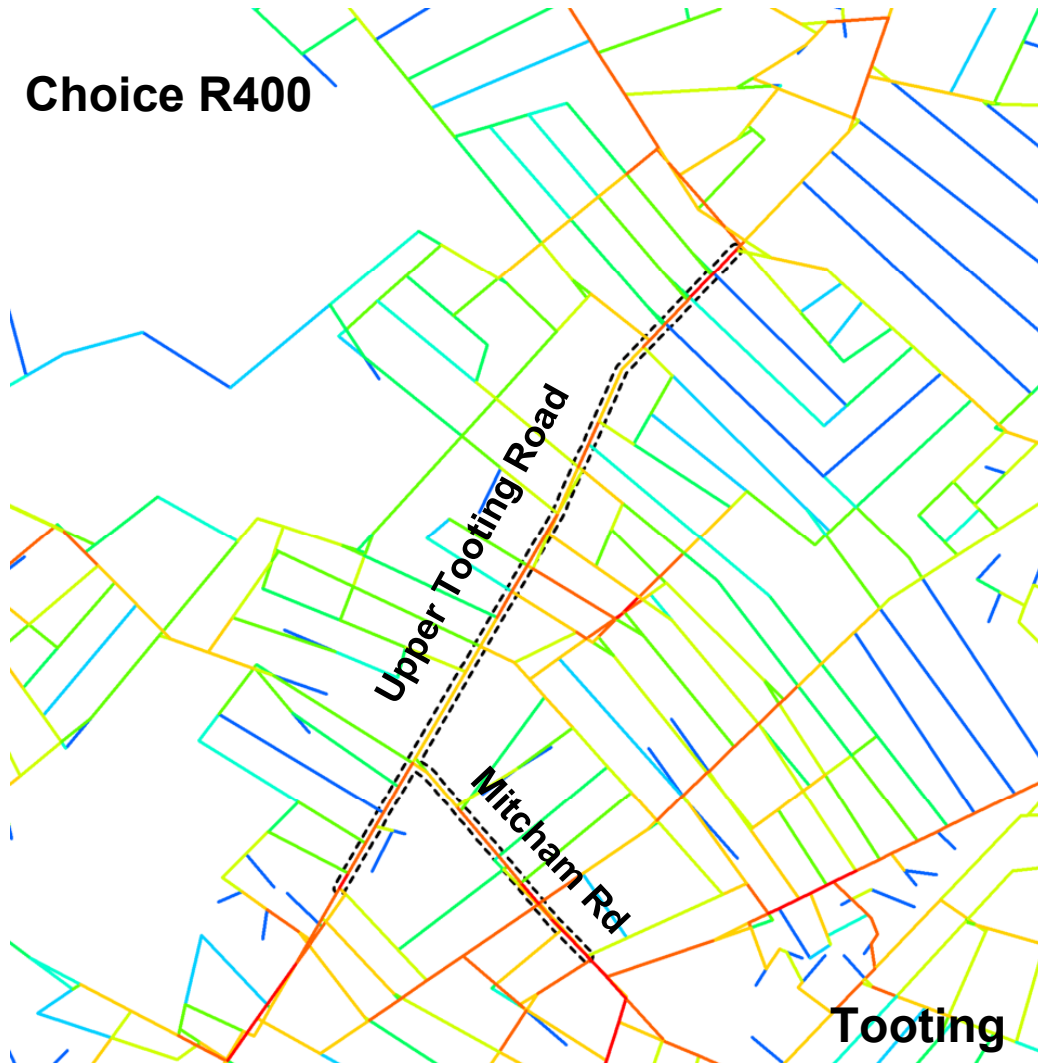


We already know that centres vary on different radii:

B. Centre – context

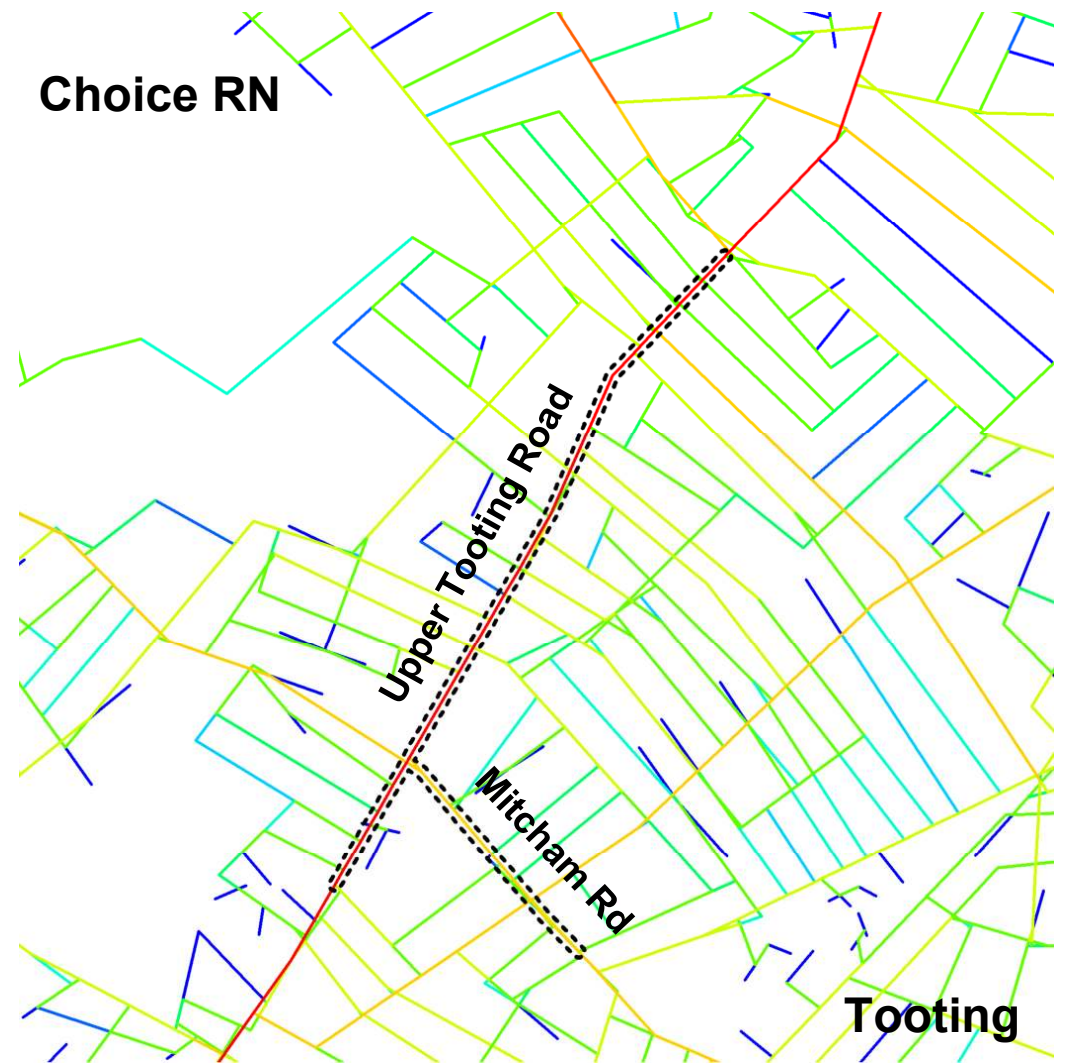
Local movement

Choice R400



Global movement

Choice RN





**But can we measure how centres stand out from their context?**

### C. Centre – context

**We do this by calculating the ratio between the spatial values of the segments in the centre and their context in different radii.**

**In all cases the centre segments are sharply distinguished from their surrounding context.**

**The difference increases with increasing radius**

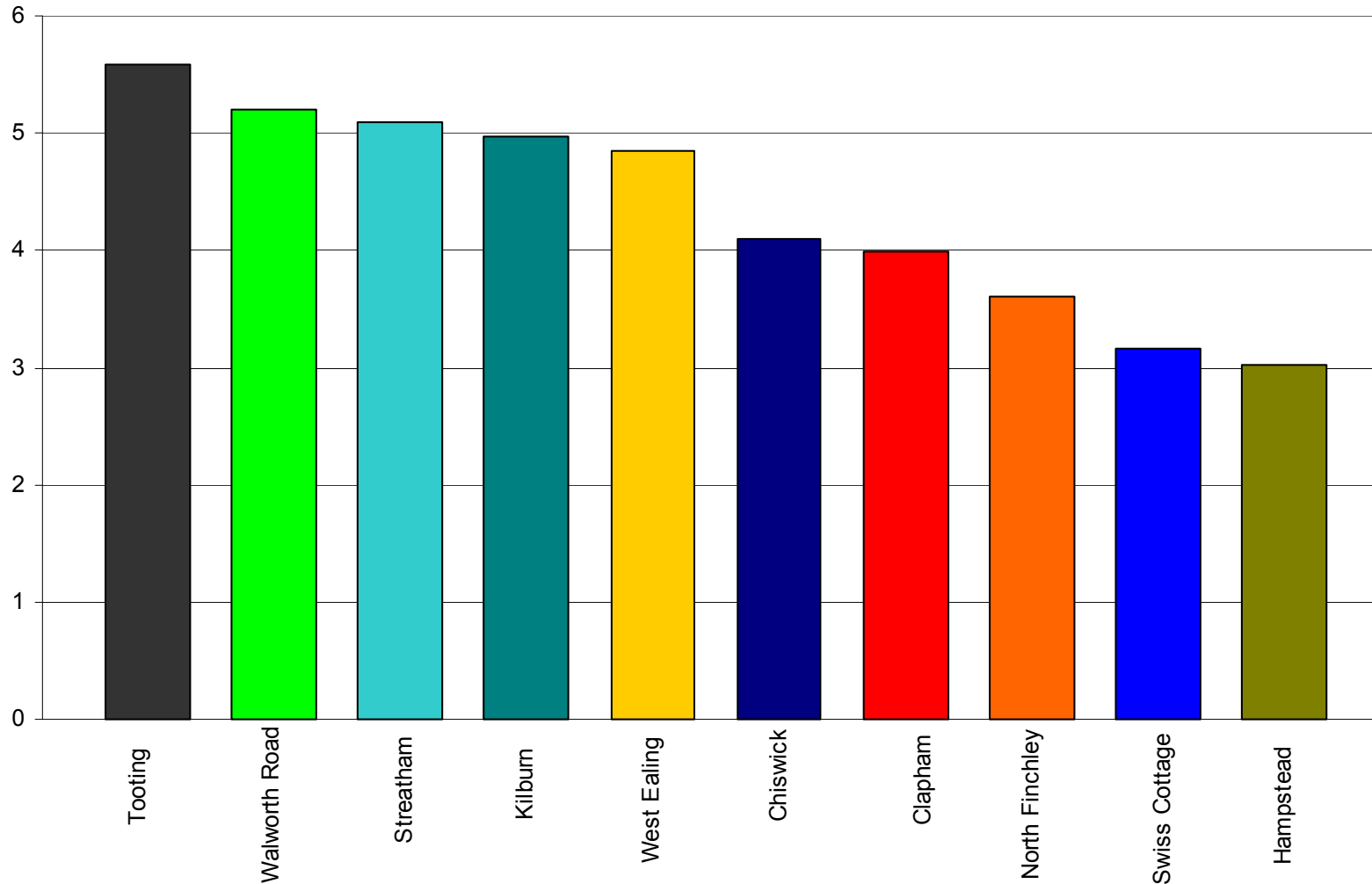
#### Descriptive Statistics

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
CC/ped800segA400avg	2.397	.609	.193	10	1.643	3.339	0
CC/ped800segA800avg	3.230	.696	.220	10	2.539	4.543	0
CC/ped800segA2000avg	4.356	.903	.286	10	3.019	5.584	0

## How do centres stand out from their context?

### C. Centre – context

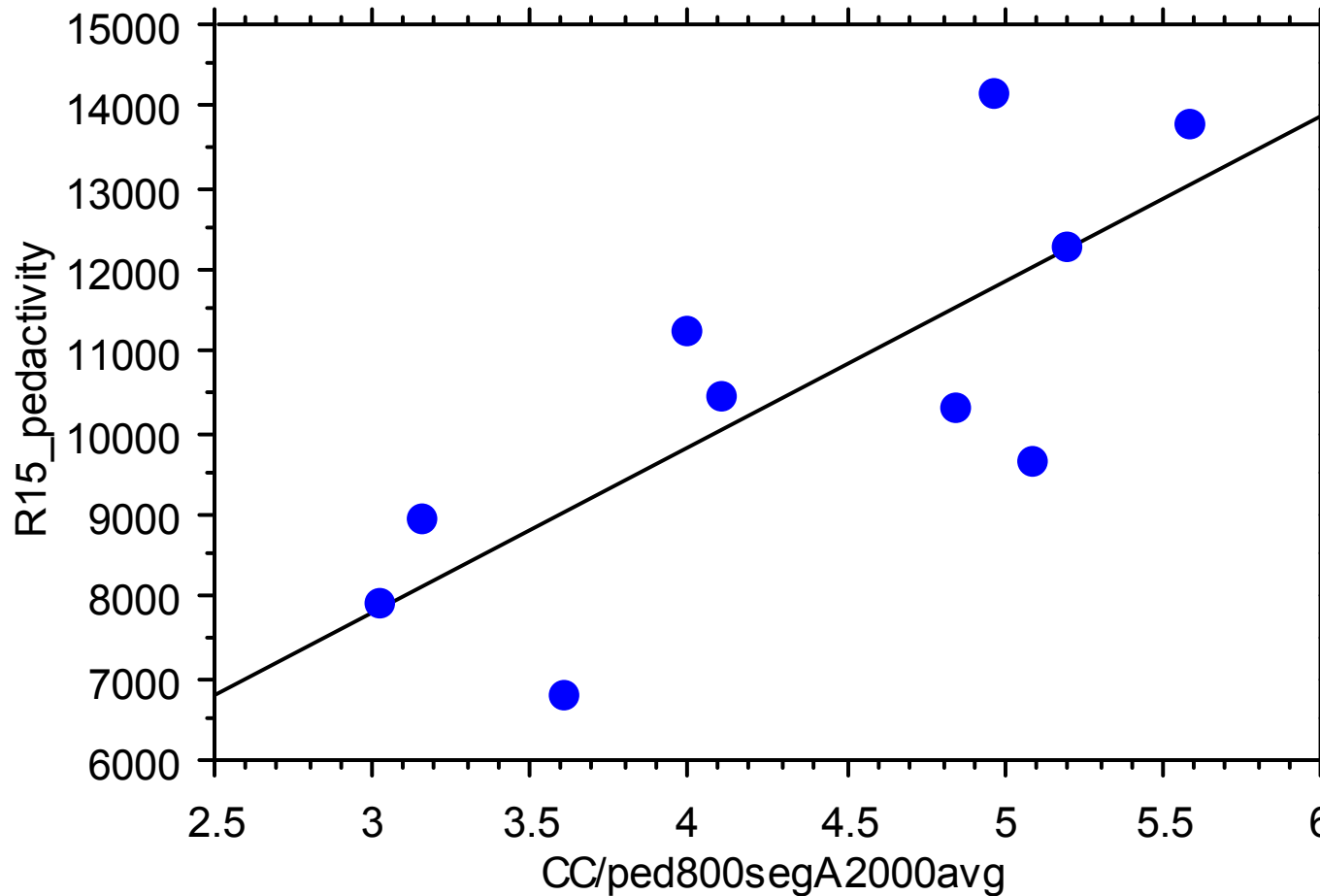
Centre - Context CHOICE R2000



### How do centres stand out from their context?

#### C. Centre – context

Regression Plot



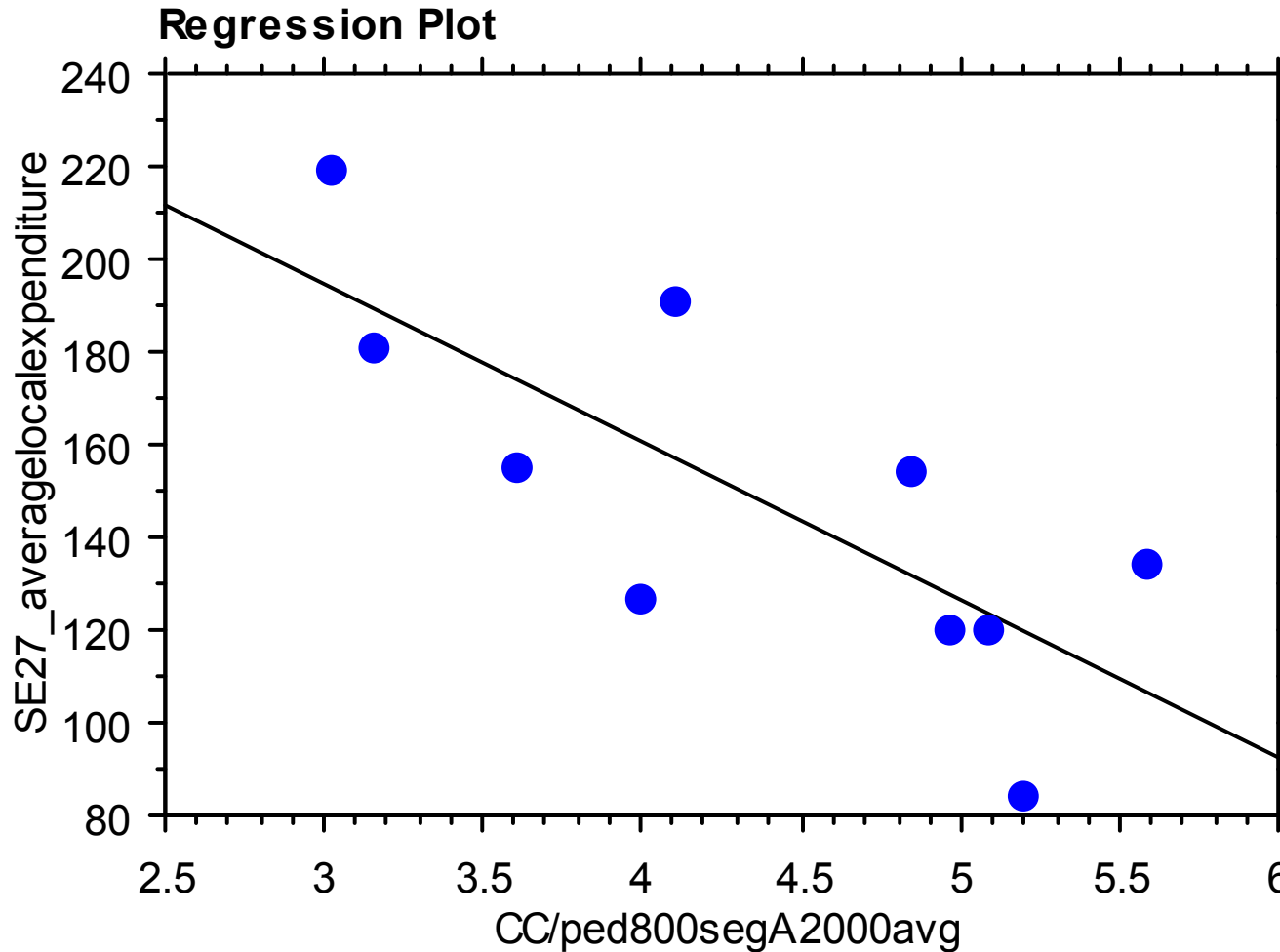
$$Y = 1767.536 + 2016.606 * X; R^2 = .584$$

**Centre-context ratio strongly correlates with pedestrian activity.**

**The higher the ratio the higher the level of pedestrian activity**

How do centres stand out from their context?

### C. Centre – context

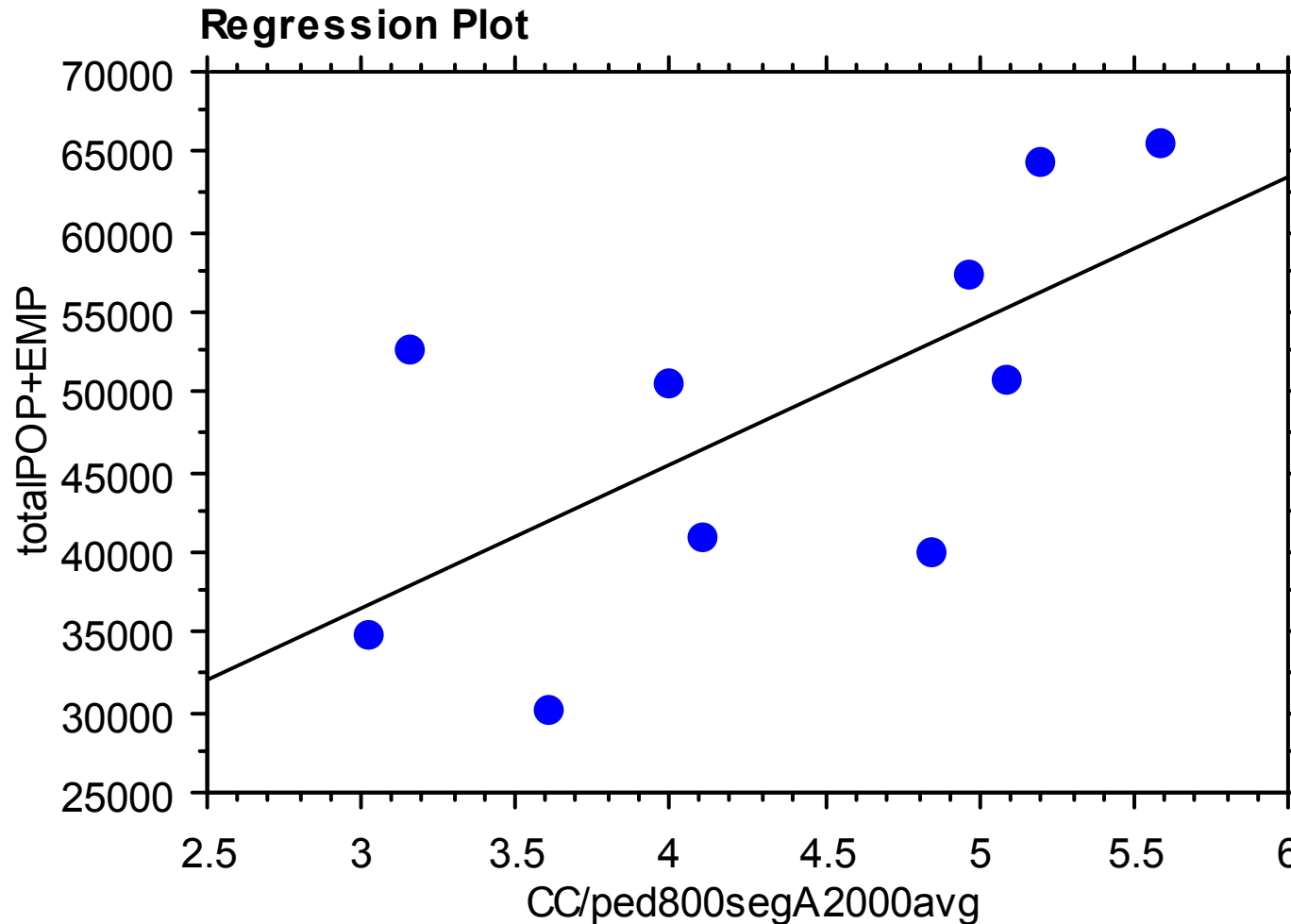


$$Y = 295.955 - 33.851 * X; R^2 = .586$$

**Centre-context ratio  
correlates negatively  
with average local  
expenditure**

### How do centres stand out from their context?

#### C. Centre – context



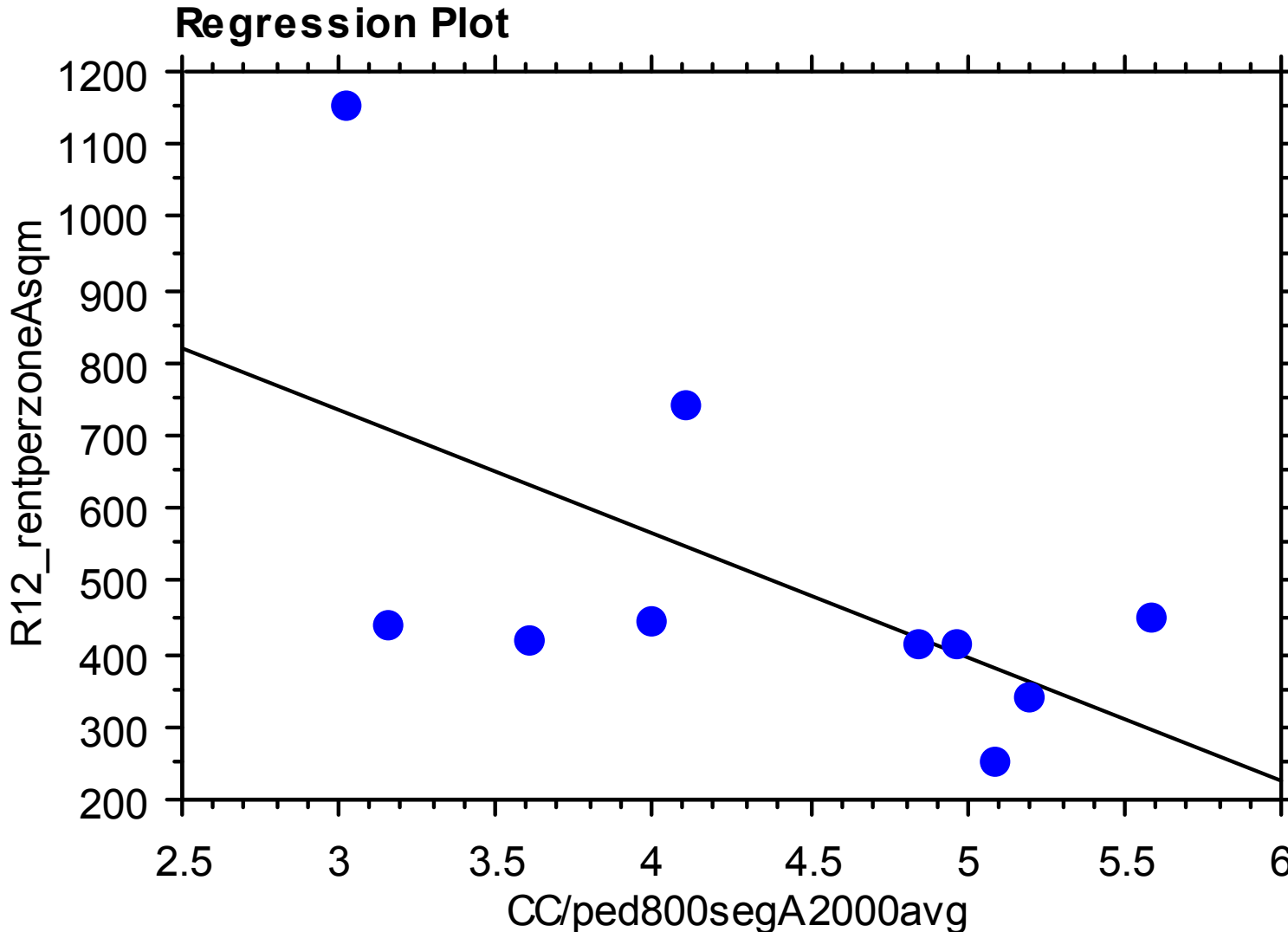
$$Y = 9755.183 + 8954.775 * X; R^2 = .452$$

**Centre-context ratio correlates with higher local population and employment densities**



How do centres stand out from their context?

### C. Centre – context



$$Y = 1247.326 - 170.07 * X; R^2 = .354$$

that it correlates weakly but negatively with Zone A rental values, with the highest values associated with the centre most integrated into its contextual area.

### Results

**There is a generic economic value associated with the variables which distinguish a centre from its context, since these create the conditions for a successful centre in the first place.**

**This however is realised in two different ways:**

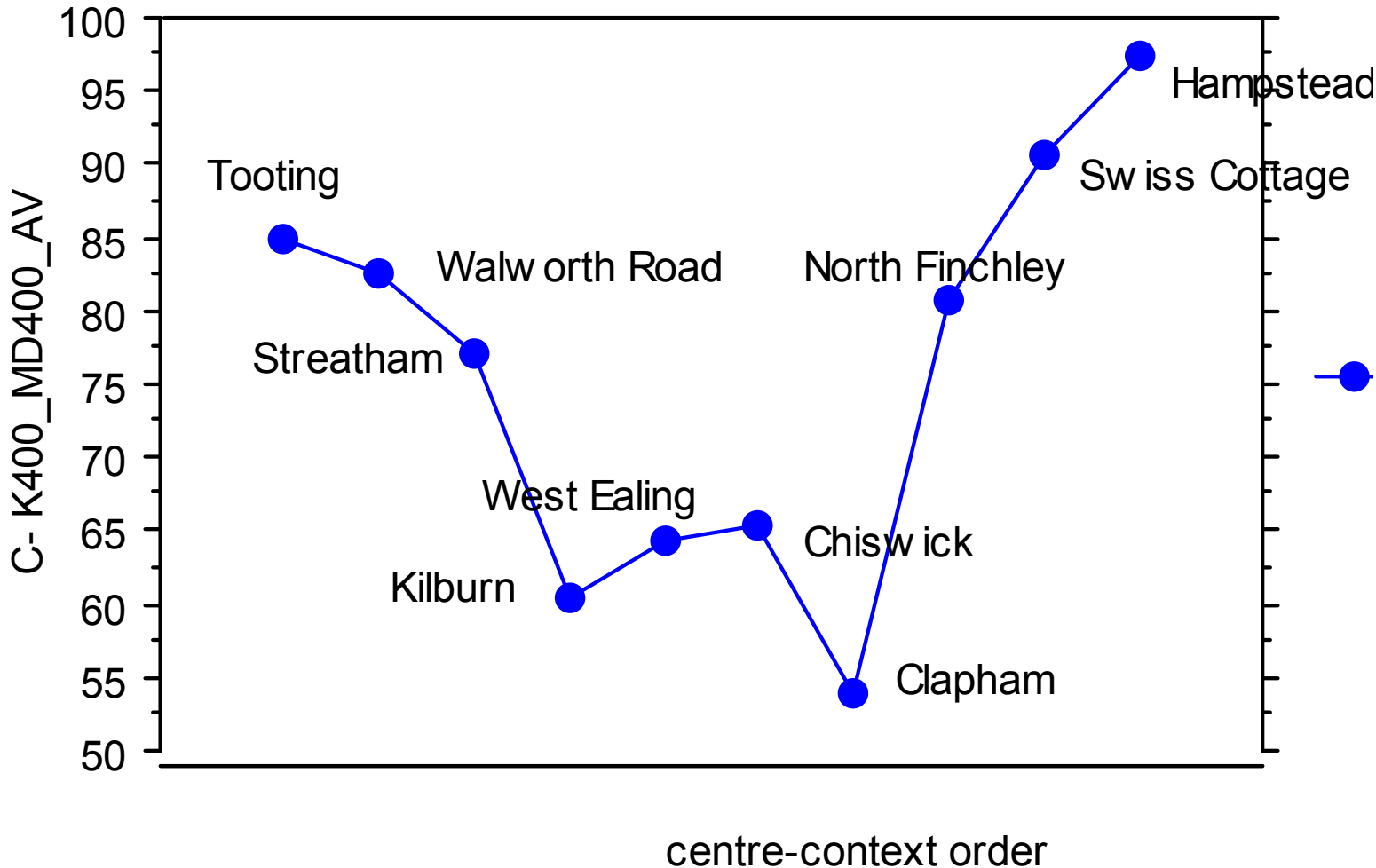
#### **1. Popular centre**

- the centre is sharply distinguished from its context on choice**
- which has high local population and employment densities**
- has high rates of pedestrian activity**
- success comes from numbers rather than affluence**
- larger, less street oriented shops**

#### **2. Selective centre**

- the centre is more part of its context on choice**
- has lower local population and employment densities**
- lower rates of pedestrian activity**
- success comes more from high value and local affluence**
- smaller, more street oriented shops**

## Integration R400

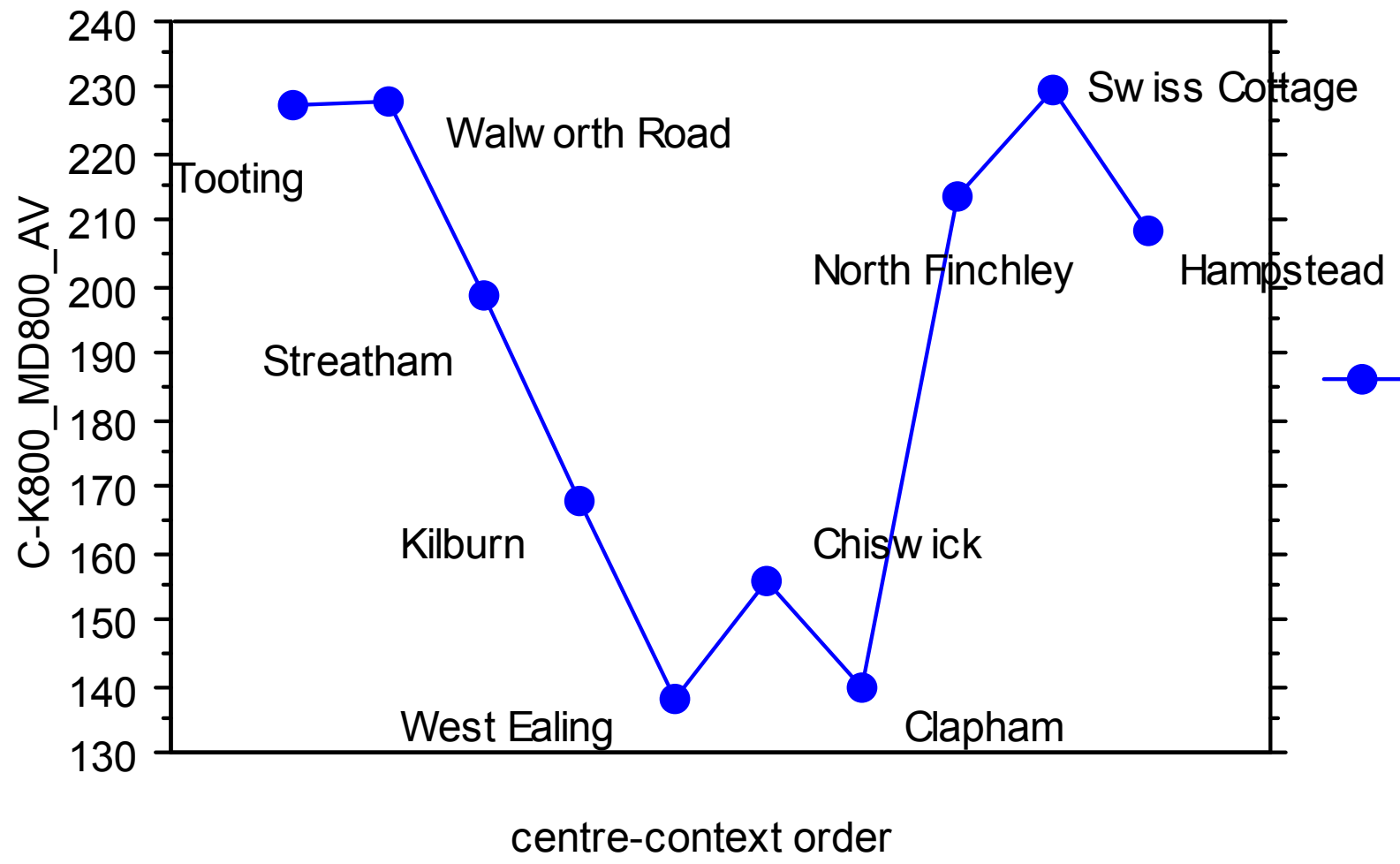


## Integration

**the key selectives are the best integrated into their neighbourhoods at 400m**

**but the top populars are also almost as good**

## Integration R800



## Integration

and at 800 they are more similar

# The starting point...

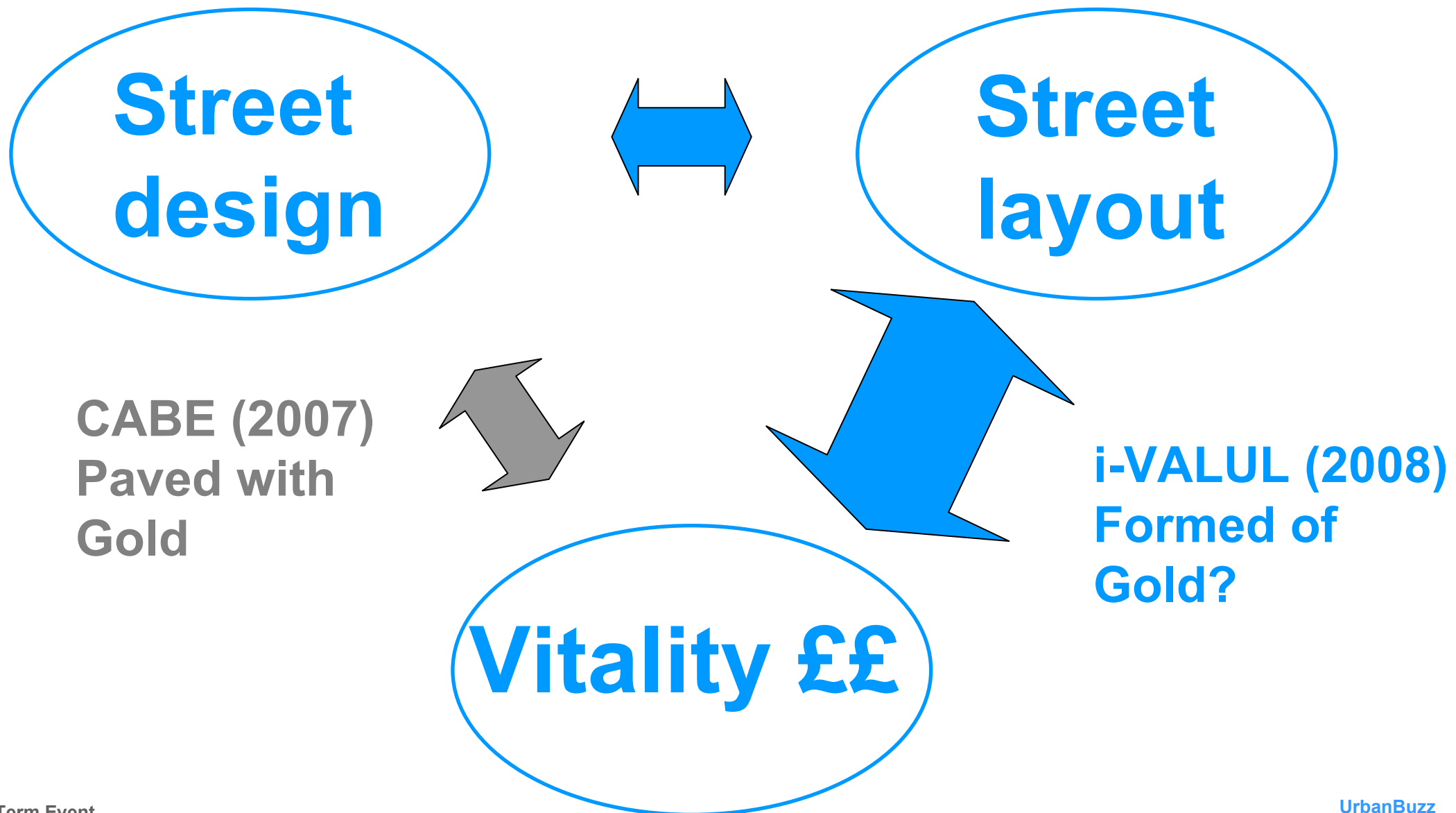


Design better streets

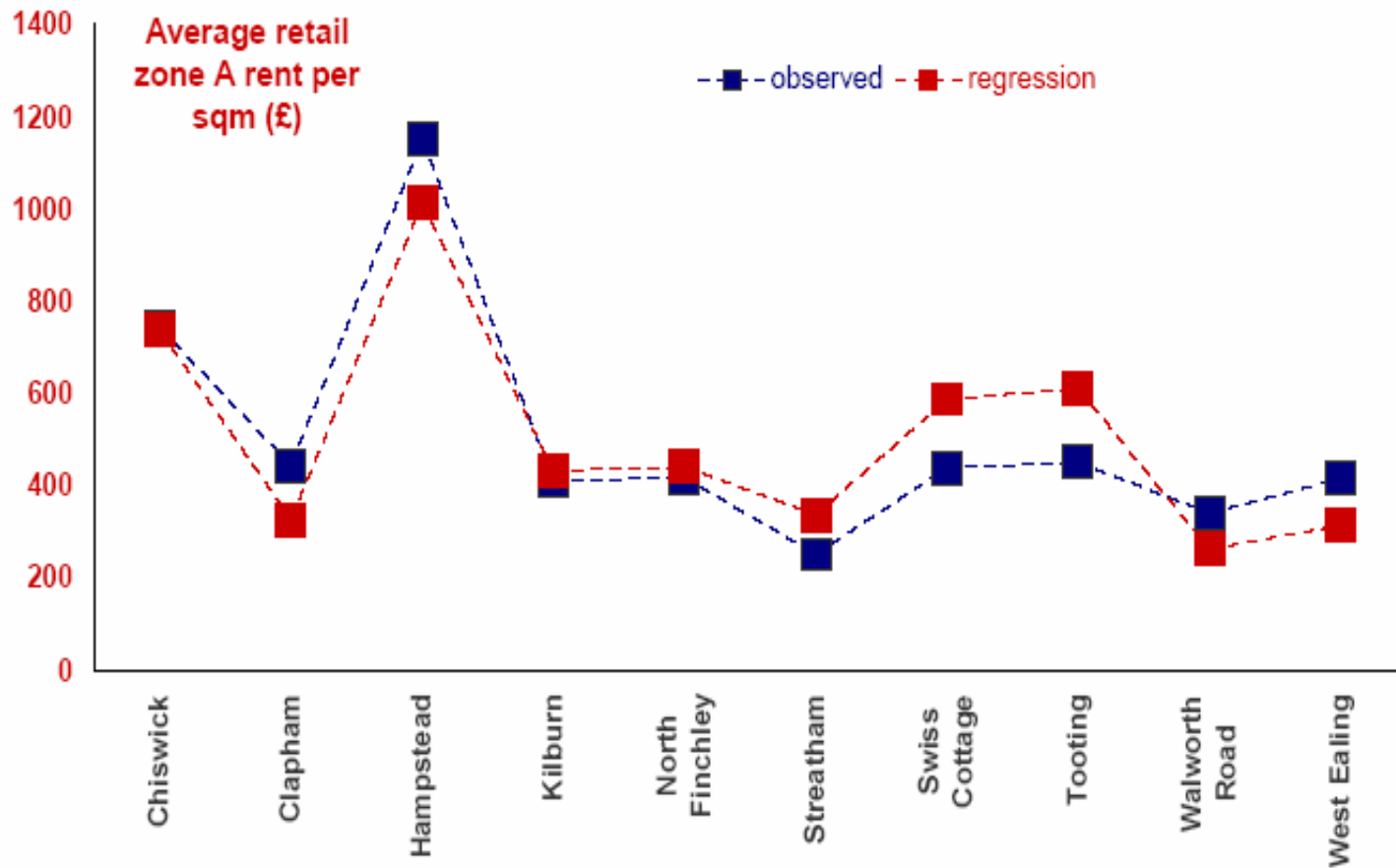




# High street vitality



# The Paved with Gold model



Average zone A rent (£/m<sup>2</sup>)

=

constant

+

*a*\*Vacant units variable

+

*b*\*Local spending power

+

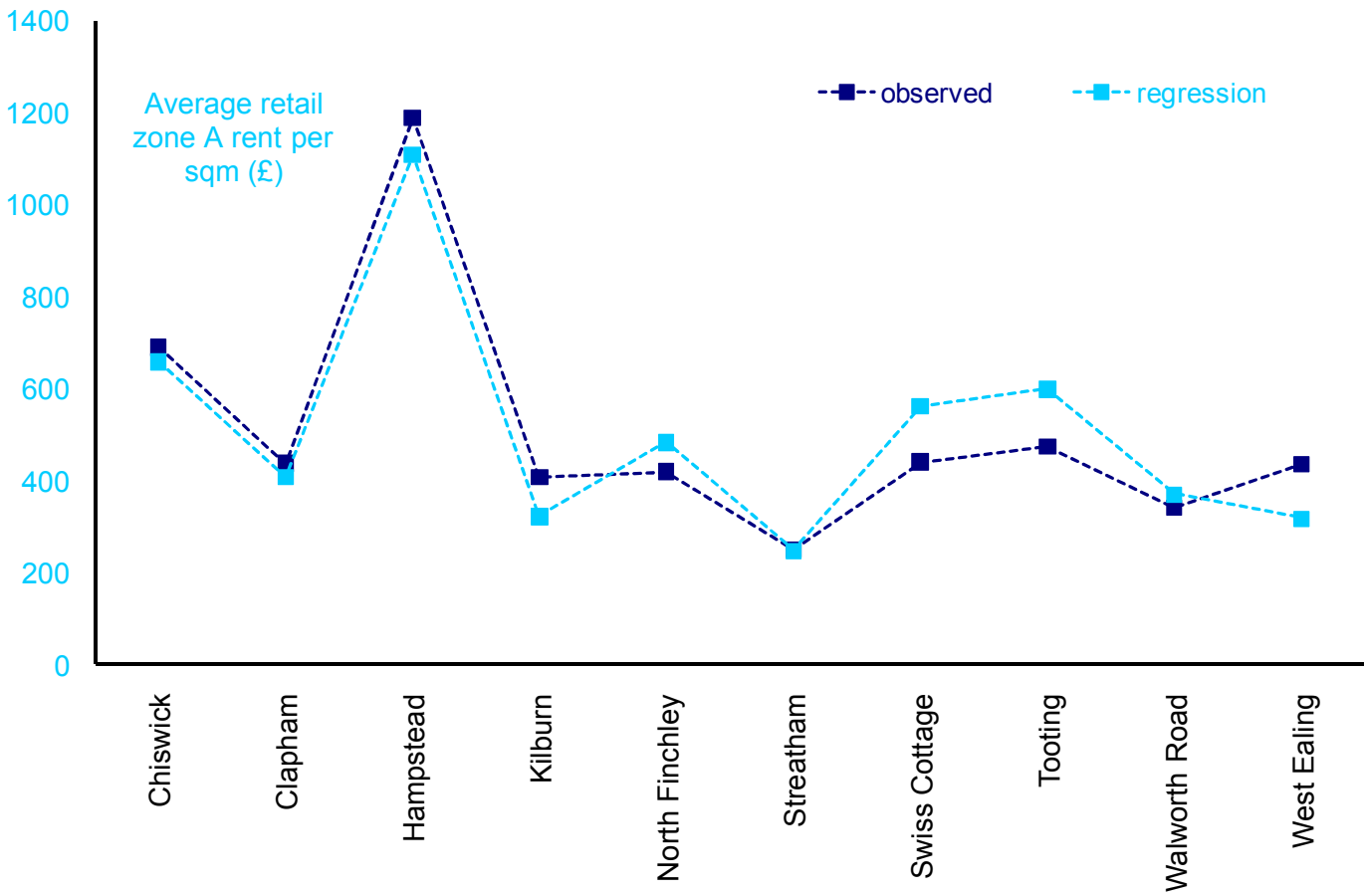
*c*\*Competition factor

+

*d*\* Street design quality var

# A similar approach...

# 4.1 Knowledge Integration KIT3 - Centres



**Average zone A rent (£/m²) =**

constant  
+  
a\* Local spending power  
+  
b\* Competition factor  
+  
c\* Local accessibility variable  
(Average Choice 800m)  
+  
d\* Street design quality variable

But...



Street design quality can thought of as linear...



... so improved access, attractiveness and performance are assumed to translate into ££'s

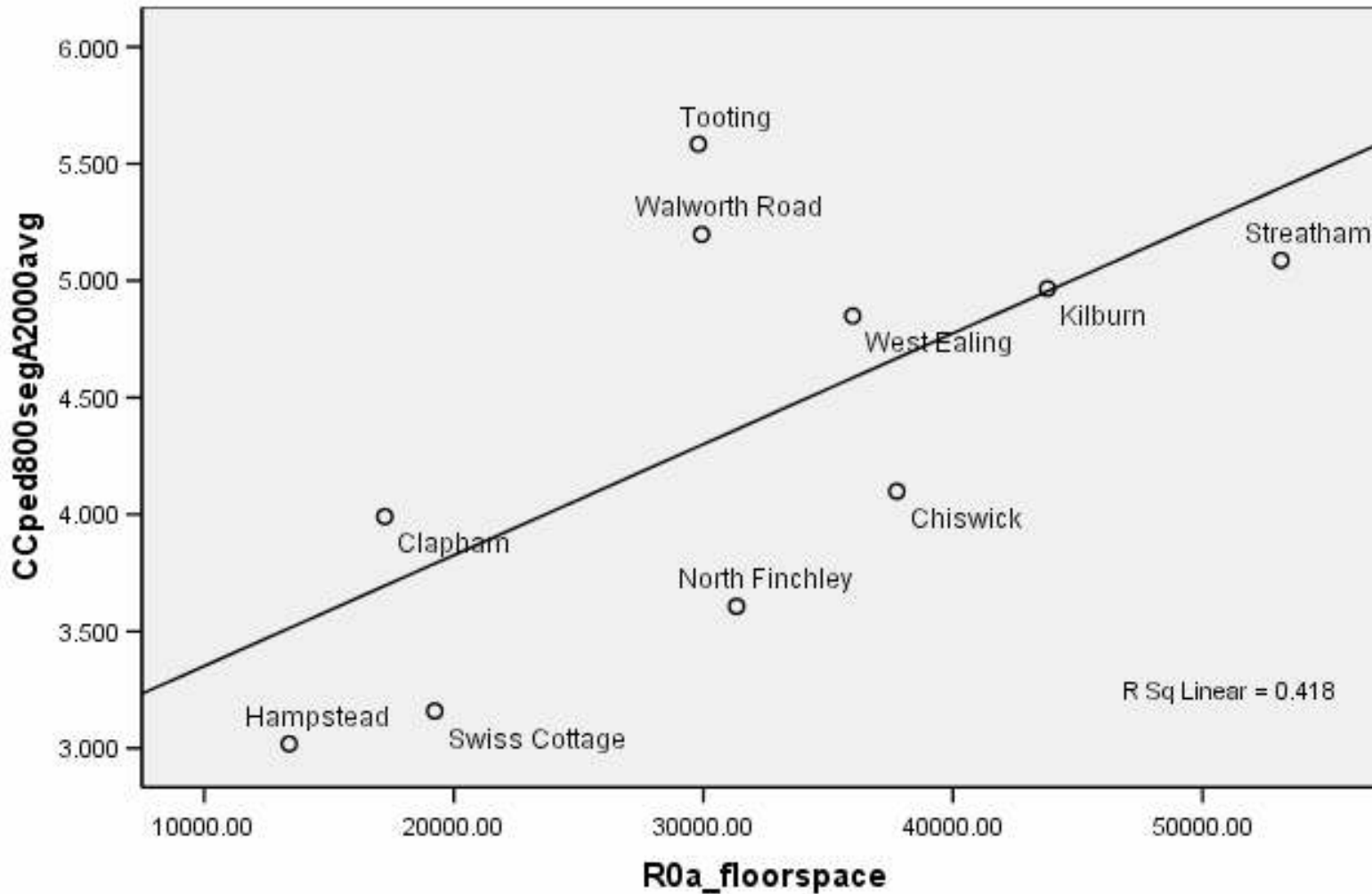
# As seen in Prof Bill Hillier's presentation

- Centres are **spatially distinguishable** from non-centres
- The formation of centres can be thought of as a process leading to different **centres types** (**Popular centres, selective centres**)
- One main factor is the **relationship centre – context**

An alternative approach...

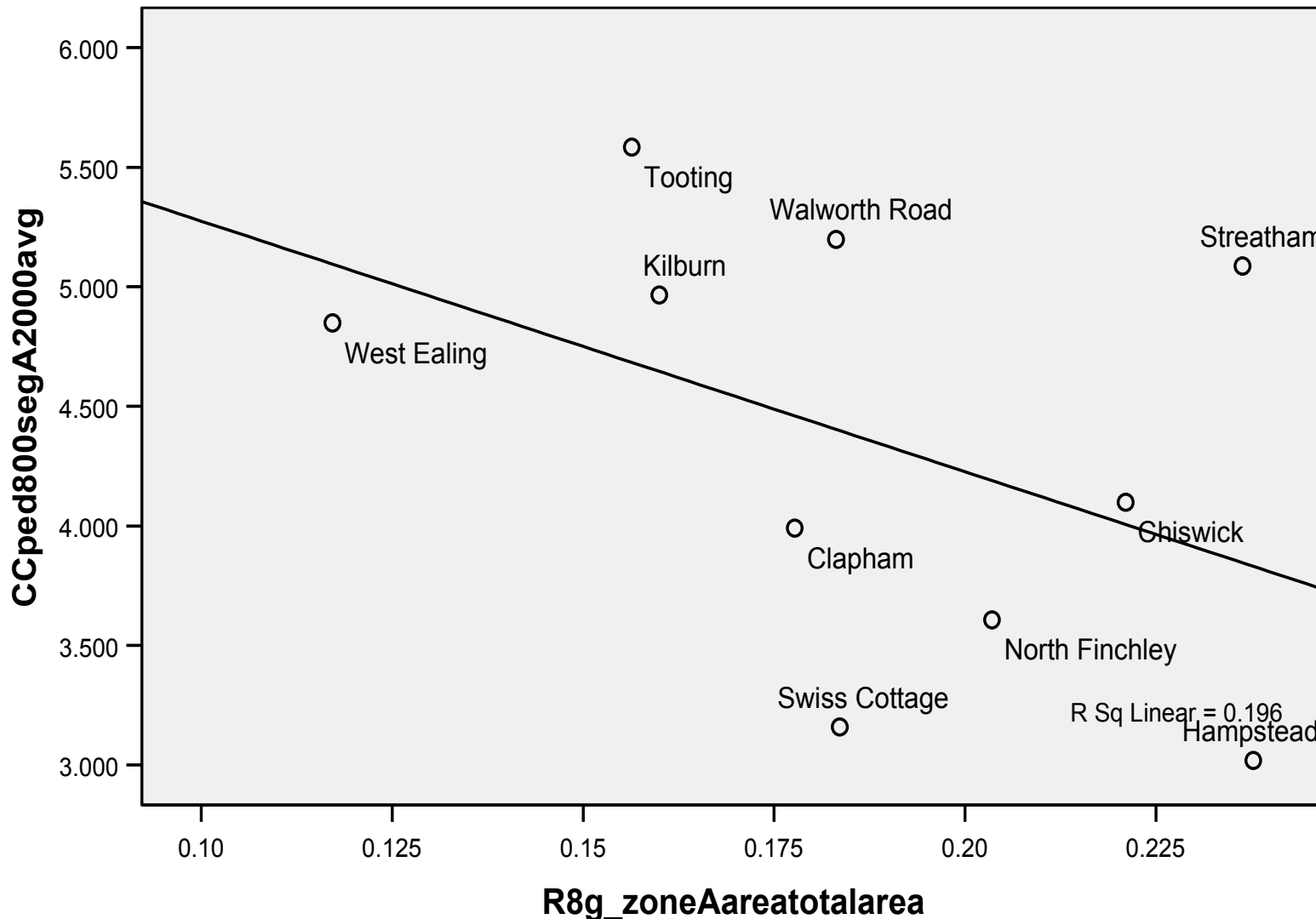
...Can we explain total rateable  
value?

## 4.1 Knowledge Integration KIT3 - Centres



**Correlation between Centre - Context variable and floorspace**

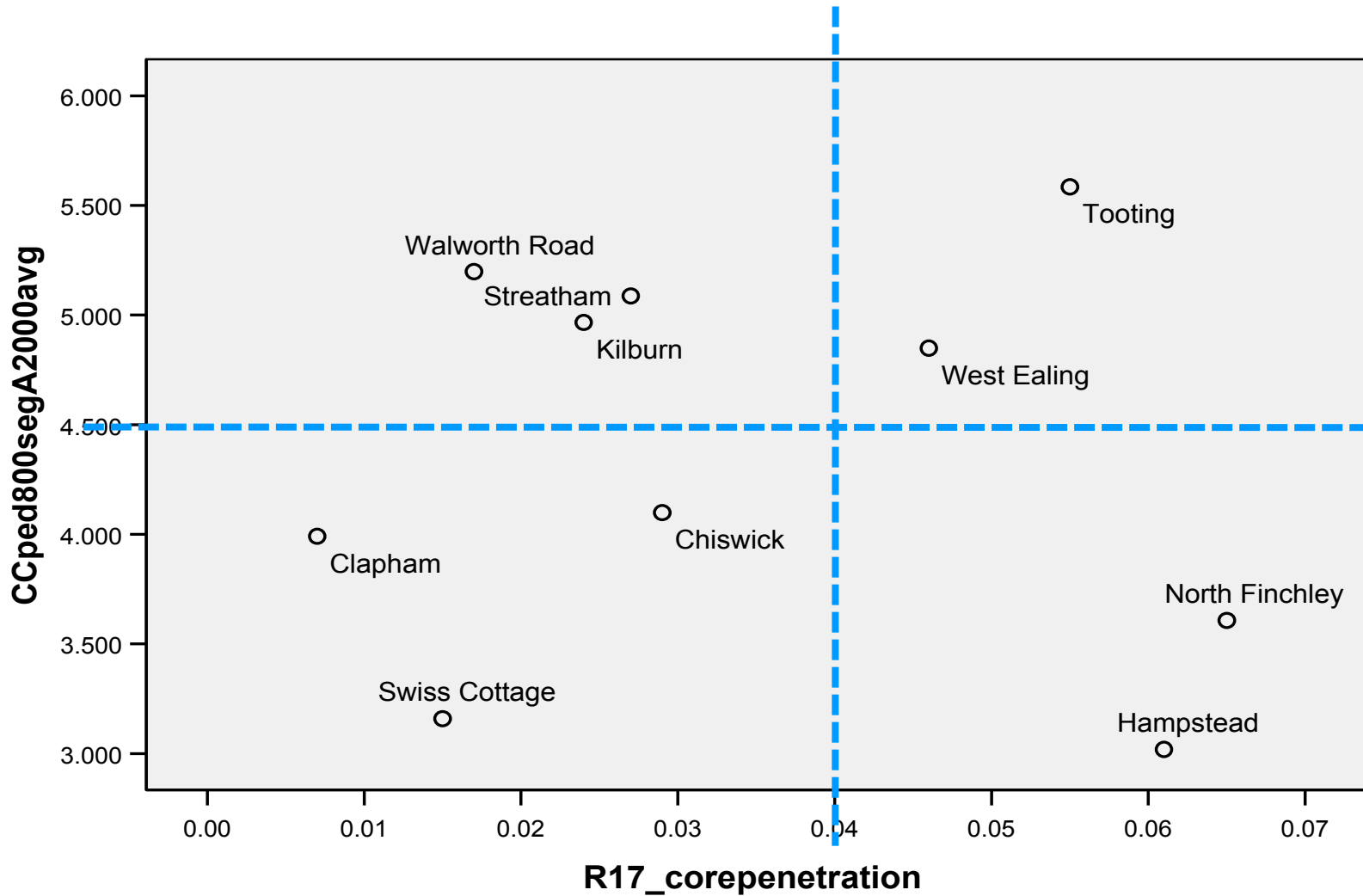
## 4.1 Knowledge Integration KIT3 - Centres



**Zone A floor space as a percentage of total floor space can be used as an indicator of the extent to which a high street relies on **frontage-focussed** retail.**

**Sites with a lower centre context indicator tend to have a more **frontage-focussed** retail offer.**

# 4.1 Knowledge Integration KIT3 - Centres



## Typology

Hampstead and North Finchley: well embedded and high core penetration

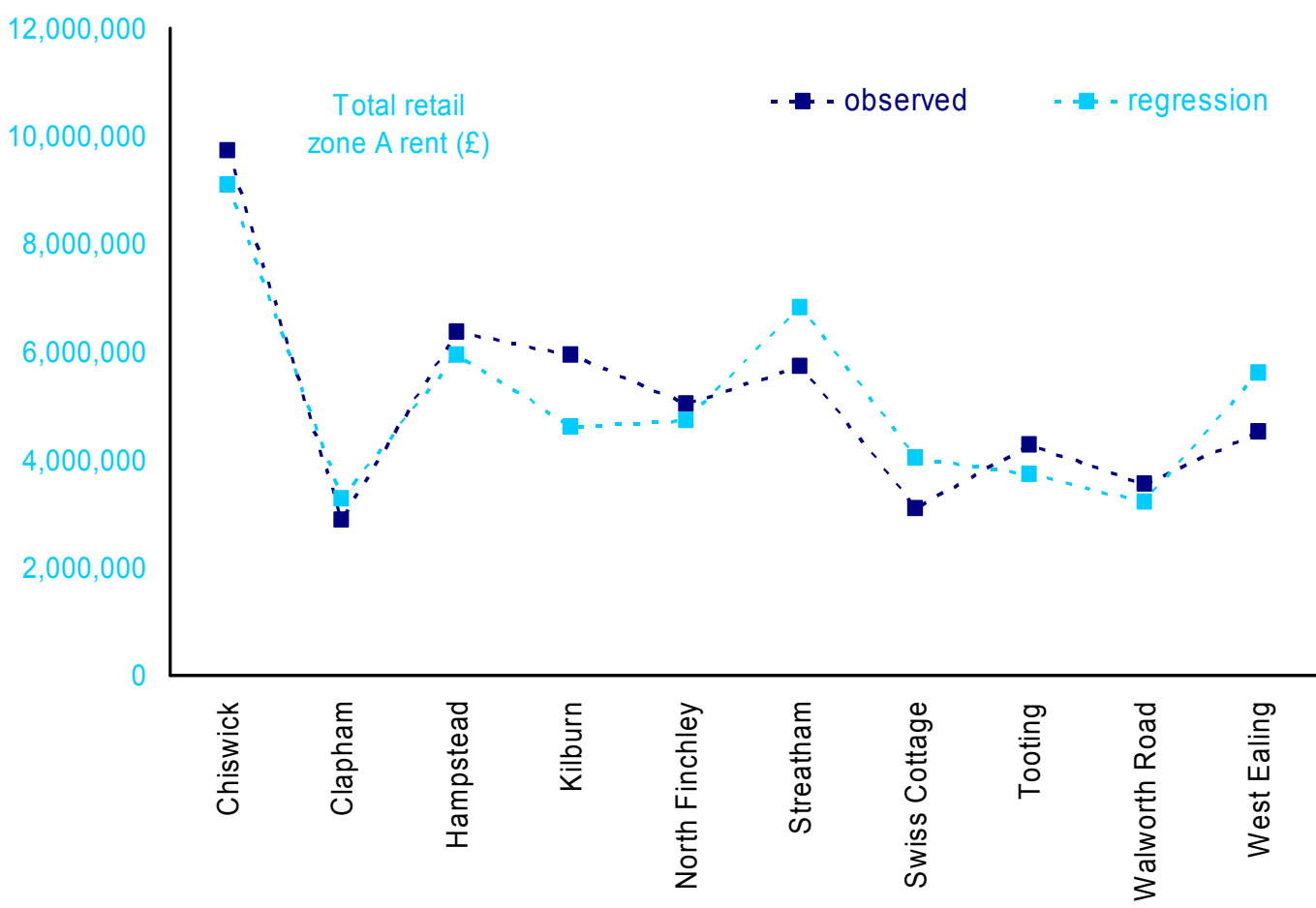
Clapham, Swiss Cottage, Chiswick: fairly well embedded and low core penetration

Walworth, Kilburn, Streatham: non-embedded and low core penetration

Tooting, West Ealing: non-embedded and high core penetration



# 4.1 Knowledge Integration KIT3 - Centres



**Total rateable value (£) =**

$$\text{constant} + a^* \text{ Total floorspace} + b^* \text{ Average local spending power} + c^* \text{ Local accessibility variable (Average Choice 800m)} + d^* \text{ Centre context dummy (Centre/Context > 4.5 = 1)}$$

# Some conclusions

- **Evidence that the spatial accessibility of the centre especially at a local radius up to 2 km is important for its performance**
- **Evidence that the street layout of the context is important for high street performance**
- **Differentiation of centre types according to centre-context relationship**
- **Promising approach for evaluating alternative floorspace scenarios**