Primary Schools, Markets and Choice: Studying Polarization and the Core Catchment Areas of Schools

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• Full paper
• Companion papers
  – [http://rose.bris.ac.uk/](http://rose.bris.ac.uk/)
School “choice” in England

School choice 'misleads parents'

School leaders are calling on politicians to end what they call "the misleading rhetoric" of school choice - which, they say, cannot be delivered.

The challenge has been issued by the Association of School and College Leaders (ASCL) and the Foundation and Aided Schools National Association (FASNA).

100,000 miss first-choice school

Almost half of parents in some parts of England did not obtain their first choice of secondary school for their children, official figures reveal.

A breakdown of last year's admissions, obtained by the Conservatives, show success rates ranged from 100% to 51%.
Social segregation?

Parents 'would move for school'

Parents are prepared to move house or lie to win a place for their child at a good school, a study has suggested.

Half of the 1,255 adults polled for the Children's Society said they would move home to get into a good state school's catchment area.

And one in seven said they would give a false address or lie about their faith to escape the "schools lottery".

Shock over schools 'breaking law'

A "significant minority" of schools in England are breaking new laws that were designed to make the admissions system fairer, the government has said.

In a sample three areas - Manchester, Northamptonshire and Barnet - it found parents were illegally being asked for money or there was other malpractice.
Ethnic polarization?

School choice 'means classroom ghettos'

By Mark Easton
Home editor, BBC News

Giving consumers choice in public services - and particularly in schools - is causing acute risks to racial equality.

That, at least, is the view of the Commission for Racial Equality which warns that Tony Blair's commitment to increasing choice undermines that other current political mantra of increasing integration.

Indeed, it's feared that choice will encourage racial segregation in an already highly segregated country.
• There is ethnic segregation between schools
• But then there is segregation between neighbourhoods
• Schools Vs neighbourhoods (post-residential sorting)
• e.g. Johnston et al. (2006)
  – ‘It has been shown herein that not only is there ethnic segregation in the country’s primary and secondary schools, but also in addition – for both the South Asian populations and for the Black Caribbean and Black African populations – that school segregation is very substantially (and significantly) greater than is the case with residential segregation.’
More geographical perspective

- Economic theory and government policy suggest schools operate within local markets to attract pupils and funding.
- However, there is a deficit of understanding about the scales and configurations of those admission spaces.
- Whilst competition for pupils and for school places is assumed to operate at some localised scale, the actual geographies of the markets, where they overlap and where they might be changing are generally unknown.
- **Aim:** To understand processes of polarization in the context of the local markets within which schools operate.
Local markets

- The geography which matters is the local, not the national or regional, and the scale of analysis should be commensurate with the local markets within which schools (and parents faced with placement decisions) actually operate.

  (Gibson & Asthana, 2000a: 304).
Why does this matter?

• Econometric models which incorporate census-based (or other) exogenous understandings of neighbourhood to define and to describe a school’s social context may, in fact, be misspecified.

• Studies that measure the differences between a school’s actual social composition and that of “its catchment” [assumed catchment] are potentially vulnerable.
Evidence of polarisation

• Are particular social (ethnic) groups travelling further to school ‘than they need to’?
• Are there (primary) schools with an intake not representative of the local community?
• Are there (primary) schools with shared admission spaces but where one has a very different intake to the other?
• Study regions: Birmingham and London
An example

• There is a primary school in Birmingham
• Within its ‘core catchment area’
  – 15% of all pupils are Black Caribbean, 38% are Pakistani, and the rest are of other ethnic groups
• From the area and attending the school
  – 23% Black Caribbean and 15% Pakistani.
• The complete intake to the school
  – 27% Black Caribbean and 13% Pakistani
• Its catchment area overlaps with another school. That school’s intake
  – 40% Black Caribbean and 0% Pakistani
• Schools neither have *de jure* catchment areas
• nor unlimited capacity
• so parental choice is constrained, ultimately by admissions criteria.
• Pupils tend to attend local primary schools
• and so there is a clustered geography of attendance.
• That geography is revealed by mapping the home address of each pupil attending any given school (from PLASC micro-data)
• The task is to define that pattern.
Some Criteria

• We don’t want the modelled catchment areas to be over-dispersed.
  – Some pupils live far from their schools
• But we also don’t want them to be over-fitted to one specific set of pupils.
  – If a postcode is near to a school and contains a pupil attending that school then it likely belongs in the (potential) catchment area.
  – But so too does a neighbouring postcode even if it does not contain a pupil attending that school – potentially the school could have recruited from there too.

• Compact and unbroken
• ‘optimised’ to areas where attendance at any particular school is prevalent
About the data

• **PLASC**
  - *Pupil Level Annual Census Returns*
• Data on all pupils in primary (and secondary) schools in England
• 2001/2 and 2005/6 data
  - *Information on state educated primary school students (5-11 years old)*
  - 'Self-identified' ethnic category collected from parents when students enrol
  - Also records postcode unit of pupils' homes
  - Which they school they attend
  - School type (selective? Faith school?)
  - Measure of deprivation (take a free school meal)?
Defining ‘core catchments’

• Imagine centring a rectangle at (mid-x, mid-y) based on the residential postcodes of pupils attending a school
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• Let the rectangle grow outwards
Imagine centring a rectangle at (mid-x, mid-y) based on the residential postcodes of pupils attending a school.

Let the rectangle grow outwards.

Until it encloses a certain proportion of all pupils who attend the school...
• Imagine centring a rectangle at (mid-x, mid-y) based on the residential postcodes of pupils attending a school
• Let the rectangle grow outwards
• Until it encloses a certain proportion of all pupils who attend the school…
• Here $p = 0.40$
• Imagine centring a rectangle at (mid-x, mid-y) based on the residential postcodes of pupils attending a school
• Let the rectangle grow outwards
• Until it encloses a certain proportion of all pupils who attend the school…
• Here $p = 0.50$
Some Refinements

- Two datasets used simultaneously: one has the postcode grid references rotated by 45°
  - Search is now N, NE, E, SE, S, SW, W, NW, N
• The direction of growth is determined as that which returns highest $n_1 / n_2$
  - where $n_1$ is number of pupils in area going to the school
  - $n_2$ is all pupils in the area (go to any school)
  - Catchment is then defined as the convex hull for pupils of school within the search area.
• Continues until a certain proportion of all pupils who attend the school are enclosed…
• \( p = 0.30 \)
• Continues until a certain proportion of all pupils who attend the school are enclosed…
• $p = 0.40$
• Continues until a certain proportion of all pupils who attend the school are enclosed…
• $p = 0.50$
• Catchment is then defined as the convex hull for pupils of school within the search area.
Other methods?

• Why not just find the ‘n’ nearest neighbours to a school
  – Because that does not consider prevalence
  – The ‘at risk’ population
  – And it assumes the school is at ‘the centre’ of its catchment

• Why not use some sort of ‘hot spot’ analysis
  – Could do but it would likely over-calibrate on a specific set of pupils rather than revealing the schools’ potential catchment areas
Birmingham
London
Does it work?
Processes of polarisation (1)

• Friction of distance / ‘least cost’ perspective
  – identify any pupils that appear to be travelling further to school than they need to
    – pupils that live within the core catchment of at least one primary school but are outside of the core catchment of the school actually attended.
  – May not be a matter of choice
    – some schools will be over-subscribed
    – catchments are defined to contain only 50% of the pupils at the school.

• Is the propensity to attend any one of the ‘near schools’ consistently lower for some ethnic groups?
Defining ‘Near’

- Define as being near to a pupil any primary school that has a core catchment that includes the pupil’s residential postcode
- Here the pupil has three near schools
Proportion attending any near school
(target catchment $p=0.50$) BIRMINGHAM
Proportion attending any near school
(target catchment $p=0.50$) LONDON
Processes of polarisation (2)

- Have evidence of a ‘migratory’ process
- But also local processes of polarisation?
  - When the intake from the local area is not representative of the local population
  - When two or more schools strongly overlap in terms of their potential spaces of recruitment but attract different ethnic groups
- Disentangle
  - migratory and local processes of polarization
  - residential and post-residential sorting
Pairwise Comparisons

• Looking inside the catchments
  – Expected intake Vs
    Locally observed intake
• Looking also at the final profile of each school
  – Expected intake Vs
    Fully observed intake
• Can also compare the profiles of locally ‘competing schools’
  – ones that overlap (strongly) in terms of their core catchment areas
Visual Summary (Birmingham)

- Shows only those schools with highest expected % Black Caribbean
### Ethnicity Profiles of the Seven Schools with Significantly Higher than Expected Percentages of Black Caribbean Pupils and a Significant Segregation Index

<table>
<thead>
<tr>
<th>Sch. Type</th>
<th>Expected Black Caribbean</th>
<th>Expected Indian</th>
<th>Expected Pakistani</th>
<th>Observed Black Caribbean</th>
<th>Observed Indian</th>
<th>Observed Pakistani</th>
<th>Competitor (observed) Black Caribbean</th>
<th>Competitor (observed) Indian</th>
<th>Competitor (observed) Pakistani</th>
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</thead>
<tbody>
<tr>
<td>Faith</td>
<td>11.1</td>
<td>16.0</td>
<td>36.8</td>
<td>49.1</td>
<td>8.18</td>
<td>1.82</td>
<td>1.87</td>
<td>31.2</td>
<td>44.1</td>
</tr>
<tr>
<td>Faith</td>
<td>20.9</td>
<td>8.37</td>
<td>36.5</td>
<td>39.6</td>
<td>3.05</td>
<td>0.00</td>
<td>27.0</td>
<td>23.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Faith</td>
<td>20.0</td>
<td>2.38</td>
<td>26.0</td>
<td>41.4</td>
<td>2.63</td>
<td>10.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Faith</td>
<td>10.1</td>
<td>3.39</td>
<td>28.8</td>
<td>34.0</td>
<td>3.92</td>
<td>8.50</td>
<td>26.0</td>
<td>0.87</td>
<td>7.79</td>
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<tr>
<td>Faith</td>
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<td>3.28</td>
<td>41.0</td>
<td>12.8</td>
<td>9.23</td>
<td>17.9</td>
<td>3.11</td>
<td>1.78</td>
<td>0.89</td>
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<tr>
<td>Faith</td>
<td>21.1</td>
<td>18.9</td>
<td>18.2</td>
<td>49.7</td>
<td>22.3</td>
<td>6.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Community</td>
<td>15.4</td>
<td>12.9</td>
<td>38.1</td>
<td>27.0</td>
<td>23.5</td>
<td>12.5</td>
<td>39.6</td>
<td>3.05</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Polarisation within the local market
Visual Summary (LONDON)

- Shows only those schools with highest expected % Black Caribbean
• Shows only those schools with highest expected % Bangladeshi
Overall segregation Index

• Which schools are least representative of their catchments?

\[ S_j = 0.5 \times \sum_{i=1}^{e} |P_{\text{observed},i} - P_{\text{expected},i}| \]

• Compared against

\[ S^*_j = 0.5 \times \sum_{i=1}^{e} |P_{\text{random},i} - P_{\text{expected},i}| \]

- \( j \) is a school, \( e \) is the number of ethnic groups
- \( p_{\text{expected}} \) is the finally observed profile of a school
- \( p_{\text{random}} \) is the ethnicity profile obtained for a school if half of its intake is randomly sampled from its core catchment and the other half sampled from outside
Role of ‘faith schools’?

<table>
<thead>
<tr>
<th>School Type</th>
<th>n</th>
<th>p</th>
<th>N</th>
<th>p</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>10</td>
<td>0.31</td>
<td>234</td>
<td>0.73</td>
<td>43</td>
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<tr>
<td>Voluntary aided</td>
<td>21</td>
<td>0.66</td>
<td>70</td>
<td>0.22</td>
<td>302</td>
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<tr>
<td>Voluntary controlled</td>
<td>1</td>
<td>0.03</td>
<td>15</td>
<td>0.05</td>
<td>67</td>
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<tr>
<td>Other</td>
<td>0</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32</td>
<td></td>
<td>322</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

School type of the most segregated schools in Birmingham
10% of all primary schools in Birmingham exhibit significant post-residential sorting.
Rises to 30% for voluntary-aided faith schools (actually Roman Catholic)
Role of ‘faith schools’?

21% of all primary schools in London exhibit significant post-residential sorting. The figure rises to an average of 44% for all ‘faith schools’ but that ranges from 18% to 78%.

When debating faith schools need to be careful about treating them as a homogenous group.
Summary

- Consistent with previous studies
  - Black Caribbean pupils appear more likely to travel further to school than they need do
    - Because they are more geographically dispersed?
  - Clear evidence of post-residential sorting is found
    - Role of faith schools?
- Evidence of polarization where locally competing schools draw markedly different intakes.
What the study does not Show

• That ethnic separation is a ‘bad thing’
• That polarization would disappear without a system of school choice.
• That recent school reforms have either worsened or improved ethnic separation.
• That ethnic groups actively avoid each other.
• That it is actually ethnicity that drives the processes of separation.
What next?

- Incorporate other measure of social polarization / segregation not based on ethnicity alone.
- To develop longitudinal understanding of whether the core catchment areas are temporally stationary or whether they are dynamically changing, and if so where and why.
- To work with the Centre for Multilevel Modelling at Bristol to assess the evidence for school competition affecting pupils' learning progress.
Thank you!