Simulating Alternative School Choice Options in Boston - Graph Appendix

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MIT School Effectiveness and Inequality Initiative†

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1 How to Read the Graphs

1.1 Box Plot

Box plots present a way to compare distributions. The middle red line shows the median. The edges of the box show the 25% and 75% percentiles. The edges of the extending lines show the range (minimum and max). All of our statistics are on a student level. (So the median is for the median student; the minimum is the minimum student; maximum is maximum student; etc.) When the median is equal to the 25% and 75% percentile, we automatically show

1.2 Geocode Map

The Geocode Map is a way of mapping out a distribution across the city. Our simulation stores geographic data using geocodes. (Boston is subdivided into 868 geocodes.) Each circle in the map corresponds to a geocode, and the center of the circle is at the centroid of the geocode. The area of each circle is proportional to the number of students represented at that geocode. The color corresponds to the average value for the students at the geocode. (The underlying data is at a student level, but the colors show a geocode average. A high student and a low student at the same geocode may balance out.) The boxplot on the right shows the student level distribution. The red line is the median. The edge of the boxes are the 25 and 75 percentile. Sometimes we decide to truncate the range so that the colors are more differentiated. (The colors are using the same scale as the box plot). Hence there may be students whose values are outside the range shown on the right.

2 Analysis of Original BPS Plans

Using the simulation methodology, we also ran the original BPS plans (but using the new processing order). The results are shown in following boxplots. The metrics we use were defined in our main report. For precise definition of what they represent, please consult our main report (Pathak and Shi 2013). The results focus on new K2 families. (The status quo uses the old processing order, the others use the new processing order. For explanation, see main report.)
Figure 1: Effective Access to Quality in Original BPS Plans. For equity, the most important to look at is the minimum: the higher access the minimum student has, the more equitable is access to quality. Also, the narrower the box or the narrower the range, the more equitable. Note that this is only counting schools that make it to families’ top 10 choice toward their access to quality.

Table 1: Equity of Access to Quality in Original BPS Plans. Effective access to MCAS quality for the student with the lowest access. For example, the above shows that in the simulated status quo, the worst-off K2 student has 19.5% chance to a school whose MCAS is top 50% and which the student would have ranked top 10.
Figure 2: Access to Top Dream Choice. This measures element of choice by Access to Top \( k \) dream choice. For example, for Top 3 dream choice, this is saying if families could rank any school in BPS, what would they rank and how much access do they get in each plan to one of these choices. (So access may be low if family is denied the choice in menu or has low chances of getting in even if the option is in menu.)

Figure 3: Access to Top Menu Choice in Original BPS Plans. The graph on left measures K2 new families’ chances of getting into top 3 choice. The graph on right measures their expected choice number obtained (which choice they get).
Figure 4: Effective Access to Capacity in Original BPS Plans. This is essentially families’ chance of getting into one of their top 10 choices. (We assume every family choose 10 choices. See our main report for details). If the minimum is too low, then there is a supply/demand challenge in some part of the city.

Figure 5: Expected Walk-Distance to Assignment in Original BPS Plans. This is students’ walking distance to school (in miles) averaged across 25 simulations.
Figure 6: Community in Original BPS Plans. The left show how many others who live within 0.5 miles from me (walking distance) will go to the same school and same grade as me. (The higher the better community.) The right show my access to some school in walk-zone. (The higher the more access to local community for those who want it.)

Figure 7: Socioeconomic Diversity in Original BPS Plans. These graphs show the % of Assigned Class Free lunch or Non-Free/Reduced Lunch. (Essentially what % of my classmates will be of this lunch status.) (We are missing lunch information for 30% of students in our sample, so these figures are % of Assigned class identified to be of this lunch status.) The narrower the boxes and the narrower the ranges, the better socioeconomic diversity.
Figure 8: Racial Diversity in Original BPS Plans. These graphs show the % of Assigned Class of certain race. (We are missing race information for 10% of students in our sample.) The narrower the boxes and the narrower the ranges, the better the racial diversity.
3 Comparison of New Plans for K1

These results focus on new families (non-continuing students who do not have sibling in the system). We focus on them because this is the primary population that the assignment reform will affect. (The underlying analysis, however, fully accounts for continuing students and siblings.) For precise definition of the plans we analyzed, the data we used, and our metrics, see the main report (Pathak and Shi 2013).

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<td>Top 50%</td>
<td>24.8%</td>
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<td>14.7%</td>
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</table>

Table 2: Equity of Access to Quality in New Plans for K1: Effective access to MCAS quality for the student with the lowest access. For example, the above shows that in the simulated status quo, the worst-off K1 student has 24.8% chance to a school whose MCAS is top 50% and which the student would have ranked top 10.
Figure 9: Effective Access to Quality in New Plans for K1. For equity, the most important to look at is the minimum: the higher access the minimum student has, the more equitable is access to quality. Also, the narrower the box or the narrower the range, the more equitable. Note that this is only counting schools that make it to families’ top 10 choice toward their access to quality.
Figure 10: Access to Top Dream Choice in New Plans for K1. This measures element of choice by Access to Top k dream choice. For example, for Top 3 dream choice, this is saying if families could rank any school in BPS, what would they rank and how much access do they get in each plan to one of these choices. (So access may be low if family is denied the choice in menu or has low chances of getting in even if the option is in menu.)

Figure 11: Access to Top Menu Choice. The graph on left measures K2 new families’ chances of getting into top 3 choice. The graph on right measures their expected choice number obtained (which choice they get).
Figure 12: Effective Access to Capacity in New Plans for K1. This is essentially families’ chance of getting into one of their top 10 choices. (We assume every family choose 10 choices. See our main report for details). If the minimum is too low, then there is a supply/demand challenge in some part of the city.

Figure 13: Expected Walk-Distance to Assignment in New Plans for K1. This is students’ walking distance to school (in miles) averaged across 25 simulations.
Figure 14: Community in New Plans for K1. The left show how many others who live within 0.5 miles from me (walking distance) will go to the same school and same grade as me. (The higher the better community.) The right show my access to some school in walk-zone. (The higher the more access to local community for those who want it.)

Figure 15: Socioeconomic Diversity in New Plans for K1. These graphs show the % of Assigned Class Free lunch or Non-Free/Reduced Lunch. (Essentially what % of my classmates will be of this lunch status.) (We are missing lunch information for about 30% of students in our sample, so these figures are % of Assigned class identified to be of this lunch status.) The narrower the boxes and the narrower the ranges, the better socioeconomic diversity.
Figure 16: Racial Diversity in New Plans for K1. These graphs show the % of Assigned Class of certain race. (We are missing race information for 10% of students in our sample.) The narrower the boxes and the narrower the ranges, the better the racial diversity.
4 Comparison of New Plan for K2

These results focus on new families (non-continuing students who do not have sibling in the system). We focus on them because this is the primary population that the assignment reform will affect. (The underlying analysis, however, fully accounts for continuing students and siblings.) For precise definition of the plans we analyzed, the data we used, and our metrics, see the main report. (Pathak and Shi 2013)

<table>
<thead>
<tr>
<th>MCAS</th>
<th>Status Quo</th>
<th>10-Zone</th>
<th>Closest Types 1</th>
<th>Closest Types 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 25%</td>
<td>5.2%</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Top 50%</td>
<td>19.5%</td>
<td>22.6%</td>
<td>22.4%</td>
<td>25.5%</td>
</tr>
<tr>
<td>Top 75%</td>
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<td>22.6%</td>
<td>30.5%</td>
<td>30.4%</td>
</tr>
<tr>
<td>Top 1/3</td>
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<td>0.7%</td>
<td>12.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Top 2/3</td>
<td>31.4%</td>
<td>22.6%</td>
<td>30.5%</td>
<td>30.4%</td>
</tr>
</tbody>
</table>

Table 3: Equity of Access to Quality in New Plans for K2. Effective access to MCAS quality for the student with the lowest access. For example, the above shows that in the simulated status quo, the worst-off K2 student has 19.5% chance to a school whose MCAS is top 50% and which the student would have ranked top 10.
Figure 17: Effective Access to Quality in New Plans for K2. For equity, the most important to look at is the minimum: the higher access the minimum student has, the more equitable is access to quality. Also, the narrower the box or the narrower the range, the more equitable. Note that this is only counting schools that make it to families’ top 10 choice toward their access to quality.
Figure 18: Access to Top Dream Choice in New Plans for K2. This measures element of choice by Access to Top $k$ dream choice. For example, for Top 3 dream choice, this is saying if families could rank any school in BPS, what would they rank and how much access do they get in each plan to one of these choices. (So access may be low if family is denied the choice in menu or has low chances of getting in even if the option is in menu.)

Figure 19: Access to Top Menu Choice. The graph on left measures K2 new families’ chances of getting into top 3 choice. The graph on right measures their expected choice number obtained (which choice they get).
Figure 20: Effective Access to Capacity in New Plans for K2. This is essentially families’ chance of getting into one of their top 10 choices. (We assume every family choose 10 choices. See our main report for details). If the minimum is too low, then there is a supply/demand challenge in some part of the city.

Figure 21: Expected Walk-Distance to Assignment in New Plans for K2. This is students’ walking distance to school (in miles) averaged across 25 simulations.
Figure 22: Community in New Plans for K2. The left show how many others who live within 0.5 miles from me (walking distance) will go to the same school and same grade as me. (The higher the better community.) The right show my access to some school in walk-zone. (The higher the more access to local community for those who want it.)

Figure 23: Socioeconomic Diversity in New Plans for K2. These graphs show the % of Assigned Class Free lunch or Non-Free/Reduced Lunch. (Essentially what % of my classmates will be of this lunch status.) (We are missing lunch information for about 30% of students in our sample, so these figures are % of Assigned class identified to be of this lunch status.) The narrower the boxes and the narrower the ranges, the better socioeconomic diversity.
Figure 24: Racial Diversity in New Plans for K2. These graphs show the % of Assigned Class of certain race. (We are missing race information for 10% of students in our sample.) The narrower the boxes and the narrower the ranges, the better the racial diversity.
5 Plan by Plan Details

Because of the large number of possible graphs, we only present the Status Quo (using old processing order), and the new plans (using new processing order). All of the analysis focuses on new families (non-continuing students and non-siblings), because this is the population most affected by the assignment plan reform, and because separating them out helps us diminish the unclear effects of grandfathering. However, the underlying simulation fully takes into account siblings and continuing students, so effect of such students taking up capacity is fully analyzed.

5.1 Status Quo

5.1.1 K1
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Figure 27: Map of Effective Access to Top 1/2 MCAS for Status Quo K1
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Figure 32: Community in Status Quo for K1. This maps out the expected same grade neighbor co-assignment count: the # of other K1 students who live within 0.5 miles from me by walking distance who will be assigned to the same school as me. The number is an average across 25 simulations.
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Figure 46: Community in Status Quo for K2. This maps out the expected same grade neighbor co-assignment count: the # of other K2 students who live within 0.5 miles from me by walking distance who will be assigned to the same school as me. The number is an average across 25 simulations.
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5.2.1 K1

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5.4.1 K1

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(b) By Lunch Status

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Figure 133: % of Assigned Class Black in Closest Types 2 for K2
Figure 134: % of Assigned Class White in Closest Types 2 for K2
Figure 135: % of Assigned Class Asian in Closest Types 2 for K2
Figure 136: % of Assigned Class Hispanic in Closest Types 2 for K2
References