School Choice: The Case for the Boston Mechanism

Antonio Miralles

Boston University, Dept. Economics, 270 Bay State Road, Boston MA02215 USA
Miralles@bu.edu

Since Abdulkadiroğlu and Sönmez's [3] work, a concern on the mechanisms used to assign children to publicly funded schools endures. Among other school districts, Boston has concentrated a lot of attention. The formerly called Boston Mechanism (BM) that was applied since 2000 has been widely criticized. Finally in 2005, the Boston Public School authority decided to replace this mechanism with the so-called Deferred Acceptance (DA) algorithm. The present paper argues that replacing BM might not be recommendable in every case, hence providing rationale to its persistence in other municipalities such as Cambridge, MA, Denver and Minneapolis.

Both in BM and in DA, parents are requested to submit a ranking with their ordinal preferences over schools. Both mechanisms follow then a multi-round assignment algorithm. In round 1, each student is considered for the school her parents put in first position in the ranking. The mechanism tries to assign this student to that school. There would be schools for which too many students are considered, and some would need to be rejected. In doing so, schools use some priority criteria (e.g. sibling already attending the school, geographical proximity, etc.) previously fixed by the school authority. Remaining ties are broken via fair lotteries. Rejected students go to the next round, and they are considered for the schools parents have ranked next in their lists. The process is repeated until a round is reached in which no student is rejected.

The difference between the two mechanisms concerns accepted students. In BM, an accepted student obtains a slot for sure at the school. Student and slot are not considered in further rounds. In DA, all students have to be reconsidered in further rounds as long as not everyone is accepted. Acceptances are meanwhile tentative. An accepted student would just be reconsidered for the same school in the next round.

This difference is paramount. DA is strategy-proof. It is weakly optimal for any parent to submit truthful reports no matter what other parents do. In BM, available slots diminish after each round. Thus it may be convenient to rank a less demanded school higher than what true ordinal preferences would induce. The fact that parents have to strategize leads to two main problems. One is lack of coordination (Ergin and Sönmez [5]). The other is that sophisticated parents may take advantage of non-strategic (naïve) parents (Pathak and Sönmez [7]), who may be harshly punished.

There is a new turn in this debate, which I subscribe. Erdil and Ergin [4] and Abdulkadiroğlu, Che and Yasuda [1] observe that DA leads to efficiency losses when priorities are weak (i.e. there are fairly less priority categories than students). This is usually the case in school choice. Lotteries are needed to break multiple ties. Therefore, parents face uncertainty when taking their decisions. Cardinal utilities, or preference intensities over schools, determine best responses. And DA, precisely due to its strategy-proofness, ignores any information on these intensities. In BM, parents with

S. Das et al. (Eds.): Amma 2009, LNICST 14, pp. 58–60, 2009.

identical ordinal preferences may submit different reports according to their intensities. BM distinguishes among them, allowing more information to be used.

To derive theoretical results, I analyze a simplified scenario with a continuum of perfectly informed rational (sophisticated) students, finitely many schools, and no priorities (i.e. all students belong to the same category). I obtain that DA performs very poorly if all the students share the same ordinal preferences over schools. Any other anonymous mechanism would weakly ex ante Pareto-dominate DA. I also obtain that BM achieves some ex ante efficiency properties that DA does not. I show that BM resembles (and sometimes coincides with) the Pseudomarket mechanism conceived by Hylland and Zeckhauser [6]. These results are robust to the inclusion of sibling priorities (for few students and highly correlated to ordinal preferences).

Nevertheless, BM punishes non-strategic parents. I suggest a partial solution for that problem. Abdulkadiroğlu, Pathak, Roth and Sönmez [2] observe that more than 35% parents in Boston in 2001 ranked an overdemanded school (one that has no slots available after the first round) in second position. Assuming that parents have reliable information on school demands, this way to proceed is naïve. If the student is rejected in the first round, she is definitely rejected in the second. This waste of one round may lead the student to a very bad assignment. I argue that this problem can be solved by erasing overdemanded schools from parents' lists at the end of each round, hence providing naïve parents with a partial protection device. This improvement is additionally innocuous if all parents are sophisticated.

I simulate a variety of scenarios: 4, 5 and 6 schools; 20, 30 and 40 slots per school; no priorities and walking-zone priority; correlation and no correlation of cardinal utilities with priority status; different levels of correlation of valuations across parents; no naïve students and half of them naïve; unprotected and partially protected naïve students. BM outperforms DA in utilitarian expected welfare in all cases. Welfare gains increase with the correlation of valuations among parents, and decreases with the valuation-priority correlation. Naïve students are harshly punished if they are not protected and there is high correlation among parents' valuations. However, the partial protective device is effective, and it does not always diminish utilitarian welfare gains.

DA shall not replace BM in all cases. BM has market-oriented efficiency properties which are important in real-case scenarios with coarse priorities. Instead, I propose BM to be partially modified so as to diminish the pervasive effects it may have over non-strategic parents. Improving BM the way I suggest has negligible implementation costs, as compared to the replacement policy once applied in Boston.

References

1. Abdulkadiroğlu, A., Che, Y., Yasuda, Y.: Expanding "Choice" in School Choice. Mimeo (2008)
2. Abdulkadiroğlu, A., Pathak, P.A., Roth, A.E., Sönmez, T.: Changing the Boston School Choice Mechanism: Strategy-proofness as Equal Access. Mimeo (2006)
3. Abdulkadiroğlu, A., Sönmez, T.: School Choice, a Mechanism Design Approach. American Economic Review 93, 729–747 (2003)
4. Erdil, A., Ergin, H.: What's the Matter with Tie-Breaking? Improving Efficiency in School Choice. American Economic Review 98, 669–689 (2008)

5. Ergin, H., Sönmez, T.: Games of School Choice under the Boston Mechanism. Journal of Public Economics 90, 215–237 (2006)
6. Hylland, A., Zeckhauser, R.: The Efficient Allocation of Individuals to Positions. Journal of Political Economy 87, 293–314 (1979)
7. Pathak, P., Sönmez, T.: Leveling the Playing Field: Sincere and Sophisticated Players in the Boston Mechanism. American Economic Review 98, 1636–1652 (2008)