Economics of Education Review 55 (2016) 149–167

Contents lists available at ScienceDirect

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev

Do educational vouchers reduce inequality and inefficiency in education?

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ARTICLE INFO

Article history:
Received 3 September 2015
Revised 11 October 2016
Accepted 14 October 2016
Available online 26 October 2016

JEL classification:
I24
I22
H52
C63

Keywords:
School choice
Educational vouchers
Agent-based modeling
Inequality

ABSTRACT

Policy debates around the topic of educational vouchers as an approach to improve the public educational system are still ongoing and a consensus on the potential benefits or drawbacks has not been reached yet. This paper models the distributional processes entailed by two alternative educational voucher systems, universal and *target vouchers*, by using an agent-based model of a highly heterogeneous school district. Using this approach allows to track which students actually switch schools and thereby evaluate peer effects. At the same it is possible to model an endogenous reaction of public schools in order to assess their reaction to increased competition. The results indicate an ambiguous effect of *universal vouchers* on low-income students. The introduction has a negative peer effect on students in low-performing schools due to "*cream skimming*", i.e. highly motivated students leaving the schools. In contrast, students who switch to better schools observe a positive effect. The negative effects are partly alleviated by low- performing schools improving their educational services as a response to a decline in enrollment. When examining *target vouchers* which are a function of student ability, the paper shows that they allow the school district to benefit from the increased competition while avoiding the deterioration of the peer group.

1. Introduction

The topic of poor public school performance is still the subject of major policy debates and is ever more interesting in light of the great achievement gaps between low-income or minority students and their respective counterparts as suggested for instance by the PISA assessment for the United States. The survey finds that "[s]ocio-economic disadvantage has a notable impact on student performance in the United States" (OECD-Report, 2012b). In particular school systems that are highly stratified tend to perform worse in terms of student average test scores (OECD-Report, 2012a). This is also reflected by the extensive reports by the National Center for Educational Statistics (Hemphill & Vanneman, 2011; Vanneman, Hamilton, Anderson, & Rahman, 2009). One proposed strategy for improving public school performance that has received increasing academic and public attention is to introduce competition through the provision of private school vouchers to students, which would grant them financial aid if they chose to attend a private school. The vouchers would provide a large student body with the opportunity to attend any school of their choice rather than having to attend the public neighborhood school, and thereby create competitive pressure for all public schools in the respective school district. The idea is based on the paradigm that, analogous to other markets, schools having to compete for

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http://dx.doi.org/10.1016/j.econedurev.2016.10.001
0272-7757/

students will enhance efficiency and improve the quality of their "product", i.e. educational experience for the students attending.[1]

Several aspects particularly relevant to the introduction of a voucher system warrant special attention. Will the program actually benefit students from low-income families or minorities who are attending low-performing schools with lower ability peer groups, i.e. will the prevalent stratification and inequality in education be reduced? Will the public schools actually improve and increase their efficiency or rather be gradually exposed to "*cream skimming*", i.e. a deteriorating peer group? This is of high relevance as it affects the peer groups of both school systems. There is a rich empirical literature that presents strong evidence for the role of peer effects in primary and secondary education (for an extensive review see Epple & Romano, 2011, and Sacerdote, 2011). Coleman et al. (1966) for instance use survey data and confirm the crucial role of peer effects and find that they are even more important for disadvantaged students. Summers and Wolfe (1977) also find that the peer group effects play a significant role in educational outcomes (for results in a similar vein see Calvó-Armengol, Patacchini, & Zenou, 2009; McEwan, 2003; Gaviria & Raphael, 2001, and Zimmerman, 2003. It would thus be of interest to provide a comprehensive approach that would allow us to engage in the complexities of the topic along multiple lines, i.e. efficiency concerns and distribution of students. The empirical literature on educational vouchers typically only focuses on certain aspects of the voucher program. Thus, as Nechyba (2000) puts it: "...[empirical] work may not anticipate all the impacts from a large-scale policy...At the same time, theoretical models or school finance are also limited in that they often either focus on only one particular aspect of the general equilibrium school finance problem, or are they too rich and complex to yield crisp predictions. It is for this reason that there is great potential for simulation approaches...".[2]

In this paper, I implement an agent-based simulation model of a representative US school district which draws on the seminal contributions of Manski (1992) and Epple and Romano (1998, 2008). I use the model to analyze the effect of a voucher program on inequality and inefficiency in the educational system.[3] The contribution of this paper is a twofold approach that allows for an endogenized reaction of public schools to increased competition on the one hand and to track the distribution of students to schools in order to evaluate peer group effects on the other hand. In particular, I extend the above-mentioned models to account for the heterogeneity of the student body, as the agent-based approach allows a much more detailed modeling of the individual behavior of the students.[4] Specifically, students have varying characteristics in multiple dimensions that are orthogonal to each other. Thus, I obtain distributions of students to schools that are only based on the inherent characteristics of students and their resulting school choices. The model then simulates how various student groups are affected not only by the introduction of the voucher program but also by the choices of their peers (and possible feedback effects). Using this approach, I then compare the effects of *universal vouchers* and *target vouchers* (which are a function of student characteristics), and compare outcomes for different distributions of income and ability.

The main findings indicate that the outcomes of a voucher program hinge on its design. First, I find that as more students are able to afford to switch from public to private school (and thereby exert competitive pressure on public schools as students do not default into public school), this causes an increase in public school performance. This effect can be created either by a change in distribution of family incomes (i.e. increasing the number of families in the middle class relative to the low-income class) or through the distribution of vouchers in order to increase the available funds to families. This outcome is confirmed by the empirical studies listed in the literature review, which find that public schools indeed react to higher competition.

Second, when looking at the effect of changes in the *universal voucher* case, the findings are similar to the results observed in Manski (1992) and Epple and Romano (1998, 2008). While the students who were previously not able to afford private school tuition and choose to switch to private school profit from a voucher system, the effect on students remaining in public schools is less clear. Given that the majority of students who are switching from public to private schools have mostly higher ability levels, the students remaining in public schools observe a decline in peer group quality ("cream skimming"). Contrary to these papers, the endogenized reaction of public schools allows them to react to a sudden decline in student enrollment by adjusting educational quality accordingly. Thus, the low-performing schools actually increase their educational service to retain students, that is, the "*cream skimming*" effect is partly alleviated through their reaction.

Finally, when the model is extended to allow for so called *target vouchers* as in Epple and Romano (2008), which are a function of the ability level or the family income of the respective students, the observed deterioration effect is avoided in the case of *ability vouchers*. Public schools observe less of a decline in their mean ability while maintaining the increase in public school expenditure. Thus, *ability vouchers* allow the school district to benefit from the higher competition while circumventing the detrimental peer group effects. The concern to what extent this policy alternative would actually be feasible is discussed in that Section.

[1] The idea dates far back; Thomas Paine for instance proposed a voucher plan in 1792, in *The Rights of Man*. For a discussion see West (1967). The more recent awakening of interest is typically credited to Friedman (1955, 1962, 1997).

[2] Two recent papers that allow for richer complexities and that take into account the general equilibrium effects are Epple, Romano, Sarpça, and Sieg (2013) and Fu (2014).

[3] See Spiro Maroulis, Eytan Bakshy and Wilensky (2014) for an approach to modeling the transition period for public choice in an agent-based model.

[4] Lavecchia, Liu, and Oreopoulos (2014) provide a survey of recent applications of behavioral economics to the economics of education and provide a framework for modeling the decision making processes of parents and students while taking into account their limited rationality.