WORKING
PAPER

The Use of Lottery Systems in School Admissions

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Preface

The Sutton Trust has commissioned RAND Europe to undertake a brief review of the use of lottery/ballot systems in admissions to schools. Evidence in the United Kingdom suggests that schools are [becoming] socially selective. Trends in school admissions on the basis of catchment areas might exacerbate social inequality in the United Kingdom. The new draft School Admissions Code coming into force in September 2008 allows schools to allocate places through the use of a lottery system. The underlying reason is that lotteries are seen as a fair and transparent way to distribute school places and promote equal access to educational opportunities. This raises questions on how and why lotteries have been used, how lottery schemes have been designed, and what the outcomes associated with lottery schemes have been.

This brief review, drawing mainly on international examples, presents preliminary findings on the use of lottery schemes in several countries. The RAND Europe study team undertook a detailed literature review to arrive at these preliminary findings. The report consists of: a summary, which outlines the main themes and findings; an introductory chapter; a chapter on the selected examples of school lottery systems that we identified; and a chapter outlining some of the implications for the UK.

This report will be of particular interest to policy makers, as well as a wider audience concerned with education policy and social inequality.

RAND Europe is an independent not-for-profit policy research organisation that aims to serve the public interest by improving policymaking and informing public debate. Its clients are European governments, institutions, and firms with a need for rigorous, impartial, multidisciplinary analysis. This report has been peer-reviewed in accordance with RAND's quality assurance standards.

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Summary

The Sutton Trust asked RAND Europe to carry out a short study of the use of lottery/ballot systems in admissions to schools, drawing on international evidence from both school and university sectors. The context of this research is the draft School Admissions Code, which will come into force in September 2008 in the United Kingdom. This admissions code allows schools to use lotteries to distribute places. Random allocation has received some attention as one method to promote a more even allocation of educational opportunities. The use of lottery schemes raises questions on how and why lotteries have been used, how lottery schemes have been designed, and what the outcomes associated with lottery schemes have been.

The Trust sought answers to several questions:

- Where have lottery/ballot systems been used for admissions to schools and universities?
- How do the random allocation schemes work?
- What have been the outcomes in terms of social mix of students and education attainment of students/pupils that have been selected in this way?
- What has been the response of parents and others to the approaches?
- How would any approach apply to schools in the UK?

Although the scope of this study did not permit answering these questions in full, the questions guided our investigation into lottery systems.

The study found that evaluations of existing lottery schemes offer little evidence linking lottery schemes to socially equitable outcomes. Rather, such evaluations mostly report on the impact of lottery schemes on student achievement. There are three main reasons for the lack of evidence on the relationship between lotteries and equity. Firstly, many lottery schemes do not have equity as an intended purpose. As a consequence, the impact on equity is not reported on. Secondly, very little research (none that we identified) has focused explicitly on this relationship. Thirdly, the design of studies that measure the impact of lottery schemes is complex and has important limitations.

The evidence gaps in evaluations of existing lottery schemes mean that this study cannot answer what the impact of the introduction of lottery schemes on equitable outcomes is likely to be and what types of lottery schemes might make school admission more socially equitable in the UK context. Further research is required to understand how lottery schemes operate in different contexts and what the associated impacts are.

One promising area of research in this area involves understanding how and why parents/pupils participate in lottery schemes. There is a developing body of work around parental choice. We know that how and why parents/pupils make choices affects outcomes in terms of participation, achievement, and potentially equity.[1] We also know that these choices are different depending on the specific context and the subgroups that one studies. Understanding choice therefore should be an integral element of any research agenda on the use of lottery schemes in the UK. Such research would inform the design, use and targeting of lottery schemes.

Table 1 gives an overview of the key observations and emergent recommendations.

[1] Parental satisfaction with the use of lottery approaches is one aspect of the choice dynamic.

Table 1: Key observations and emergent recommendations

Key observations	Emergent policy recommendation for the UK
Several countries use lottery schemes to ease oversubscription for different purposes	**The design of the lottery systems should relate to specific purposes/admission problems**
Summary The research shows that several countries have used lottery schemes. In all cases, lottery schemes have aimed to ease oversubscription in school and universities. In the Netherlands, the management of oversubscription in higher education is the sole aim of the lottery scheme. In the United States and New Zealand, lottery schemes were part of wider school choice, charter school, or voucher programmes. In Sweden and New Zealand the use lottery systems was part of reform aimed at increasing competition between schools and raising the standard of overall schooling. In some cases, lottery schemes had specific purposes aside from the management of oversubscription. In Chicago, the introduction of lottery schemes is related to specific desegregation court orders. In Milwaukee, the use of lotteries aimed to give better educational opportunities to pupils from low-income families. Although it seems obvious that the design of the lottery system should follow from a clear understanding of the rationale for instituting a lottery scheme in the first place, the examples that we have uncovered suggest that this is not necessarily the case.	
The majority of studies look only at student achievement rather than the impact of lottery schemes on access to educational opportunities	**There is a need to measure outcomes associated with intended purposes**
Summary We did not identify evaluations that systematically assessed the impact of lottery schemes on issues such as social selectivity and access to educational opportunities. Rather, studies have focused on student achievement. These studies have shown a differential impact of lottery schemes on student achievement. The results of evaluations are inconclusive. Some studies highlight a positive impact on student achievement, while others see the impact as insignificant. Overall, the impact seems to be highest for particular subgroups (such as female or white students) who have entered specific programmes at specific schools. Given the wider aims of some lottery schemes, there is a need to measure outcomes associated with their intended purposes.	
Studies have shown to an extent how and why parents choose to participate	**Policy makers should understand how and why parents choose**
Summary Though few studies have highlighted parents' responses to lottery schemes, some studies in the US have linked the outcomes of lotteries to the choices of parents/pupils. Given that these choices are heterogeneous, lottery schemes seem to have a differential impact. Specific outcomes are linked to specific preferences. This means that the link between preferences and effects is an important factor to consider when designing a lottery scheme.	
There are lessons for the United Kingdom from the evaluations of lottery schemes in other countries	**Research into the impact of lottery schemes is complex, but needed**
Summary We identified a number of methodological issues in the evaluations of lottery schemes in our international examples that indicate the difficulties in performing evaluations. Overall, research into the effects of lottery schemes is complex and faces a number of pitfalls. This complexity limits to an extent the ability of researchers to measure outcomes. However, the growing importance of lottery schemes also means that evaluations are required to understand the full impact of lottery schemes. The challenge to evaluators is to control for the methodological pitfalls (see Section 2.3) in research design. One promising area of research involves the study of how and why parents/pupils choose.	

CHAPTER 1 Introduction

The Sutton Trust's interest in the use of lottery schemes in school admissions stems from research in the UK, which indicates that state schools are socially selective.[2] The best performing schools are often located in more affluent areas, thus the schools' catchment areas may exclude families with modest means.[3] High-performing schools sited in poorer areas tend to admit few children on free school meals. These trends in school admissions, defined by catchment areas, may exacerbate existing social inequalities.

The School Admissions Code regulates admissions in the state schools system, including Academies, Trust Schools, and boarding schools. In September 2006, the Department for Education and Skills launched a consultation on the new School Admissions Code. This new Admissions Code will come into force September 2008. The Codes and regulations are being revised to set admission standards that promote fair admissions and equal access. Schools must now comply with the Code's mandatory provisions.

Under the draft Code, schools will have the freedom to determine their own admissions policies, but will no longer be able to use interviews as part of admissions arrangements or take into account parents' financial status, occupation, education or social background, ability to support the school, or former family connections with a school. Schools and local authorities will be able to continue to use all other admission arrangements and oversubscription criteria, including those which give priority to children who live nearest to a school; or within a particular catchment area; to those with siblings attending the same school; and banding arrangements designed to ensure that a school's intake represents the full range of ability of the applicants.[4] The code will prohibit oversubscription criteria that seek to select by stealth (such as the use of supplementary application forms).[5]

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[2] See for instance West, A. and Hind, A., "Secondary School Admissions in England: Exploring the Extent of Overt and Covert Selection", Centre for Educational Research Department of Social Policy, London School of Economics and Political Science, March 2003 and on the link between social mobility and educational opportunity, see Blanden, J., Gregg, P., and Machin, S. (2005), "Intergenerational Mobility in Europe and North America", Report by LSE Centre for Economic Performance for the Sutton Trust.

[3] A study by the Social Market Foundation, for example, cites several research studies on the 'house price premium' which show a relationship between school performance and property values. The report objects to school admission based largely on geography because making children's rights to a good education dependent on where they live is arbitrary.

[4] Fair Admissions, Equal Access. 08 September 2006. Press release available at: www.dfes.gov.uk/pns.

[5] *A Short Guide to the Education and Inspections Bill 2006.* Available at www.dfes.gov.uk/publications/educationandinspectionsbill/docs.

The benefits of banding to increase equity/decrease social selectivity have been noted above. With the introduction of banding, the admission arrangements of a school may be less reliant on, for example, where applicants live, more on the basis of the ability of those who apply. One consequence of banding, whether anticipated or not, can be for children who live further away from a good school to gain admission to the school ahead of some applicants who live closer. Thus, if the school is located in an area where people live in ethnically segregated groups within communities, it may help improve the ethnic mix at such schools.[6]

Under the new code, schools will also be able to allocate places by lottery.[7] These lottery systems have already been used in several schools and the admissions practice has been upheld when challenged.[8]

Random allocation has received some attention as one method for distributing school places more fairly and for promoting a more even allocation of educational opportunities. Government ministers have advocated the adoption of computerised lottery systems.[9] A study by the Social Market Foundation advocates a national ballot for oversubscribed schools, within the context of a broader, national parental choice scheme.[10]

Some schools have adopted lottery systems in cases of oversubscription. At Haberdashers Aske's Hatcham College Academy in Lewisham, for example, one fourth of the places available for 11-year-olds were selected at random from within the school's three-mile catchment area. Wallsall Academy has a "doughnut" system of admissions which has been introduced to try to achieve a mix of pupils from different backgrounds. The school's catchment area is split into an inner and outer ring, and a proportion of places is set aside for children in each zone.

However, whether or not random allocation policies will enhance open and equitable access in UK schools remains an empirical question. Future evaluations of the use of lotteries in the United Kingdom will need to address this question.

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[6] *Higher Standards Better Schools for All* White Paper and Education Bill 2006. Race Equality Impact Assessment. February 2006. Available at: www.dfes.gov.uk/publications/educationandinspectionbill/docs

[7] See for instance "School Places Lottery Aims to End Back-Door selection", Times, January 2007, available at http://www.timesonline.co.uk/article/0,,2-2539393,00.html.

[8] "Lottery of school places backed"BBC News, 29/9/2006. Available at: news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/4293446.stm.

[9] "Parental school choice 'naïve". BBC News, 8/2/2006. Available at: http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/5237548.stm.

[10] *School Admissions: A report of the Social Market Foundation Commission.* London: Social Market Foundation. 2006.

CHAPTER 2

An analysis of the use of lottery systems in other countries

Experience and research in other countries may point to successful practices that have applicability in the UK. This exploratory study gathered information on lottery or random admissions practices in the United States (primary and secondary school levels), Sweden (up to grade 10), New Zealand (secondary school level), and The Netherlands (medical schools in higher education). This survey of lottery schemes is not exhaustive, but offers examples of how lotteries are being used in several countries. Table 3 at the end of this chapter provides an overview.

In order to draw together evidence from several perspectives, We consulted web sites, policy documents, researchers and research studies, and government publications. Where possible, we tried to identify cases which were backed up by further research to identify the effects of lottery-based admissions. The study questions provided the initial starting point for the investigation (see Table 2). However, we expanded the questions to also consider the aim or purpose for adopting a random admissions policy, as both the design of the scheme and the criteria used to judge its impact may be dependent on purpose.

Table 2: Sutton Trust research questions

▪ Where have lottery/ballot systems been used for admissions to schools and universities?
▪ How do the random allocation schemes work?
▪ What have been the outcomes in terms of social mix of students and education attainment of students/pupils that have been selected in this way?
▪ What has been the response of parents and others to the approaches?
▪ How would any approach apply to schools in the UK?

2.1 Where and why have lottery systems been used for admissions to schools and universities?

In the United States, lottery admissions have been used in both primary and secondary schools, primarily in cases of oversubscription. Lottery admissions are often part of wider school choice, charter school, or voucher programmes as a way to manage oversubscription.

In the USA vouchers and charter programmes have been adopted to improve educational outcomes by providing alternative choices to regular schooling. Vouchers are financial grants that parents can typically use at any public or private school. Charter schools are

schools of choice that are funded by public money but are self-governing, operating outside the traditional system of public-school (state-funded) governance under a quasi contract or 'charter', issued by a government agency (e.g. school district or state education authority). Charter schools are less controversial than vouchers, and therefore the more popular choice option.[11] As of January 2006, 40 states and the District of Columbia have passed charter school legislation.[12]

In Sweden, random assignment is used in cases of oversubscription in specific municipal schools up to grade 10. In New Zealand, ballots are part of a wider enrolment scheme to prevent overcrowding and manage enrolment in a fair and transparent way. In The Netherlands, admissions to medical schools in tertiary education are part managed by lottery. The sole focus of the system in The Netherlands is to ease oversubscription.

2.2 How do the schemes work?

Charlotte-Mecklenburg, North Carolina

In response to a court order which abolished race-based bussing to achieve desegregation, the Charlotte-Mecklenburg school district initiated a choice-based lottery system in 2002. Under this system, parents submitted their top three school choices. The district assigns each student to a neighbourhood 'home school', usually the school closest to them, and guarantees admission to this school if students did not receive any of their top three choices. Admission to non-guaranteed schools was determined by lottery. Students choosing non-home schools are first assigned to a priority group (based on previous school attendance, free lunch eligibility, and school choice zone) and then given a random lottery number. Any slots remaining after home school students are accommodated are assigned in order of priority group and random number. If a school is not filled by those listing it as a first choice, the process repeats with those listing the school as a second choice. Oversubscribed schools are usually filled on the first round.

A study by Hastings, Kane and Staiger (2005) found that wealthier, white students (not eligible for the federally funded free-lunch programme) were more likely to list only a single choice -their home school- because the average quality of their home schools is significantly higher. More affluent students are less likely to identify a better choice of school than their home school for both academic quality and proximity. Among all students not eligible for free lunch, non-white students were twice as likely as white students to list three choices (59 percent versus 29 percent). These choice patterns suggest that this scheme may not be suited to overcoming admissions problems associated with the correlation between school quality and catchment areas.

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[11] Gill, B.P., Timpane, T.M., Ross, K.E. and Brewer, D. (2001), *Rhetoric versus Reality: What We Know and What We Need to Know About Vouchers and Charter School,* Santa Monica, CA: RAND.

[12] Betts, J. and Hill, P. (2006), "Key Issues in Studying Charter Schools and Achievement: A Review and Suggestions for National Guidelines", NCSRP White Paper Series, No. 2., Center on Reinventing Public Education, University of Washington.

Chicago Public Schools, Illinois

In the Chicago Public Schools (CPS) system, each student is guaranteed admission to a neighbourhood school, but can also apply to any other CPS school. More than half of all high school students in 2000 and 2001 exercised this option. A student must apply, with no limitations on number of applications. In most cases, a lottery admission is used when schools are oversubscribed (lotteries are not used for some selected programmes). Because of desegregation goals and variation in the number of slots in different grade levels, separate lotteries are conducted for each gender-race-grade combination. Schools housing separate magnet programmes conduct separate lotteries for each programme.

Like Charlotte-Mecklenberg, there are differences in which parents participate in the CPS choice scheme. A study by Berry Cullen, Jacob, and Levitt (2006) found that students entering lotteries are less likely to be black or male, have substantially lower test scores, and are less likely to be poor (as proxied by free lunch eligibility and census tracked poverty rates).

Milwaukee Parental Choice Programme, Wisconsin

In Milwaukee, the choice programme funded by the City aims to give pupils from low-income families the choice of attending private schools.[13] Eligibility is determined on the basis of household income and residency (resident in the City of Milwaukee). Household income cannot exceed 175% of the federal poverty level or 220% of the federal poverty level for siblings of pupils who are already participating in the Milwaukee Parental Choice Programme. [14] The pupil registers by filling out an application form. Choice schools must accept all eligible choice applications during each open application period and cannot select on the basis of race, ethnic background, religion, prior test scores, grades and membership in organisations. If applications exceed the number of places available in the private school, a random lottery decides the selection of 'choice students'.

Evaluations have not systematically focused on who participates in lottery schemes. Rather, evaluations have focused specifically on student outcomes and make comparisons of the student achievement of students accepted by lottery and those denied a place. Some evaluations show an improvement in achievement of students placed in private schools compared to students denied a place.[15] However, other studies show an insignificant impact.[16] It is important to note that in these cases lottery schemes are very much part of the voucher and charter school programmes. Effects have to be seen in this context.

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[13] For particular details on participation and costings, see Wisconsin State Legislature Information Leaflet, www.legis.state.wi.us/lfb/Informationalpapers/29.pdf (accessed January 2007).

[14] For exact tabulation of household costs see State of Wisconsin Department of Public Instruction, http://dpi.wi.gov/sms/doc/mpcfaq06.doc, (accessed January 2007).

[15] Green, Peterson, and Du (1999) and Rouse (1998).

[16] See evaluations run by the State of Wisconsin Department of Public Instruction in the first six years of the programmeme at http://www.disc.wisc.edu/choice/choice_executive.html#four (accessed January 2007) and Witte J. (1993), "The Milwaukee Parental Choice Programme," in *School Choice: Examining the Evidence*, ed. Edith Rasell and Richard Rothstein, Washington, D.C.: Economic Policy Institute, pp. 69-109.

Universal voucher system in Sweden

Sweden introduced a universal voucher scheme in 1992. The reforms meant that municipalities became responsible for schools and their financing. Independent schools became eligible to receive funding from municipalities. Each student can use a municipal voucher to choose a school within the municipality. The cost of the voucher is the average cost of education in a state school. Any school that meets the requirements of the National Agency for Education is entitled to this funding, whether religious, for-profit or charitable. Schools are prohibited from charging top-up fees and are not allowed to select pupils by ability. Students are selected on the basis of the date of application (a preference for early applications) and lottery systems in cases of oversubscription. The schools must adhere to the national curriculum.[17]

Evaluations have not focused on the outcomes of the lottery schemes but on the outcome of the overall education reform. Evidence suggests that competition from independent schools has improved the performance of state schools. Moreover, evaluations (see Raham 2002) indicate that independent schools are more likely to be established in areas of under-performing state schools serving disadvantaged children. The proportion of disabled and socio-economically disadvantaged pupils in independent schools tends to be higher than in state schools.

New Zealand Enrolment Scheme

In New Zealand, ballots are used as part of the overall enrolment scheme. School boards are responsible for the management of overcrowding in schools.[18] To this end, school boards draw up 'home zones' (school districts) with the capacity of local schools in mind. The maximum capacity is determined in consultation with managers from the Ministry of Education. Enrolment schemes are activated in case the capacity of the schools does not meet the 'in-zone' demands for places or in case the capacity cannot meet demands from out-of-zone pupils. As school boards are required by law to find the capacity to meet the demand of in-zone students, enrolment schemes mainly address the management of out-of-zone students. Each school board can draw up an enrolment scheme in consultation with the Ministry of Education for specific schools. However, there is a nationally mandated order of priority for specific pupil groups and most enrolment schemes are similar.[19] The priority groups are:

1. students accepted for enrolment in a special programme run by the school (e.g. programmes aimed at the intake of ethic minorities or pupils with special needs);
2. siblings of current students;
3. siblings of former students;

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[17] Raham, H. (2002) *Decentralization and Choice in the Swedish School System: Policy Lessons for Canada.* SAEE.

[18] For information on the New Zealand system, see Ministry of Education information on schemes at http://www.minedu.govt.nz/index.cfm?layout=document&documentid=8146&data=l#P0_0, (accessed January 2007).

[19] For a 'pro forma' enrolment scheme, see http://www.minedu.govt.nz/index.cfm?layout=document&documentid=8146&data=l#P559_62700, (accessed January 2007).

4. children of board employees;
5. all other students.

If there are more applicants than places in groups 2-5, ballots are used to assign places per priority group. Schools can determine the number of places per priority group. Pupils in group 1 are treated as in-zone students. The new system has meant that school choice is constrained by 'home zone' boundaries and represents a more limited ambition of the government towards school choice and instituting educational markets. This research has not identified any specific evaluations of the lottery system used in New Zealand. Previous studies in New Zealand on equity issues show that where parents/pupils can make a choice subscription at better performing schools tends to rise. Before 2000, this meant that many underperforming schools (many schools with high proportion of ethnic minority students) had strongly declining enrolments.[20]

Medical school admissions lottery in Dutch higher education

A lottery system is an integral part of the allocation of places in Dutch medical schools. The main reason for using the lottery system was the oversubscription of medical schools. Places at medical schools are closely managed by the Dutch Government in relationship to the number of job openings available in the medical field. Up until 2000, medical school admissions in The Netherlands occurred solely on the basis of a grade point average weighted lottery. This system meant that places in medical school were allocated through lottery with chances improving for candidates with higher grade point average (GPA) scores. The minimum requirement to enter the lottery is the secondary school degree of the applicant (VWO). In this way, the average chance of getting a place was about 35% compared to 70% for candidates with the highest GPAs. There are no limitations on how many times a student can enter the lottery. From 2000 after a public outcry over the plight of a 'bright' student who failed to gain admittance to medical school three years in a row, universities can select up to 50% of their intake.[21] Five out of nine medical schools used this opportunity to select on the basis of personal statement, extensive tests, and interviews. The selection criteria varied between universities. The first selection was on average about 10% of the total intake. The main underlying reason for using selection was to improve the quality of student (i.e. select students who would achieve better). Two universities also specifically used the selection procedure to allocate places to graduates, ethnic minorities, and mature students. These groups are significantly underrepresented (compared to their % of the total population) in Dutch medical schools. The lottery system did not address and is not concerned with the problem of underrepresented student groups.

In recent evaluations at four of the universities using selection, three universities found that selected students did not achieve better outcomes (academic achievement) than students allocated places through the lottery systems. They have decided to stop selection on the

[20] See Fiske, E (2000), "Rationing Compassion", *The American Prospect*. Vol. 11 (13) May 22, 2000 http://www.propsect.org/archives/v11-13/fiske-e.html.

[21] See De Gruijter, N.M. (2006), "Selectie van Studenten en Bindend Studieadvies", ICLON University of Leiden.

basis of costs associated with the selection procedure. One university did find better achievement in selected students and will continue with selection.[22]

Several universities in the United Kingdom have taken similar approaches. In 2004, Leeds Metropolitan and Huddersfield introduced lottery systems for physiotherapy courses. The lottery randomly allocates places between applicants. Leeds Metropolitan has also used a system combining selection and random allocation for a small number of places. The main reason for this introduction was oversubscription. There is no evaluation evidence on student outcomes, impact on equity, or changes in the student mix through lotteries.

2.3 What are the outcomes?

What the studies say

Overall research shows very few studies that examine outcomes. Of those that do, *the majority look only at student achievement rather than examining the impact of lottery schemes on equitable outcomes in society or on issues such as social selectivity*. These studies have varying conclusions on outcomes related to student achievement. In addition, there is some debate on how variables have been controlled for in some of these studies.

A study by Green, Peterson, and Du (1999) on the Miwaukee Parental Choice Programme found that students placed in private schools achieved better in maths (by 11 percentile points) and reading (6 percentile points) than students who had been denied a place. Rouse (1998), again for Milwaukee, shows a positive gain in maths achievement but not in reading. She also points out a differential effect among choice schools, highlighting that not all schools are created equal. This evaluation and similar work[23] does not specifically assess the make-up of the population and differential effects among the student population (by subgroup of the population). However, a study by Hoxby (2004a) on charter schools in the Chicago area that operate similar lottery schemes to manage oversubscription noted a particularly positive effect in student achievement (reading and math scores) for Hispanic pupils and pupils from low-income backgrounds compared to Hispanic and low-income pupils who were denied a place.[24]

Other studies on the Milwaukee Parental Choice Programme show mostly insignificant improvements in student achievement and relatively high drop-out rates.[25] Hastings, Kane, and Staiger (2005) looking at the use of randomised lottery schemes in Charlotte-

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[22] See for instance Urlings-Strop, L.C., and Splinter, T.A.W. (2005), "Decentrale Selectie voor de Studie Geneeskunde aan het Erasmus MC: Validiteit van de Selectiemethode. In *Meten en Onderwijskundig Onderzoek*", Proceedings van de ORD 2005 Gent (p. 412-413).

[23] See for instance Hoxby's work on charter schools in Arizona, Hoxby, C.M. (2001), "The Rising Tide," *Education Next*, Winter 2001. Results have been also replicated in New York.

[24] This effect was greater than for other pupil populations. This finding was also reported in Hoxby and Rockoff (2004); These studies, however, do not take into account a possible rejection effect for those who did not gain a place in the lottery.

[25] See evaluations run by the State of Wisconsin Department of Public Instruction in the first six years of the programmeme at http://www.disc.wisc.edu/choice/choice_executive.html#four (accessed January 2007) and Witte J. (1993), "The Milwaukee Parental Choice Programme," in *School Choice: Examining the Evidence*, ed. Edith Rasell and Richard Rothstein, Washington, D.C.: Economic Policy Institute, pp. 69-109.

Mecklenburg show that among those applying to the oversubscribed schools, winning the lottery had no discernable impact on students' own reading and math scores overall. However, winning the lottery seemed to have had modest impacts on other outcomes, such as reducing absences and disciplinary suspensions. A study by Berry Cullen, Jacob, and Levitt (2006) finds little evidence that winning a lottery provides any systematic benefit across a wide variety of traditional academic measures. However, similar to Hastings, Kane and Staiger (2005), they cast the net wider and identify a number of benefits such as improvements in self-reported disciplinary incidents and arrest rates.

Problems in measuring outcomes

There are a number of problems associated with interpreting effects of even well-designed studies on education outcomes. Betts and Hill (2006) cite three main problems in assessing the effects of charter school enrolment, and these also apply in comparing outcomes for students in other kinds of schools:

- It is impossible to observe the same students simultaneously in both schools in which they are admitted by lottery (if they win the lottery) and schools which they attend if they lose the lottery. Thus, it is necessary to create a 'counterfactual' or approximation to something that never really occurred.
- There are many kinds of schools—some serving poor and disadvantaged and others serving advantaged; some receiving the same money as nearby schools and other less; some in supportive local environments and some not—and differences might be related to differences in results. Thus, the analysis must take account of what kinds of schools the students in a study are actually attending. Good results in one school may not generalise to other schools.
- Student achievement is affected by many non-school factors, such as the influence of parents and peers and local environment. Statistical methods are needed to eliminate these factors, and the accuracy of findings depends on the quality of the data available and on the number of students (the issue of statistical significance).

Lottery systems have some benefits for assessing students' educational outcomes because they set up a 'quasi experiment' where lottery winners constitute the 'treatment' group and lottery losers the control group. Unobserved factors, like motivation, family background and support from the family should on average be identical between applicants who win and lose the lottery. For this reason, lottery studies provide excellent internal validity, i.e. they eliminate some extraneous factors associated with achievement (third bullet point above).

However, lotteries also introduce selectivity bias, which threatens external validity. In situations where lotteries are used for admission to over-subscribed schools, these schools are, by definition, different from other schools. Oversubscribed schools are likely to be above average in quality. Furthermore, schools may hold multiple lotteries by grade, characteristics (see example of vouchers in New Zealand) or for students living in different neighbourhoods (e.g. Wallsall Academy's 'doughnut' approach). Schools may have more applicants for places in some grades or in some neighbourhoods, so results may not apply to other grades or neighbourhoods. Third, students must apply to join a lottery. Students (and families) that exercise this choice may be unrepresentative of students as a whole, both

in terms of observable characteristics (e.g. race, ethnicity) and unobservable characteristics (e.g. motivation, degree of family support).

These three types of selectivity bias—the potentially unrepresentative nature of schools that perform lotteries, the potentially unrepresentative nature of students within a given school who had to win a lottery to gain admission, and the self-selection of students into lotteries more generally—raise important concerns about the overall external validity of lottery-based estimates of outcomes.

A fourth problem with lotteries is that it does not take account of the fact that many families denied admission to one school of choice continue applying until they get admitted to another one. This introduces substitution bias, and is potentially serious as the lottery analysis may wrongly suggest that lotteries have no effect on learning when in fact lottery losers simply choose to attend another equally good school.

This brief review indicates that although lotteries support a quasi-experimental design, which has some benefits over other methods for assessing outcomes, there are other pitfalls to assessing the impacts of lottery admissions that still need to be taken into account.

2.4 What is the response of parents?

There are few studies that examine the reactions from parents. In the United Kingdom, some articles provide anecdotal evidence and show mixed reactions, but not systematic research.[26] The paragraphs below outline some of the evidence found in the studies. Particular attention is paid to studies in the US that examine how parents and pupils decide to opt in.

Evaluations of the Milwaukee Parental choice Programme show that parental attitudes toward choice schools, opinions of the Choice Programme, and parental involvement were very positive for choice parents over the first four years. Attitudes toward choice schools and the education of their children were more positive than their evaluations of their prior public schools.[27]

Circumstantial evidence from New Zealand suggests that parents actively opted for better schools when given the choice. In this way, the introduction of school choice had a larger than expected impact. The low enrolment at underperforming schools put pressure on the Government to close schools and inadvertently led to further reforms of school zones. [28]In this sense, parental choice can produce a systemic impact on education.

The studies on lottery systems in the United States show more clearly how parents/pupils decide to opt-in. They indicate differences in which parents decide to opt-in to a lottery

[26] The BBC reported on some parents' reactions, see http://news.bbc.co.uk/2/hi/uk_news/education/4293446.stm (accessed January 2007).

[27] See evaluations run by the State of Wisconsin Department of Public Instruction in the first six years of the programmeme at http://www.disc.wisc.edu/choice/choice_executive.html#four (accessed January 2007).

[28] See for instance New Zealand Council for Educational Research, http://www.nzcer.org.nz/default.php?cPath=76&products_id=133 (accessed January 2007).

system. Hastings, Kane, and Staiger (2005) report on the reasons why parents and pupils participate in the lottery scheme in Charlotte-Mecklenburg. Parents/pupils may chose schools for other reasons than academic improvement. For instance, one quarter of parents who were willing to exercise choice chose schools with lower mean test scores than their designated schools. This observation indicates that there are trade-offs to consider between academic improvement and features of the school (e.g. distance from home, specific pupil make–up of school and neighbourhood). Some parents decide not to exercise their choice and stay with their designated school.

How parents choose is also relevant in understanding the impact of lotteries on academic achievement and the differential impact on distinct groups of pupils. Hastings, Kane, and Staiger (2005) argue that whites are more likely to choose magnet schools with intensive academic programmes. These programmes are associated with particular improvement of student achievement. Non-whites chose magnet schools more often, but entered less academically demanding programmes. Thus, even though these pupils are enrolled in good schools, their overall achievement is expected to be at the same level. These observations point to a differential impact of lottery schemes and help to explain the modest overall impact of lotteries on student achievement. In addition, studies have also analysed gender-specific impacts. Hastings, Kane, and Staiger (2006) show that the heterogeneous preferences of parents also explain the gender-specific impact of lottery schemes. For instance, white females showed a significant increase in test scores if they won a place in their first-choice school. In summary, specific outcomes are linked to specific preferences.

The link between preferences and effects is an important factor to consider when designing lottery schemes. For instance, studies (see e.g. Hastings, Kane, and Staiger 2006) show that students who opt-in are more likely to be white and more affluent than students who do not apply to participate. This observation suggests that if lotteries are meant to alleviate socioeconomic imbalances it will be important to ensure that parents in target groups are informed and even assisted in applying. This intervention would need to be carefully designed and handled, however, as assistance directed at certain groups could undermine the perception of 'fairness' that lottery systems are meant to establish. *In this sense, there could be a trade-off between the 'fairness and transparency' of a system and targeting of interventions.*

Table 3: Overview of selected lottery schemes outside of the UK

	Purposes	Process	Outcomes Measured	Research Results	Parent/other responses	Comments/info sources
Charlotte-Mecklenburg NC, USA	Introduced in 2001 after court banned race-based bussing	Parent submit 3 choices; guaranteed place in local school if not selected; lottery system for non-guaranteed schools.	Math, reading scores; absences; disciplinary actions	Students of parents who value test scores in listing schools have higher achievement; For avg. student attending first choice school not related to achievement/other outcomes	Not given aside from parents' choice preferences.	Hastings, Kane and Staiger 2006
Chicago Public Schools, USA	Introduced in 1980 as result of desegregation consent decree with the federal government	Students apply to schools. Places at oversubscribed schools determined by separate gender-race-grade combination lottery.	Standardised test scores; attendance rates; course taking; credit accumulation	No discernible impact on various measures of achievement for those winning the lottery		Berry Cullen, Jacob, and Levitt 2006 Lottery data from 194 separate lotteries at 19 high schools
Milwaukee Parental Choice Programme	Introduced in 1990 to improve educational opportunity of low-income students	Students apply to schools. Available places at oversubscribed schools allocated by randomised lottery.	Standardised test scores; attendance rates; drop-out rates, parents' satisfaction	Studies show a varying impact on various measures of achievement for those winning the lottery	Parents' satisfaction rates appear positive	State of Wisconsin evaluations; Green, Peterson, and Du (1999); Rouse (1998)
Universal voucher system in Sweden	Introduced in 1992 to promote/support choice in educational system	Students apply to school of choice. If the school is oversubscribed, they enter a randomised lottery. Some priority is given to specific disadvantaged groups.	Standardised test scores per school	Studies show that achievement has improved in low-performing state schools.		
New Zealand Enrolment School	Part of ongoing educational reforms in New Zealand that commenced in 1989. Lottery mainly used to ease oversubscription	Lottery applies to out-of-zone students. Students apply and are classified in priority groups Randomised lotteries take place per priority group.	Not given	No real evaluations of lottery schemes available.		
Medical school admissions lottery in Dutch higher education	Solely used to ease oversubscription in courses	Lottery applies to all students who apply. Some minimum eligibility exist.	Student achievement in exams	No real evaluations of lottery schemes. One externality of lottery schemes has been that students from certain backgrounds have remained underrepresented.		

CHAPTER 3 Implications for the UK context

A brief review of lottery or random selection schemes in other countries indicates that identifying "lessons" for UK policymakers is not straightforward. However there a range of significant issues and questions that must be borne in mind. This chapter summarises some relevant issues.

The design of the lottery systems should relate to specific purposes/admission problems

Although it seems obvious that the design of the lottery system should follow from a clear understanding of the rationale for instituting a lottery scheme in the first place, the examples that we have uncovered suggest that this is not necessarily the case. The Charlotte-Mecklenburg case, for example, aimed to address racial imbalances after bussing was eliminated. But the data indicate that white students in affluent neighbourhoods were able to 'game' the system by listing only one school, their guaranteed home school, as first choice. In effect, these students never entered the lottery for oversubscribed schools. Non-white students were twice as likely to list three choices, thus had a higher probability of entering the lottery.

There is a need to measure outcomes associated with intended purposes

Many of the studies we examined did not necessarily attempt to evaluate whether the espoused rationale for adopting a lottery policy actually worked in the intended way. In the UK the concern seems to be about equity, and the hope is that a lottery admission will yield a better 'mix' of students than admission by catchment area. The design of the system should proceed from a 'theory of action'—a set of causal statements linking an action (a government policy) to a desired goal (equal access). If the theory of action is faulty, the policy will likely be ineffective. If it is sound, then evidence should demonstrate that the policy is achieving the desired goal.

Policy makers should understand how and why parents choose to participate

One appealing feature of a lottery system is that it appears to treat all students fairly—'winning' is a chance occurrence, not determined by ability, ethnicity, residence, or other student characteristics. In actuality, lotteries are 'fair' only for the pool of students (and parents) who choose to join the pool. The US studies demonstrate that some students are more likely than others to join the pool in the first place. Certain students may opt not to choose. This self-selection into lotteries raises problems of external validity when comparing outcomes for lottery students versus others. In addition, US studies show that some parents/pupils who opt-in may not always make choices that will maximise overall student achievement or produce outcomes that policy makers desire. Encouraging certain

students to join the pool or to channel certain choices may threaten the perceived fairness of the lottery. In this sense, there could be a trade-off between the fairness and transparency of a lottery system and the targeting of interventions.

Research to examine effects can be complex

It can be very difficult to reliably measure effects associated with lottery schemes. Even though lotteries have an advantage in supporting a quasi-experimental design— a far better method than most for determining causality—the lottery itself poses threats to external validity, which limits our ability to generalise findings. This is a concern when policy makers typically seek evidence to show that an education intervention works and has wide applicability. Given evaluations are needed to assess the impact of lottery schemes, such studies need to be smart and aim to address the methodological difficulties outlined.

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