



The Utility of Online Choice Options: Do Purely Online Schools Increase the Value to Students?

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Abstract: Online education has grown in popularity as a choice option over the past decade. A variety of studies exist on methodologies for content delivery and on the impacts of online education for specific communities. However, few works have considered the utility of online educational choices in comparison to physical schools. Using an expected utility model this paper examines the value conferred to a student in an online charter school versus traditional physical schools in the same state. Value in this case is defined as the likelihood of performing better on a standardized test.

Keywords: online education; charter schools; school choice; expected utility

La utilidad de las opciones de elección virtuales: ¿Las escuelas puramente virtuales aumentan el valor para los estudiantes?

Resumen: La educación virtual ha crecido en popularidad como opción en la década pasada. Existe una variedad de estudios sobre las metodologías para distribuir contenidos y sobre los impactos de la educación virtual sobre comunidades específicas. De todos modos, pocos trabajos han considerado la utilidad de las opciones de educación virtual en comparación con las escuelas físicas. Utilizando un modelo de expectativa de utilidad, este artículo examina el valor que le es conferido a un alumno en una escuela pública de gestión autónoma virtual frente a escuelas físicas tradicionales del mismo

estado. El valor en este caso se define como la probabilidad de un mejor rendimiento en una prueba estandarizada.

Palabras clave: educación virtual; escuelas públicas de gestión autónoma charter; opción de escuela; expectativa de utilidad.

A utilidade das opções de escolha virtual: As escolas puramente virtuais aumentam o valor para os alunos?

Resumo: A educação virtual tem crescido em popularidade como uma opção na última década. Há uma variedade de estudos sobre metodologias de distribuição de conteúdo e os impactos da educação virtual em comunidades específicas. Entretanto, poucos estudos têm considerado a utilidade de opções de educação virtual em comparação com as escolas físicas. Usando um modelo de utilidade esperada, este artigo examina o valor que é conferido a um aluno em uma escola pública virtual autogerida (charter) frente a escolas físicas tradicionais de um mesmo estado. O valor neste caso é definido como a probabilidade de um melhor desempenho em um teste padronizado.

Palavras-chave: educação virtual, escolas públicas charter; escolha escolar, utilidade esperada.

Introduction

Proponents of online charter schools offer them as politically and economically viable educational alternatives that offer the same benefits as school voucher programs but which also alleviate the transition costs associated with changing schools. Today 45 states offer some form of online education program – most in the form of online charter schools (Center for Digital Education, 2009). Online charters are the newest approach in the lineage of school choice programs. While the perceived benefits of online charters captivate some policy makers, critics denounce online charters as focusing more heavily on the affluent (Ingersoll, 2004). Given the novelty of online charters, there is little credible evidence regarding their impact on student achievement. As with the research on physical charters, this shortcoming is largely due to the difficulty in separating the observed differences in quality from data on the performance of students who attend the schools (Hanushek et al., 2007).

This paper addresses the question of school quality as implied in the choice to attend an online charter school by developing a utility model of online charter programs versus their physical alternatives. Additionally, it examines the impact of school quality on the decision-making paradigms of parents. Logically, the lack of transaction costs associated with online charters should make parents more sensitive to questions of school quality and hence increase their level of competition with physical schools with regards to school quality.

There are many factors to consider when parents are deciding on a school for their children. However, parents ignore many of these factors completely – either out of ignorance of the factors, ignorance of options, some combination of both, or (most troubling) a lack of concern for either. In modeling the choice between two options – an online charter school versus a physical school – it is necessary to assume that those making the choice are fully informed individuals. Additionally, one needs to assume that they are making their choice on readily observable factors. Following methods used by Hanushek et al. (2007) and Richter and Brorsen (2006) this paper uses aggregated school-level data, since this is presumably the only thing the parents see, in order to distinguish between differing levels of school quality.

Different Types of Online Programs

A trend which has emerged in K-12 education over the past decade, along with online charters, is the use of online schools as a supplement for the traditional school day. This approach means that students may take a class at an online school while they are a full-time student at a physical school. Additionally, there has been a rise in the use of national online schools, some of which are free of charge and others which have a cost associated with them. Schools such as Connections Academy® have become a popular option in many states. This paper chooses to focus only on a state-level online charter for two reasons. First is the fact that the school in question, the South Carolina Virtual Charter School (SCVCS), is free to any student in the state. Therefore it meets the requirement that attending the school does not incur a transaction cost. Second is the fact that data were available on a SCVCS students' previous school, something that was not available for national programs such as Connections Academy. Additionally, this approach avoids confounding choice based on quality with the impact of large scale advertising which is being conducted by Connections Academy. If the results indicated that Connections Academy showed differences in quality, it would be difficult to separate the quality-related factors in decision making from the influence of advertising.

Theory

Expected Utility Theory argues that individual decision-makers choose between uncertain prospects by comparing their expected utilities, which are calculated as the weighted sums of adding the utility values of outcomes multiplied by the probability of the outcome being obtained. This is a seemingly reasonable proposition, but there are questions regarding what utility means for the decider. That is, what an outsider observes as increasing the utility of individuals is not necessarily the key factor which deciders are using to make their decisions.

Most value-added models associated with school choice define value added as the likelihood of performing better on standardized tests; e.g., if school x produces more value than school y then school x should be preferred, provided the likelihood of achieving that value is sufficiently high enough to satisfy a decision maker's (i.e., parent's) risk tolerance. However, it has been demonstrated that parents do not always choose based upon demonstrable results. Take aggregate performance of public versus private schools for example – on average public schools out-perform private schools on National Assessment of Educational Progress (NAEP), yet many parents and policy makers still hold the belief that private schools are superior to public schools in terms of performance (Lubineski, 2006). Reasons associated with this phenomenon revolve around the concept of cost expectations – if an item is more expensive, then one expects it be superior to a less expensive item (Kalwani, 1992; Krishna, 1992). It has even been demonstrated that in situations where individuals have no retail cost, but rather only opportunity cost, they still believe the more costly item is superior even if the functionalities of the items would indicate otherwise. This principle has been demonstrated in studies of charter schools (e.g., Rivkin, Hanushek, & Kain, 2007). But what happens when there is no opportunity cost? That is, what occurs when there are no costs associated with changing schools? Online charter programs provide an excellent opportunity to study this. They are state chartered schools, and therefore can serve any student in the state. Because they are online, they require the ability to use, and have ready access to, technology. These features would likely make them more popular with parents from a median to higher socio-economic status, making them a good comparison to parents in previous studies on physical charter schools.

Review of the Literature

There is a small amount of policy literature related to online charter schools. For this reason, I draw from the literature on both charter schools and the literature on online education in general. It should be noted that the majority of the literature on online education is confined to post-secondary education. However, there is a growing body of literature on K-12 online education which is also relevant.

Previous studies related to choice options have considered charter and private schools but have not focused on the increasingly popular option of online schools – 45 states currently have some form of K12 online program (Center for Digital Education, 2009). Online charters serve to replace the student's physical school just as a charter school serves to replace a conventional public school. Online charters have the benefit of providing standards-based curriculum to students and avoid the financing and accountability issues associated with vouchers or education tax credits. Programs and concepts differ from state to state, but most online supplemental programs follow the model of South Carolina, although it would be more accurate to say that follow the Florida model since most states, including South Carolina have based their programs off of the Florida Virtual School (FLVS) program's model (Berge, 2006).

The FLVS model does not follow the traditional school calendar or block schedule. As an online school it is not bound by time or place. Rather it allows students to take courses year round and holds open enrollment. Traditional public school teachers are trained in online education including technical components such as using the learning management systems (Blackboard, Moodle, etc.) as well as the impact of specific modalities for human-computer interaction. These may include the use of synchronous video-conferencing for conducting labs or the use of threaded message boards for English courses. In any case, the modality of the interaction tends to be determined by how effectively it is believed to deliver the material to the end user. The funding for the school is based on the traditional public funding structure, with the per pupil allotment following the student.

Ahern and El Hindi (2000) found that the asynchronous nature of online communication provided a dynamic similar to a traditional classroom. However, Greenlaw and Brown-Welty (2009) found that the fluidity of the interactions and the ability of students and teachers to “stay on topic” were greatly diminished in the online setting. This phenomenon was attributed to the use of conversational language in discussion forums. Davidson-Shivers et al., (2000) compared synchronous and asynchronous communication mediums to determine the impact on content-related participation. Their findings indicated that synchronous communication provided more immediate, but less subject-specific responses whereas asynchronous responses were more focused and content specific. They attributed this to the fact that students and teachers had more time to reason and consider their responses.

Berge and Clark (2005) describe the benefits that online charter schools can bring to minority and high poverty students who have traditionally been underserved in public education systems. They also address the question of the digital divide and the question of a student's volitional competence to be successful in online education. The limitations of minority and high poverty groups with regard to technological access are also dealt with in their text. In a series of case studies they raise questions of equity in the provision of online learning. Measures of effectiveness are only touched on, and they leave open the factors related to a parent's choosing to send their student to an online school versus a traditional school. While the study deals with important questions, and establishes that online programs can increase educational outcomes for underserved students, this is not the population which traditionally enrolls in online courses. A

variety of studies including those by Cobb and Glass (1999) and Hughes et al. (2007) establish that students from higher socioeconomic statuses enroll in online education programs at a higher rate than their lower SES counterparts.

An area of research which must be addressed in discussing online charters is a student's previous experience with technology. A 2000 report from the National Telecommunication Information Administration finds a clear divide between access to technology based on both race and socio-economic status (National Telecommunication Information Administration, 2000). This variance included both access at home as well as at school. The level of technology in the classroom is related not just to socio-economic status, but also to the way in which it is implemented. While it is clear from the research of Eamon (2004) that the frequency of computer use by poor and non-poor students was not significantly different, there was a significant difference between the rates of non-academic use. This difference was due primarily to the poorer students lack of home access and reliance on school computers (Eamon, 2004). Additionally, high poverty schools tend to use technology as an add-on for instruction, whereas low to median poverty schools tend to integrate technology into instruction (Muir-Herzig, 2004).

Studies on the value of technology for addressing the learning needs of at-risk students are fairly conclusive in terms of the need to address the digital divide. Although policies are in place, such as the Close the Gap project, they are at odds on how the digital divide should be addressed; i.e., policy initiatives are unclear as to whether addressing the digital divide means working on factors of related to effectiveness and equity, or the nominal allotment of technology to at-risk students. A number of studies have found positive impacts from technology use on at-risk student in early childhood (Parrette, Hourcade, & Boeckmann, 2008; Hohlfeld et al, 2007). However, the preponderance of studies concerning technology use in secondary education for at-risk students finds better results from after-school or community programs than from direct use of technology for content delivery during the school day.

Kuttan and Peters (2003) found that while technology can have positive impacts, the direct use of technology in classrooms is ineffective due to inequities in technical abilities among high poverty and minority students. The primary suggestion they offer to remedy this is, "creating statewide integration approaches that would make technology an important ally for the academic standards movement," (Kuttan & Peters, 2003, p. 94). Studies by Page (2002) found significant differences in achievement between at-risk students who used technology in the class and those who did not. Despite these positive findings, though, the aforementioned studies used small samples. Kuttan and Peters based their case study on economic enhancement and Page's work looked at 10 classrooms with two study groups. Broader scale studies have shown less positive results. Research on online programs by Zhang (2005), Smith (2006), and Cavus (2007) found mixed results in learning outcomes for those in a traditional course versus an online course. While Zhang and Cavus both found significant positive relationships between the amount of online learning and scores, Smith found no significant difference.

Hanushek et al. (2007) examined whether the average charter school was better or worse than the average public school. Their results indicate that the decision of parents to exit a charter school was significantly related to perceptions of school quality. Their findings also indicate that the relationship between school quality and exiting a charter school is significantly larger than the relationship of quality and exiting a conventional public school based upon the same factors. Considering this, they find that the introduction of a charter school reduces an individual's costs of changing schools. The latter finding is not surprising; however, the idea that parents are exiting charter schools due to quality questions whether or not the schools are serving their intended purpose or are being managed properly. It implies that in the decision to enter the charter school

parents placed a higher value on the fact that it was not a traditional public school rather than the level of student outcomes the charter produced. Particular reasons for this comparatively lower performance of charter schools is noted by Finn et al. (2000), specifically that charter schools are frequently started by individuals with limited experience in running a school – a complex task by any measure.

In addition to questions of expectations, there is also the aforementioned question of the population within the charter schools. That is, is the charter school serving the population for which it was intended? In their study of Arizona charter schools, Cobb and Glass (1999) found that charter schools were more ethnically segregated than traditional public schools. Specifically, they found a higher proportion of White non-Hispanic students in the charters. These findings are consistent with findings from Berge and Clark (2005) who found that minority students were underrepresented in online charter schools. The reasons for these differences in demographics have been addressed by previous authors including Hughes et al. (2007).

Christensen and Overdorf (2001) point to online education as a disruptive innovation – an innovation which disrupts the current trends. They point to online classes as being viewed as “good-enough,” that is, meeting the median standard. This begs the question of the quality instruction given a student’s current physical school. If they are at a high performing school, then they would be adversely affected by switching to an online charter.

With regards to the “why” of choosing an online charter, the answer may be similar to the reason someone would choose a physical charter. According to Hanusheck et al. (2007), charter schools offer the purported benefits of vouchers or tax credits while avoiding the financial questions which detractors of these programs often identify – inequitable distribution and “cream skimming” (Lundsgaard, 2002). Additionally, because online charter students do not have to travel to attend school or deal with any of the other opportunity costs of switching schools, the choice of parents to enroll them in the online charter would be expected to be based in quality of educational outcomes.

The South Carolina Virtual Charter School

This paper considers the South Carolina Virtual Charter School. The SCVCS was chosen for two reasons: first South Carolina is a traditionally poor state which has lagged behind in educational outcomes (National Education Association, 2011). It was felt that the divide between socioeconomic statuses in the state would provide a clearer example of the dichotomy between high socio-economic status and low socio-economic status students. Second, given the research of Christensen and Overdorf (2001), the rationality of parents choosing online options, given their role as disruptive innovations, have yet to be explored.

The SCVCS is part of the South Carolina Public Charter School district. In order to enroll in the SCVCS students must transfer from their traditional school to the SCVCS. The SCVCS has been in service for three years and serves two percent of the student population of South Carolina at any given time (South Carolina State Department of Education, 2011a). The SCVCS is funded by the state and must meet the same requirements as physical schools for course development and alignment to state standards. Students from physical schools must receive parental approval to enroll; e.g., some degree of parental support may be suspected given the need for ascent, as well as the fact that the student is ostensibly taking courses entirely at home. According to the 2009 SCVCS program evaluation, the average teacher at an SCVCS has 14 years of teaching experience and all individuals teaching for the program must have completed two professional development courses that are required for state certification to teach online.

Enrollment in the SCVCS is largely not reflective of the SC K-12 demographic. Whereas the SC K-12 make up is 53.8% White non-Hispanic, 38.9% African American, and 5.5% Hispanic with other minorities making up the remaining 1.8%; the SCVCS is 84.2% White non-Hispanic, 13.6% African American, and 1.5% Hispanic. Demographic data reflecting previous enrollments indicates that 51% of students were enrolled at a Home School or Private School prior to enrolling in the SCVCS. Additionally, the average School Poverty Index for public school students in an online charter school in SC was 45.6 whereas the state's average School Poverty Index is 65.2

As previously mentioned, some feel that due to the technical nature of online learning, only those with ready access to technology will benefit. South Carolina avoids this trap since every school in the state has been networked since 2001 (SC K12 Technology Initiative, 2009) i.e., it may be expected that students have experience with technology. However, as seen in the work of Muir-Herzig (2004) access to technology does not necessarily equal the ability to use technology. This leaves open the question of how the technology proficiency impacts student success. Higher poverty schools in South Carolina have a higher average student to computer ratio than lower poverty schools, 3.8 students per computer compared to 1.3 students per computer (South Carolina State Department of Education, 2010). So while all schools have access, the capacity of students to access computers is greater in lower poverty (i.e., wealthier) schools.

Given the demographics of the SCVCS, as well as the data on prior enrollments, an initial reading would seem to suggest that students who attend an SCVCS are from higher socio-economic backgrounds and would therefore be less apt to withdraw from school. This conclusion is supported by findings from Figlio (1999) and Hardaway and McLoyd (2009). This would appear to indicate a lower level of student heterogeneity in the SCVCS than in the study of charter schools by Hanushek et al. (2007).

Table 1

Demographic and Grade Level Comparison

Demographics	SCVCS	SC K12	Other Charter
White Non-Hispanic	84.2%	53.8%	54.4%
African American	13.6%	38.9%	37.8%
Hispanic	1.5%	5.5%	4.7%
Other Minority	0.7%	1.8%	3.1%
K-2	18.0%	23.4%	13.9%
3 to 5	26.0%	23.6%	17.5%
6 to 8	25.0%	23.1%	25.0%
9 to 12	20.0%	29.9%	43.6%

Note that White non-Hispanic students tend to be from higher SES (lower poverty) schools. The fact that they are represented at a much higher level in the SCVCS is indicative of the school serving more students from low to median poverty schools. Also note that one would expect high school students to be the largest group represented; however, they are actually the third lowest. Potential reasons for this may deal with parent effects. According to Blackboard's Speak Up Survey, parents are increasingly demanding newer and more technology driven learning methods for their students (Blackboard, 2011). The same survey found "unprecedented levels of demand" for digital choice. The fact that the percentage of high school students in the SCVCS does not more closely resemble the state's K-12 percentage is surprising, as is the higher representation of those in grades 3

through 5. This distribution could be indicative of lagged effects of the trends seen in the Speak Up Survey that indicated over 60% increase in support for online options from 2003 to 2010 (Blackboard, 2011).

Analysis and Methodology

To specify a model of added value, the performance on the state mandated accountability test over a four year period (2007-2010) was used. The High School Assessment Program (HSAP) exam is a state mandated test given to students in South Carolina which is required for high school graduation. It tests subjects of English/Language Arts and Mathematics. Since the question is not one of performance, but of parents' perception of performance, this measure lends itself well to determining the how parents make choices in determining quality differences.

This study uses the likelihood of achieving a higher score on HSAP as the measure of value. In specifying the value-added model, the baseline was the state average. So the question is whether the student has a better chance of scoring above the state average at a traditional public school, or the SCVCS. Data were obtained from the SC State Department of Education (HSAP Results, 2011) on High School Assessment Program exam results for a three year period 2007-2010. Public schools were ranked by poverty index and divided into 75th percentile, 50th percentile, and 25th percentile (South Carolina State Department of Education, 2011b). The School Poverty Index (SPI) was used as a measure of poverty rather than National School Lunch Program data. SPI is a percentage of students in a school who are eligible for Free/Reduced Lunch and/or Medicaid.

The primary factor serving as a determinate of success in academic programs in the South Carolina appears to be poverty. The correlation between SPI and performance was $-.67$ and was significant at $\alpha = .05$. Note that the relationship is negative because a higher poverty index indicates more poverty. The negative relationship means that students from schools with a higher poverty index are scoring lower than students from schools with a lower poverty index.

School Poverty Index (SPI) is a rating 0.0 to 100; because it is based on National School Lunch Program (NSLP) data as well as data for Medicaid eligibility, it is more reliable than simply using NSLP data, which may be inflated (Dunifon & Kowelski-Jones, 2003). While the data on self-identification indicates that students underreport NSLP data, NSLP data have been shown to be an unreliable measure of poverty by individual audits from the Department of Agriculture, Inspector General (US Department of Agriculture, 2004). Additionally, Harwell, and LeBeau (2010) found NSLP data to be a poor indicator of socio-economic status.

Because private schools have no poverty index, they were not considered as they would skew the data. The average score for the state over a three year period on the High School Assessment Program Exam for English Language Arts (ELA) and Mathematics was used as the baseline. The average score for each quartile was used as the utility measure and the percentile scoring above the baseline for each quartile as the probability of maximizing that utility measure. This same process was then repeated for the SCVCS as a whole. To calculate the value conferred by each school, each school's percentage scoring above the state average was multiplied by the mean score for the school. This is understood as the likely payoff (value) for that school. This was done for both ELA and Math for each high school in the state. I then averaged the payoffs for each quartile. This is understood as the likely value offered by any school within that quartile. This would be the value conferred to a student should they choose to *stay* in a school within that quartile. I then repeated the process for students in the SCVCS. This is considered the likely payoff for a student who chooses to *switch* to the SCVCS. Table 2 offers the scores and percentages whereas table 3 describes the payoff matrix. The formal statement of the above process is seen in equation 1 in appendix A.

Modeling the Utility of Online Charter Schools

Initial results on the performance of the online charters indicate that scores are below the state average on English/Language Arts performance, as well as Mathematics – see Table 2. This is an unexpected finding given that one would expect to see results which closely align with students of similar SES from physical schools. This is not the case and would appear to indicate a difference in quality between the SCVCS and traditional public schools. Additionally, since all charter schools in the state have self-selecting populations, it is difficult to account for factors that would affect achievement that are also not related to family and background factors, which also impact achievement. Mizala, Romaguera, and Urquiola (2007) demonstrated that achievement scores were well correlated to socioeconomic status. As seen in the data from the SCVCS, the higher level of socioeconomic status does not lend itself well to making comparisons to outcomes from physical schools based upon location alone, since the selection of the SCVCS likely has a high degree of endogeneity to educational outcomes.

Since parents have the choice of sending their children to their local public school, a private/home school, SCVCS, or a physical charter school, if parents are making decisions on the basis of quality, they would be rational to choose the school which they perceived as producing the highest quality. Given the population of the SCVCS, it appears there are other factors which could incentivize a parent to send their student to the SCVCS such as weighing costs and benefits of private school, public school, or a third option based upon variables of tuition cost, quality, safety, and the like. The following section provides an analysis of mean differences in HSAP scores as an estimate of the value added by the SCVCS versus the option of a traditional public school. These differences are examined based the public school's poverty index with inferences drawn as to where a student would receive higher value – a traditional public school or SCVCS.

Utility Outcomes

Historical HSAP scores from 2007-2010 are aggregated based upon the school's SPI. The SPI is grouped according to its being in the 25th percentile (high SPI), 25th-75th percentile (Median SPI), and the 75th percentile (low SPI). As previously mentioned, because no SPI is recorded for Private and Home Schools, they have been omitted.

Table 2

Historical HSAP Scores based upon SPI

	ELA Hist	Math Hist
Online Charter	225	221
State Average	232	231
1Q Public	207 (3.5%)	205 (25%)
M Public	219 (30%)	220 (89%)
4Q Public	233 (87%)	237 (100%)

(% schools scoring above online charter)

As seen in table 2, there is only a 13% probability that the utility for ELA will be increased by switching for a student from a school in the 75th percentile. To specify this more clearly, we can multiply the probability of achieving more utility in a physical school by the school's mean historical

score, then multiply 1 minus that probability by the historical mean of the online charter. The higher value is that which yields the greatest utility.

Using the same example of an ELA student in the 75th percentile we see that $(1-.13)(233) = .87(233) = 202.71$, whereas $.13(225) = 29.25$. A payout matrix of the expected utility of staying and switching using the current year's data is found in table 3.

Table 3
Expected Utility of Switching versus Staying

	V ELA	V Math
1Q Public	217.13 (7.25)	165.75 (56.25)
M Public	157.5 (65.7)	24.2 (195.8)
4Q Public	29.25 (194.01)	0 (237)

What becomes immediately apparent from table 3 is that a parent in the 75th percentile is always better off staying in the public school versus switching to the online charter school – if they are deciding purely on the value of test scores. Parents within the median would increase their utility in ELA by switching, but decrease it in Math. Given the differential utility of switching between Math and ELA ($195.8 - 65.7 = 130.1$ Stay) and ($157.5 - 24.2 = 133.3$ Switch), a parent in the median would increase their utility more by switching. Additionally, a parent in the 25th percentile is always going to increase their utility by switching.

Discussion and Future Research

This paper sought to address two questions: first, whether the value offered by an online charter school was greater than that of a physical school and second, if parents were basing their choices on the value offered by a particular school. To the first point, online charters offer an added value for a specific group of students – those from high poverty schools. However, given the research on access to technology and technical capabilities, this is not the group which is being served. To the second point, because the largest enrollments do in the SCVCS do not come from low SES students, it does not appear that parents are choosing on the basis of added value.

To answer the first question, I compared the value between traditional public schools in South Carolina and the SCVCS. Value is here defined as performance on the High School Assessment Program exam. The state average was used as the baseline and the average performance of each school was used as the utility offered by that school. The percentage of students scoring above that state average was used as the probability of an individual from that school maximizing their utility. Results indicate that students from low to median poverty schools will almost always do better in their physical school than in the SCVCS. However, students from high poverty schools will always do better by switching to the SCVCS.

To answer the second question, I examined the results from the abovementioned utility comparison. It is clear that parents from demographic groups traditionally associated with high SES (White non-Hispanic) are sending their students to the SCVCS in much higher numbers than any other demographic group. Additionally, White non-Hispanics are represented in the SCVCS at a level which is disproportionately high when compared with that group's representation in the traditional public schools. Given this representation and the tendency of higher SES students to outperform their lower SES counterparts, it is surprising that the SCVCS offers a greater value only to higher poverty students.

It is interesting that the considerations given to the SCVCS by parents from higher socioeconomic statuses appear to be largely unwarranted because studies on physical charters also found that they underperformed traditional brick and mortar schools. This would seem to indicate two things: first the benefits of charter schools as a choice option may be overstated in both the physical and the online environment. Second, given the lower performance of both physical and online charters, there is a question of student selection into charters in general which should be examined. As indicated by the findings above, the rational choice for parents from upper income schools would be to keep their students in the public school, rather than a choice option.

The utility outcomes of the SCVCS indicate that it is a good program for a specific segment of the population. However, the segment of the population that would benefit the most – high poverty students – are also the least likely to have the technical capacity to operate in the SCVCS. This suggests a question of equity if online charters are to be used as choice options; i.e., those who would be best served by online charters have the least access to the technology skills necessary for that service to occur. Given the research on the access to, and use of, technology by high poverty students the issue of equity is not surprising; i.e., high poverty students have less access to technology so they have less access to online charters.

Given these findings one should ask themselves why parents from lower poverty schools would choose the SCVCS. As previously mentioned, parents may not be deciding on the basis of the readily observable value offered by a particular school but on some other factor. The fact that the online charter is a novel approach to education may impact their decision, or simply the fact that it is not a traditional public school. This last sentiment may have more to do with reputation than with performance; e.g., the previously discussed choice of parents to send their children to private school shows similar characteristics. Because we cannot fully experience the utility U enjoyed by any one individual but rather can only observe portions of it, the parent's observed utility V may not be the primary factor in their choice. Although this paper does not specify a full model of factors impacting the utility of choosing an online school, I feel it is necessary to offer examples for future research. While we cannot quantify every potential influence, we can offer a model to approximate the impacts – see Appendix B for the utility function discussing these factors.

Factors which would be considered include: *student effects* – are the students in online charter schools significantly different than those in traditional public schools? *Peer and social issues at the physical school* – what was the peer or social situation at the physical school; i.e., bullying, disproportionate representation in terms of race, ethnicity, gender, SES? *The prevalence and type of technology use in the classroom* – what type of technology access and experience did students have in their traditional school? These are all factors which should be considered in future research of online charter schools. A limitation of this study is that, although it considers multiple schools, it is only a single state. Additionally, if additional student-level data were available it would have increased the ability to fully predict a rational choice on the part of parents. While a full list of factors impacting expected utility would be nearly impossible to work with, and hence the need for a model, I feel the previous listing would provide valuable additions to the literature and provide policymakers with the type of information necessary to offer effective and equitable choice options.

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Appendix A

Using aggregate school level data from the SC Department of Education, equation 1 describes the expected utility for a student i from school j moving from their physical school to the online charter school.

Equation 1:

$$\begin{aligned} P_{ni} &= \text{Prob}(U_i > U_j \forall j \neq i) \\ &= \text{Prob}(V_i + \epsilon_i > V_j + \epsilon_j \forall j \neq i) \\ &= \text{Prob}(\epsilon_i - \epsilon_j < V_i - V_j \forall j \neq i) \end{aligned}$$

The probability that a parent n chooses school i (in this case an online charter) is equal to the probability that the utility of choosing i is greater than the utility of choosing j . The Utility of a decision i is the probability that the expected utility of i plus unobserved factors/error (ϵ_i) is greater than the expected utility of an alternative j plus unobserved factors/error (ϵ_j). For a complete description of this formula, see Train (2003). In this case the expected utility of switching to an online charter school is the probability that doing so will yield a higher test score than the alternative of staying at one's current location.

Appendix B

As noted in Train (2003) because the attributes of any given decision maker i do not vary over the alternatives, e.g. a person does not gain more income for a decision to buy a used car versus a luxury car over, the attributes of any individual can only enter the model in ways which express differences in the utility of alternatives – in this case, the decision to attend an online charter school (U_1) versus a traditional school (U_2). Let Y equal a socio-demographic variable which may impact utility; let SPI equal the school poverty index; and let θ capture the effect of Y on the utility of the alternative between an online charter school and a traditional school.

Equation 2:

$$\begin{aligned} U_1 &= \alpha SPI_1 + \beta SPI_1 + \theta_1 + Y + \epsilon_1 \\ U_2 &= \alpha SPI_2 + \beta SPI_2 + \theta_2 + Y + \epsilon_2 \end{aligned}$$

Because we cannot know the full utility, only differences in expected utility matter (Train, 2003). For this reason we simply normalize the choice such that one factor equals 0, s.t. $\theta_1 = \theta_1 - \theta_2$. When we do this, θ_1 is understood as the differential impact of the variable Y on U_1 versus the alternative U_2 . The model then becomes:

Equation 3:

$$\begin{aligned} U_1 &= \alpha SPI_1 + \beta SPI_1 + \theta_1 + Y + \epsilon_1 \\ U_2 &= \alpha SPI_2 + \beta SPI_2 + \epsilon_2 \end{aligned}$$

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