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School Choice: The Divergence between Intentions and Outcomes

By: Beverly Chodorov

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Paper presented to:

Public Policy Studies Preceptor, Heba Alex
Faculty Advisor, Professor Sorcha Brophy
Department of Public Policy Studies
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Abstract

This paper aims to quantify the net change in student outcomes at the district-level resulting from the introduction of government-sanctioned school choice. I highlight the urgency of evaluating the numerous forms of school choice throughout the nation, given the rapid shift in our nation's educational system from funding public schools to funding private institutions. Using a fixed effects model to compute data from the State of Louisiana, I find that Louisiana's Voucher Program has hampered student outcomes, whereas charter schools have improved student outcomes. This paper ends with recommendations for policymakers to combat further stratification and exacerbation of the ever-increasing achievement gap, as well as possible expansions of this pressing dialogue.

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Acknowledgments

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Introduction

The release of the PISA (Programme for International Student Assessment) results last year demonstrated how the performance of an average American 15-year-old has been stagnant since 2000 (Goldstein 2019). Furthermore, it revealed that our nation's achievement gap continues to diverge— with the top 10th percentile of students performing progressively better as the bottom 10th percentile of students performs progressively worse.

The academic achievement gap, a historical problem in the United States, was highlighted by the release of the Coleman Report in 1966. Coleman, one of the first researchers to collect educational data nationwide, found that the inequity in school resources did not explain the observed differences in academic achievement at the school level. This stunned policymakers and researchers nationwide, who had presumed the achievement gap was the result of varying quality and quantity of human and capital resources throughout the country (Hill 2017). Moreover, he asserted that students' social contexts (home, neighborhood, peers) had a greater impact on their outcomes than schooling itself.

Ultimately, the Coleman report suggested that schools failed to uphold some of the central tenets behind our nation's educational system: to offer social mobility and to equalize opportunity for all. Such failure implied that the wealthy would remain wealthy and the poor would remain poor, creating an intergenerational predicament that could not be easily addressed. Furthermore, an adolescent's social context was also shaped by the traditional setting of the nation's educational system, where a student is assigned to a district based on their geographical coordinates and subsequently attends their district school. Because well-off families could mobilize in search of higher quality schools (albeit at the risk of facing higher property taxes), a student's coordinates did not permanently hinder the quality of education they received, but as a

result, neighborhoods became more socioeconomically homogenous. Thus, within the traditional setting, affluent families who valued school quality were allowed ample opportunities to choose their preference, while the immobile and underprivileged were left to endure the quality of whichever school their student was assigned to.

In an attempt to equalize opportunities, at least 28 states have enacted forms of private school vouchers (or tax credits), and 44 have approved charter schools since the 1966 Coleman Report (EdChoice 2019). Furthermore, in most cities, states have allowed for "open enrollment"- the concept that you could go to whichever public school of your choice, regardless of your district assignment. Policymakers primarily believe that government sanctioned school choice would create a competitive market, theoretically increasing the quality of all schools within a district. The theory's underpinnings came from the fact that assigned public schools were no longer guaranteed students, and thus, funding. Schools would now have to compete with other publicly funded alternatives, forcing school administrators to steadily increase the quality of their schools in order to retain more students.

Currently, the most predominant form of school choice is charter schools— as of 2016, they educated over 3.0 million students and represented over 7% of the public schools in the United States (National Center of Educational Statistics). As exhibited in Appendix A, over half of the nation's charter schools are located in cities, which is a result of a sequence of national events during the 20th century. While the American Industrial Revolution led to a mass migration to the cities for economic opportunities (Hirshman & Mogford 2009), *de jure segregation* (segregation enacted by the law) separated communities and opportunities within cities themselves. Thus, when technological advancements allowed the rich to escape from cities to

suburbs during the late 20th century, poverty became an urban phenomenon that has been primarily composed of Black and Latino populations (Jargowsky 2002, Stoll et. al 2000).

Ultimately, for decades, state and local officials struggled to shift educational funding from wealthy districts to failing inner-city schools without political turmoil. However, the No Child Left Behind Act of 2001 strengthened the accountability requirements for Title 1 (federal) funding by requiring that "Academic Year Progress" be separated into subgroups (Shaul & Ganson 2005). This new policy pressured state and local officials, in order to retain federal funding, to remediate the poorly funded, underperforming public schools in their district. School choice policy became one of the many mediums policymakers used to secure their federal funding— since according to the U.S. Census Bureau, such federal funding accounts for 8% of K-12 education revenue (Moore & Deardorff 2017).

Alternative public schools, conceived through school choice policy, depend on public funding but are allowed complete autonomy of school budget and curriculum, so long as they are in compliance with state regulation. Supporters of school choice suggest that flexibility in spending allows for higher levels of financial efficiency in serving students, given that these schools do not face the same bureaucratic constraints as traditional public schools (Gronberg et. Al 2012). However, research on segments of school choice have been relatively mixed (Hanushek 2007; Hoxby 2003; Gronberg et. Al 2012; and Clark et. Al) and outcomes have been difficult to synthesize given that the intention and quality of such schools vary. Yet, most of the literature on school choice has not focused on aggregating district-wide outcomes to acknowledge the net result. Since school choice can induce variation within a district for the quality of education a student receives, there is a large potential that the net outcomes averaged over the district may be negative. More students may be harmed than those that benefit from the

induction of school choice, especially if our nation's most disadvantaged students fall in the former category.

Thus, I plan to use a fixed effects model on years of school outcomes to parse out the effects of school choice on public schools. Then, to further my analysis, I will take a weighted average of scores within the treated districts (those with school choice) and compare such with a hypothetical scenario of the same district without school choice. I hypothesize that school choice will stratify the outcomes across schools of the same district, and further, that the net effect of school choice on aggregate outcomes will be negative.

Literature Review

As mentioned, the Coleman Report (1966) is one of the first statistical analyses of nationwide educational data that highlighted the income and racial achievement gap. Although the first state to pass a law allowing the existence of charter schools was in 1991 (Wright & Finn 2016), these ideas of government sanctioned school choice had circulated within society for a while. I will first provide historical context for the theory of government sanctioned school choice, and then summarize the literature of those for and those against said approach to the nation's educational system.

In 1962, one of the University of Chicago's most famous economists, Milton Friedman, published *Capitalism and Freedom* in which he discussed the potential of private market forces to improve educational quality by rethinking the monopolistic power of the government in allocating taxpayer funds (p. 75-79). Instead of the traditional assignment of public schools, he suggested the potential of extending vouchers to parents such that they could decide to which school to send their student. The voucher system would lead to a competitive market, granted there is more than one "seller" (school) and many individual "buyers" (students). Combined with the significant costs of entry (starting a school) and exit (closing a school), Friedman believed schools would provide specific qualities of education that would specifically cater to parents. Although Friedman explicitly discussed a voucher program, this theory underlies government sanctioned school choice— where competition is created by withholding school funding to shift power to families. Thus, deviating from traditional public school assignment, voucher programs, charter schools, and tax credit programs are all ways in which local governments offer families an option to send their students elsewhere, by means of reallocating per pupil educational spending.

Arguments for government-sanctioned school choice ranged from increasing the efficiency of school processes to allowing parents a way to voice their demands. School choice is thought to facilitate local innovation, (Hanushek et. al 2007) since the privatization of education does not hold the same set of regulatory burdens and rigid curriculum as traditional public schools do. Without the same set of regulatory burdens, universities are allowed flexibility to start their own charter schools and continuously experiment with curriculum and their organizational structure based on data-informed decision making. *The Ambitious Elementary School: Its Conception, Design, and Implications for Educational Equality* chronicles how, in the past two decades, the University of Chicago has built a charter school institution that has successfully diminished the racial and income achievement gap for thousands of black students by reinventing core educational mechanisms (Hassrick, Raudenbush, & Rosen 2017). Additionally, some have argued that the newfound threat of losing students, and thus, funding, would lead schools to aim for higher quality (Sude, DeAngelis & Wolf 2018). Now that families have choice, all schools will now have to improve their quality and respond to parental demands to sustain their existence (Ambler 1994). This allows for the differentiation in the educational goals of a school (Hoxby 2003), meaning if families in low income areas prefer college preparatory curriculum and classes, the educational market will respond accordingly.

However, those against school choice are concerned about the risk of autonomy (Wohlstetter et. Al 1995) as well as exacerbating class and racial segregation (Kleitz et al. 2000). When Bifulco and Ladd (2007) studied charter schools in North Carolina, they discovered that the existence of school choice increased racial isolation of both white and black students within and across schools. Furthermore, if a community was racially heterogenous (50% white and 50% black), researchers (Kleitz et al. 2000) were concerned that the introduction of an

alternative public school in a district with solely one neighborhood school could lead to each race constituting a majority in one of the two schools, creating *de facto* segregation. Additionally, entrusting a private party with no prior history to execute public welfare goals based on a written proposal can be risky, especially if it affects the most disadvantaged and vulnerable population, our nation's inner-city students (Garmezy 1991). The National Education Association (NEA) found that one out of every three charter schools that had opened in 2000 closed by 2010, demonstrating extreme instability given that a decade is shorter than the lifetime of a student's education. Furthermore, the Center for Popular Democracy found that the financial impact of fraud, abuse, waste and mismanagement of charter school funds had reached over $223 million in 2017. In the same vein, researchers have found that private schools that accept vouchers are generally of lower quality than the average private school (Sude, DeAngelis & Wolf 2018). They reasoned that the specific subset of private schools that were willing to commit to the regulatory burden of accepting vouchers was likely due to under-enrollment and financial difficulties.

Thus, because of its many forms as well as different implementations, school choice has become a multifaceted conundrum. Although school choice is becoming more bipartisan, there are still ramifications for specific elements of policies as legislators try to win the support of several stakeholders, making most school choice policy politically entwined. Furthermore, some forms of school choice directly target low-income populations (Milwaukee and Louisiana voucher programs), while others focus on students with learning disabilities (Arkansas Succeed Scholarship Program and Florida John McKay Scholarships), complicating holistic research studies. Researchers have used a variety of statistical methods and models to analyze the effects of school choice, however, most of this research focuses on one form of government sanctioned

school choice (i.e. private voucher system) and/or a smaller area within the United States (Cullen et. al 2005, Egalite 2016, Holmes et al. 2003, Sude et al. 2018). Thus, by including both voucher data as well as charter school data, I hope to be able to more distinctively determine the effects for the three main stakeholders: those in a means-tested voucher program, those in charter schools, and those in traditional public schools.

While some papers focus their attention on the admissions processes of charter schools (Eckes & Trotter 2007, Dolle & Newman 2008), they overlook the potential differences in cultural capital between parents who explore school choice versus those that stay in traditional public schools. Almost all enrollment in alternative schools require families to fill out some type of additional form, and thus these schools are "opt-in"— meaning students can be excluded from such policies. Policy makers assume that school choice programs are open to all, but taking advantage of alternative education inevitably requires cultural capital (skills and resources that help individuals navigate within institutions), as well as social capital (a social network) (Lareau, 2015, p. 4). In the case of school choice, families must have knowledge about admissions processes and know how to apply- which is what I consider cultural capital. The families who remain at traditional schools may be unaware of alternative schools and their application processses, and thus could face further disadvantage compared to a system with one assigned public school. Hence, in order to account for these families, I plan to take a weighted average of the district, which will equally represent each student to determine net effects on the district itself. It is plausible that however much a student succeeds in a charter school, there is a corresponding student left behind in the traditional public school who has a greater magnitude of deficit in their learning, further exacerbating the nation's achievement gap.

Thus, I am highlighting the necessity of acknowledging which subgroups of a neighborhood are utilizing school choice. How can we equalize opportunity for all if we cannot equalize the "mediums of equalizers" (school choice) themselves? However, the very puzzling attribute of cultural capital is that it cannot be easily quantified— families of the same exact demographic can hold different amounts of cultural capital. Although some studies (Angrist et. al 2013) compare students who won the charter school lottery versus those who didn't, they ignore the students of families who were not aware of the lottery at all. Therefore, by aggregating outcomes at the district level, a picture can be painted of the effect of school choice on the whole district.

Methodology

Although the federal government requires states to provide various metrics and uphold certain guidelines, states are granted a substantial amount of freedom to construct their curriculum as well as how to evaluate the quality of their schools. Thus, proper comparison amongst states of several outcomes is almost impossible. Hence, to construct a comprehensive analysis, it was of utmost importance to find a state that has multiple forms of school choice.

To assess the effects of school choice on academic success, I plan to use a fixed effects model, and take the computed predictors to create a cohesive analysis of aggregate district outcomes. Fixed effects models allow researchers to control for variables that have not or cannot be measured, by controlling the unit of analysis against itself (Allison 2009). I will be specifically assessing the impact on public schools, and ultimately if their district contained a form of school choice. The model, mathematically, is as follows:

$$Y_{ij} = \theta_i + \eta_j + \beta X_{ij} + \delta Z_{ij} + \epsilon$$

Where *i* is a specific school and *j* is a specific school year. *Y* will be a specific outcome of the school (performance score, dropout rate, graduation rate, etc.). θ is the fixed effects parameter for observed characteristics of schools (demographic information, % economically disadvantaged, etc.). η is a parameter representing differences in time. *X* is a dummy-variable [0,1] that represents if the public school was located in a district with charter school(s), while, *Z* is a dummy-variable that represents if the public school was located in a district in which students attended the Louisiana Scholarship Voucher program. Lastly, β and δ are coefficients that represent the impact of school choice on the specific outcome *Y*. To clarify, each observation within my dataset will have the observed variables (*X*) and outcomes (*Y*) of school *i* at time *j*.

Data Analysis

After surveying the quantity and quality of educational data in all fifty states, it became apparent that Louisiana best facilitate the analysis. Not only has Louisiana published the most outcomes, it contains organization of data by district and has the longest record of public educational data, but the state also offers school choice in the form of charter schools, voucher programs, and tuition donation credit programs.

New Orleans had become the first majority charter school city in the United States, with over 90% of New Orleans students in charter schools (Kincade 2015). Plagued with failing schools in the beginning of the 21st century, the educational system worsened when Hurricane Katrina hit in 2005. Thus, as school campuses were in ruins, public school teachers were on unpaid leave, and students were missing over two months of school, the state's task force contracted charter management organizations and created school choice to speed recovery of the state's educational system (Dreilinger 2016). Further, New Orleans piloted a Scholarship Voucher Program in 2008 that expanded state-wide in 2012 (Louisiana Department of Education 2020a), prior to the adoption of voucher programs in many other states. Although the Louisiana Department of Education (2020b) advertises the Tuition Donation Credit program on its website, the funding itself comes from private donors and the distribution of scholarships are managed by two not-for-profit organizations. Thus, the Tuition Donation Credit program represents an indirect transfer of funds from private entities that do not affect the state's educational budget, which is why it is excluded from this analysis.

School Types	# of Schools	# of Students Served
Public	1177	636,926
Public Charter	146	80,183
Private w/ Public Voucher	113	6,909
Total	**1,436**	**724,018**

Figure 1: The composition of K-12 schools for the 2017-2018 year

Furthermore, Louisiana remains an ideal candidate for this study since the number of alternative (charter, private with voucher, virtual) schools make up such a large portion (18%) of the educational system (Figure 1). Because Louisiana's educational system is disjointed and parish (district) boards wield large amounts of power, the heterogeneity of organizational structures and their educational intentions would make selection bias relatively minimal. Each charter school must be approved by a parish board, and the organization of magnet schools are ultimately left to the guidance of the parish board. Additionally, one may be concerned about selection bias relative to the qualifications to take part in Louisiana's voucher program, as it is means-tested. However, to be eligible for a voucher, Louisiana requires that family income does not exceed 250% of the federal poverty line. Taking a weighted mean of schools, I found that 63% out of all Louisiana high schoolers in the 2017-2018 year were economically disadvantaged. Thus, I expect an even higher proportion of the state's high schoolers to be under 250% of the federal poverty line. Furthermore, if families are above the voucher ceiling, they can still attend the scholarship school by means of direct payment.

Because the metrics to evaluate high schools differ substantially from the metrics used to evaluate elementary and middle schools for Louisiana, I ultimately had to select on which type to run a fixed effects model. Although elementary and middle school data in Louisiana includes attendance, dropout, and LEAP (Louisiana Educational Assessment Program) scores per school, the high school data contains significantly more outcomes. These additional metrics includes average ACT score, drop-out rates, percent enrolled in college, graduation rates, and strength of diploma (a formula to determine how likely students from 9th – 11th grade are to graduate on time). These additional factors generate a much more comprehensive School Performance Score (SPS) for Louisiana High Schools. The overview of schools serving high school students (8th - 12th grades) is shown in Figure 4, and alternative schools also make up a fifth (20%) of all Louisiana public high schools.

High School Type	**# of Schools**
Public	259
Public Charter	40
Private w/ Public Voucher	12
Virtual	4
Total # of High Schools	315
Total Students	163,973

Figure 2: High Schools in Louisiana for the 2017-2018 school year

From my data analysis, there are a total of 21 parishes out of 67 that offer school choice to high schoolers, either through means of charter schools and/or offering vouchers to approved private schools under the Louisiana Scholarship program. Since Louisiana strengthened its data collection at the start of 2012, and any information prior is only available as a PDF or was not recorded, eight years of historical school data were available for use in this study (starting from the 2011-2012 school year and ending after the 2018-2019 school year).

Type of Parish	**# of Parishes**
No School Choice	46
Charter	8
Voucher	7
Charter & Voucher	6
Total	**67**

Figure 3: Parishes in 2018-2019

Tracing the respective parish of each student attending virtual schools (online schooling) is nearly impossible, since a Louisiana resident can attend any virtual school of their choice. From the 2017-2018 data, there were only four virtual schools that served a total of 129 Louisiana seniors. Out of the 43,575 seniors taking the ACT during the 2017-2018 data, seniors from virtual schools made up less than 0.3% of the test-takers. Thus, I've decided to exclude virtual schools from my dataset, since only 3 out of every 1,000 seniors attend virtual schools.

Magnet schools are another form of school choice offered in Louisiana, in which geographical boundaries are disregarded so academically talented students can gather together and attend advanced programs with rigorous curriculums (Gamoran 1996). Yet, admissions processes of magnets vary— while some are test based (like Louisiana School for Math, Science & the Arts), others use a student's grade point average for consideration (C.E. Byrd High School). Additionally, some schools only have a portion of the student body enrolled in a magnet program (C.E. Byrd High School), whereas other schools require all students to be a part of a magnet program (Louisiana School for the Math, Science & Arts). Further, while most magnet schools are directly managed by their parish board, several magnets are run by university institutions. Because of large deviations within the execution of magnet schools and the lack of standardized guidelines, it is very difficult to compare schoolwide results on an equal basis. Another problem arose within the fixed effects model— within the period of data collected, additional magnet schools did not open, and current ones did not close. Thus, because there is no change in magnet school status throughout the last decade, the fixed effects model cannot evaluate the effect of a magnet school on a district.

In spite of these early limitations, I was able to perform the fixed effects model for three different outcomes: ACT scores, graduation rates, and school performance scores. Below, I

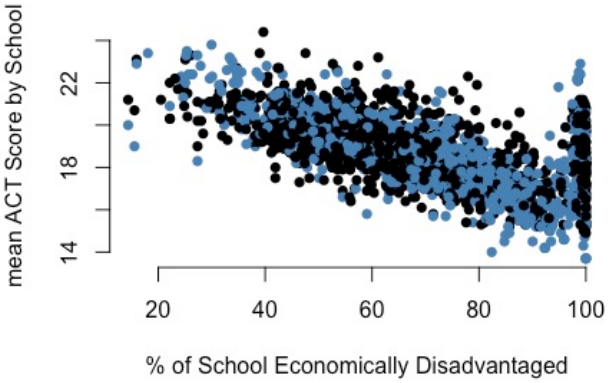
describe the results for each outcome, interpret each coefficient, and summarize goodness-of-fit statistics. In order to simplify terminology within the analysis, I will refer to districts that contain charter schools and/or vouchers for private schools as "school choice districts". On the other hand, I will refer to districts that do not contain any pertinent form of school choice, and thus require their students to attend their geographically assigned school, as "traditional districts." The unit of the fixed effects model is a public school at a period in time, and binary variables are used to account for which type of district the public school is situated in.

Outcome Metric: ACT Score

A widely contested outcome metric, the ACT (American College Testing) exam has been used since 1959 by colleges to evaluate high school students in the admissions process. For more than a decade, standardized college entrance exam scores have been known to be highly correlated with parental income (Rampbell 2009). As shown in Figure 4, there exists a very similar relationship between economic disadvantage and ACT scores, even at the school-level.

Louisiana, in state legislation R.S. 17:3973, defines economic disadvantage as students with one of the following characteristics: homeless, incarcerated, in the state foster system, or a student in a family that requires any form of financial assistance (food, healthcare, self-sufficiency). With almost a fifth of Louisiana's population in poverty (U.S. Census Bureau 2019), it is likely that the economically disadvantaged designation is most frequently used to describe those who require financial assistance— which is more colloquially known across the

Fig. 1: ACT scores v. % Econ. Disadvantaged



nation as those who receive “free or reduced lunch.” Since the units of the dataset are at the school-level, Louisiana releases the percentage of a school population who is, by the state definition, economically disadvantaged.

In Figure 4, public schools in school choice districts are colored blue, whereas public schools in traditional districts are colored black. While public schools in school choice districts outperform their counterparts in traditional districts when there is a smaller percent of economically disadvantaged students (<40%), it is evident that public schools in school choice districts underperform those within traditional districts when there is a larger percent of economically disadvantaged students in their schools (from 60-90%). I hypothesize that this relates to Friedman’s theory of school choice inducing competition, but with the caveat of cultural capital. With a lower percentage of economic disadvantage, public schools from school choice districts have distinctively higher ACT scores (illustrated by the cluster of blue points above the black between the 20-40% economically disadvantaged range)— demonstrating the theory that induced competition does lead public schools to strive for higher quality. However, since economically disadvantaged families are likely preoccupied with satisfying basic needs, they would not have the time, resources or cultural capital to evaluate school options in the same manner that wealthier families can. Combining the idea that Friedman’s educational market is only competitive if the “buyers” are concerned about quality, and that alternative schools within school choice districts are “opt-in”, it is unsurprising that public schools in very disadvantaged districts may not feel competitive pressures of school choice.

After running the fixed effect model on ACT scores as an outcome by using the `plm` package in R, the results are shown in Table 4. There is a total of 261 unique schools, observed from a range of 1-8 periods (years), for a total of 2,031 observations.

Outcome: ACT Score				
n = 261, T = 1-8, N = 2031, f test pvalue < 2.22e-16				
Term	**Estimate**	**Std. Error**	**p.value**	**Sig. Level**
Scholarship	-0.3295765	0.07359908	8.02E-06	***
Charter	0.30233714	0.08862359	0.00066072	***
Senior Count	-0.0003829	0.00017474	0.02857092	*
% Female	0.02211878	0.00976246	0.02359069	*
% Minority	-0.0012301	0.00090564	0.17455715	
% Fully Proficient	0.00821734	0.00096722	4.12E-17	***
% Economically Disadv.	0.00330552	0.00193839	0.08831667	.

Table 4: The results of a fixed effects model on the outcome ACT Scores

Firstly, it is important to notice that presence of charter schools and scholarship schools have opposite effects on ACT scores of public schools. For two public schools of the same characteristics, the public school situated in a district with scholarship-approved schools perform, on average, 0.3 points worse on the ACT than the public school in a traditional district. However, for two public schools with identical characteristics, the public school situated in a district with charter schools perform, on average, 0.3 points higher on the ACT than the public school within a traditional district. I have verified that both types of school choice are located in districts with similar levels of economic disadvantage (Appendix B), but the key difference is that most Louisiana private schools approved for the voucher program are religious— over 80% of the scholarship-approved private schools for the 2018-2019 school year has a religious affiliation. Friedman's market competition theory does not consider the possibility that families may be more motivated by how their religion is practiced than the objective quality of the school, which is what I ultimately hypothesize leads to polarized effects of school choice. Thus, it is likely that public schools in areas with scholarship approved private schools may feel a lack of pressure to compete, since they cannot provide the same quality of religious education.

Furthermore, my fixed effects model suggests that for two public schools with the same characteristics, on average, the public school with 500 more seniors will have a lower ACT score, a magnitude of 0.2 points fewer. I hypothesize this decrease in score is due to the typical structure of school administrations, where there is one principal, and maybe several assistant principals. However, the larger the student body, the less time and effort school administrators will have available to commit to each student. Howley and Howley (2006) find a similar conclusion, where smaller schools promote a "close-knit family atmosphere" and "a shared commitment to a set of core values" (p. 1). I believe these effects are amplified within learning, and with school administrators having less capacity to devote to each student, individualized mastery of a topic becomes harder to achieve, leading to gaps in learning that reveal themselves in ACT scores.

Thirdly, from the results of my fixed effects model, I expect that when comparing two public schools with the same characteristics, on average, the public school with 10 percent more females will have a higher ACT score of 0.2 more points. While Capraro, Capraro and Wiggins (2000) found that females are no less likely to score well on mathematics standardized tests than were their male counterparts, Mucherah and Yoder (2008) found that female students had higher levels of reading motivation, which directly led to female students achieving higher reading scores for standardized testing. Thus, I hypothesize while math section scores may be the same, since half of the ACT exam consists of reading and writing skills, a higher percentage of females at a school may lead to higher ACT scores. As expected, the ratio of fully proficient students has a positive effect on ACT scores. Although Louisiana does not provide a definition for full proficiency, Limited English Proficiency students are defined as individuals who do not speak English as their primary language and have a limited ability to read, speak, write or understand

English. If a family lists another language besides English, the student is offered an English Language Proficiency screener, and if the student fails the screener, the student will be identified as Limited English Proficiency (LEP) until the student is deemed English proficient. Furthermore, since LEP students are still required to take all examinations, I believe that the results of the analysis are validated.

Finally, the positive effect between percent economically disadvantaged and ACT scores may seem counterintuitive. However, the percent economically disadvantaged at a school only considers whether a student's family needs financial assistance or not and is not a continuous variable like parental income. Although a family may not qualify for federal assistance, that does not guarantee they have the capacity to spend 100 or more dollars on ACT preparation (since test preparation is the underlying factor behind parental income that creates profound correlation of ACT scores). Furthermore, Louisiana has the largest gap in mean incomes of families sending their children to public versus private school. I hypothesize that this is ultimately the situation in which the majority of families are still lower class, even if they are not economically disadvantaged. What I believe causes the striking positive relationship between percent economically disadvantaged and slightly higher ACT scores is Louisiana's Minimum Foundation Program (MFP). The MFP aims to allocate funds equitably, and thus uses "add-on" weights for certain student characteristics (like economic disadvantage or student disability) to recognize the extra cost of instruction. For the 2019-2020 school year, the state allocated an additional $570 on average per economically disadvantaged pupil (Louisiana D.O.E. 2019). Thus, a slight change in percentage of economically disadvantaged students (e.g., 2-3 more students qualify for free/reduced lunch one year because their parents lost employment) would result in an extra

$1,000+ for the school in the short term and would not undo the student's long-term academic success prior.

Since my analysis uses the `plm` package of R, the R-squared values of the 'full' model are not exhibited, and rather, only the R-squared values of the 'projected' model are displayed. Thus, the projected R-squared metrics are unreliable for goodness-of-fit because they do not account for the individual fixed effects that explain additional variation (Endsley 2016). However, the p-value of the F-statistic is suggested as an appropriate measure of goodness of fit for a fixed effects model (Torres-Reyna 2010). Thus, for the ACT outcome, my fixed effects model had a p-value of less than 2.2×10^{-17} for the f-test, signifying that these results likely did not happen by chance.

Outcome Metric: Graduation Rate

Louisiana identifies graduation cohorts at the beginning of 9th grade each year, separating cohorts by school. A student successfully graduates with their cohort if they graduate no later than August 31st of their fourth year (Louisiana Board of Education 2017). Ultimately, the graduation rate is used to determine how many students have dropped out or are unable to complete their degree by the summer of their fourth year. Removals from the cohort are granted if the student has died, transferred out of state, or transferred to a non-public school. For transfers across schools, rules vary slightly, depending on whether it is within the same district or across districts (Louisiana Board of Education 2017). In simplest terms, students who transfer within their first three years are ultimately counted at their new school. For those that transfer after their third year are still counted at their older school (Louisiana Board of Education 2017). However, a strong limitation of using graduation rates is that Louisiana hides the rates of schools if the graduation rate is below 5% or above 95% for privacy protection. Additionally, Louisiana did

not publish their graduation rates by school for the 2011-2012 school year. To account for both concerns, I have removed those observations from the fixed effects model, leaving the total number of observations to be 1605.

Outcome: Graduation Rate				
n = 263, T = 1-7, N = 1605, f test pvalue < 2.22e-16				
Term	**Estimate**	**Std. Error**	**p.value**	**Sig. Level**
Scholarship	24.6923011	6.0657384	4.96E-05	***
Charter	39.9729327	4.77153247	1.35E-16	***
Senior Count	0.03659192	0.00824348	0.00000979	***
% Female	-1.8163776	0.48313966	0.00017759	***
% Minority	-0.0000352	0.01853708	0.99848694	
% Fully Proficient	0.00885719	0.04583795	8.47E-01	
% Economically Disadv.	0.53478826	0.09726733	4.59E-08	***

Table 5: The results of a fixed effects model on the outcome of Graduation Rates

A particularly meaningful result from this outcome is the large positive effect of school choice districts. A possible explanation is indeed Friedman's competition theory, as school quality is known to have a negative relationship with probability of drop-out (Mahuteau & Mavromaras 2014). Further, it is well-known that students who do not finish high school are more likely to face lower wages, need public assistance, and end up in prison (Olson, 2006). However, I fathom there may be another underlying factor that is accounted for by the coefficient of school choice districts—geographic area. From Table 6, a plausible generalization is that school choice programs are about four times more likely to be located in denser (suburban and city) areas. Thus, this relationship may be indirectly reflected in the results of the fixed effects model, where difference of geographic area/density may play a

Geographic Location of School Types for 2017		
Locale	**Traditional Public**	**Charter**
City	24.9%	56.0%
Suburban	32.1%	26.2%
Town	13.9%	6.4%
Rural	29.1%	11.3%
Total	**100%**	**100%**

Table 6: National Center of Education Statistics

key role in sculpting social norms of graduating high school. McCracken & Barcinas (1991) found that a higher percentage of urban students had aspirations for post-college education versus rural students, with rural students twice as likely to not attend college as urban students.

Perhaps surprisingly, senior class size exhibits a positive relationship with graduation rates. The model predicts that when comparing two schools with equal characteristics, the school with an additional 100 seniors will have a graduation rate that is 3% higher. Although a technical explanation could be that the weight of one college dropout decreases as the grade size gets larger, I hypothesize that the positive relationship between graduation rate and class size could also relate to academic tracking. Academic tracking is the practice of offering differential curricula by assigning high school students based off of their interests and abilities, which has faced significant controversy for promoting educational stratification within academic achievement and student aspirations (Conchas 2006). However, for schools with class sizes larger in magnitude, the probability of academic tracking is more likely (based on the fact there are more students to separate into more classes). The differentiated curriculum and separating peers closer in ability has been found to compensate initial disadvantage of student characteristics (economically disadvantaged, gender and racial disparities), and thus have been found to have a net effect of lifting graduation rates (Gamoran and Mare 1989).

Although the negative relationship between the female ratio at a school and its graduation rate may be unanticipated, Olatunji (2005) found that Mexican-origin girls are three and half times more likely than boys to leave school. Further, the results of the fixed effects model indicate a positive relationship between percent economically disadvantaged and graduation rates. I propose that this is similar to the earlier argument for the ACT score outcome, in which

the additional MFP funding to schools for economically disadvantaged students allows schools to build additional resources.

Outcome Metric: School Performance Score

Since 1999, Louisiana has issued yearly school performance scores (SPS) to impartially compare and evaluate schools against one another. This score, based on a 150-point scale, is converted to a letter grade (A-F), in which Louisiana hopes will be a reliable and simple metric for families to compare schools (Louisiana Department of Education 2018). It is a weighted score of several metrics, as described in the table below:

Table 7: Louisiana School Performance Score Breakdown for the 2016-2017 year

Metric	Weight	Description
Graduation Rate	25%	Measures the number of students to graduate within four years.
ACT/Workkeys	25%	Measures student performance on the ACT or WorkKeys assessment
State Assessment	25%	Uses LEAP scores and other state subject assessments to assess student progress and performance
Strength of Diploma	25%	Measures students graduating in four years with high value college or career credentials (AP and IB Programs)

It is important to note that 100 points as an SPS score signifies 100 percent proficiency for all students, while a score of 150 points for a school demonstrates advanced proficiency for all students (Louisiana Department of Education 2012). The SPS score is also the metric that Louisiana uses to numerically evaluate whether a school is failing and needs intervention. Schools are incentivized to strive for an "A" through the promise of financial rewards and public recognition. However, if a school receives a D or F letter grade for a consecutive number of years, they may face soft remedial tactics (the state working closely with the school administration on a turnaround plan) or, more severely, face permanent closure. Thus, for a

variety of reasons, the SPS score is key to many stakeholders— the board of education, school faculty, and parents. Something to note is that Louisiana occasionally adjusts its SPS formula. Upon computing box and whisker plots of school performance scores by year, I realized that there existed a large deviation in SPS for the 2011-2012 school year— likely because of a change in formula computing. Unfortunately, the Louisiana Department of Education only began publicly posting its SPS formula in the 2017-2018 school year. Thus, from excluding the 2011-2012 school year in the fixed effects model, my residual sizes improved significantly. The results of the fixed effects model for SPS scores are shown below.

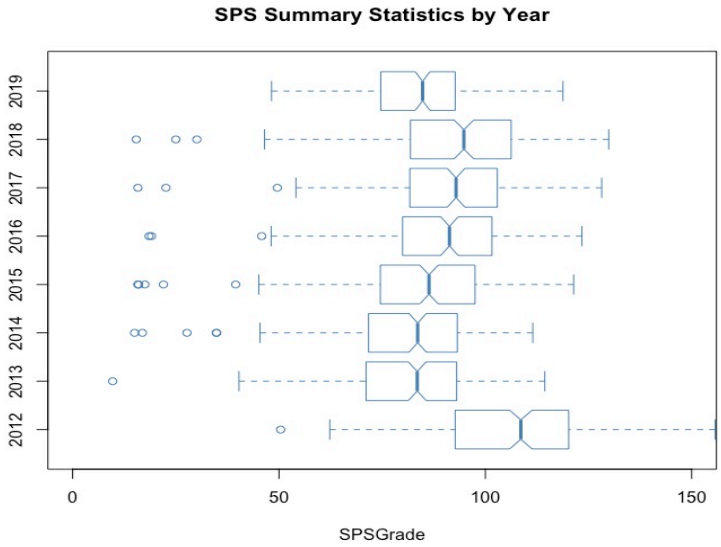


Figure 3: A Box and Whiskers plot of SPS by year.

Outcome: School Performance Scores				
n = 268, T = 1-8, N = 2079, f test pvalue is 2.22e-16				
Term	**Estimate**	**Std. Error**	**p.value**	**Sig. Level**
Scholarship	6.15677255	1.42660919	1.6929E-05	***
Charter	6.65333339	1.10312011	2.0334E-09	***
Senior Count	0.0082512	0.00193389	2.1057E-05	***
% Female	-0.1298685	0.10626231	0.22183846	
% Minority	-0.0083302	0.00435335	0.05586841	.
% Fully Proficient	0.04829221	0.01016796	2.2301E-06	***
% Economically Disadv.	0.00071358	0.02116333	0.97310675	

Table 8: The results of a fixed effects model on School Performance Scores

Public schools in school choice districts, on average, perform higher than those in traditional public schools. Although religious preferences may still influence families who decide to enroll their children into voucher-approved private schools, I believe the transparency and simplicity of SPS grades cause school performance scores to weigh heavily on a family's decision. Furthermore, scholarship-approved private schools are not required to post ACT results, but they do receive a SPS grade that is public to the community. Thus, because SPS grade are available to families to compare while ACT scores are not, public schools in school choice districts may see more value in improving their SPS grade instead of their ACT score. Ultimately, this is what the state of Louisiana prefers, since the SPS grade is what they deem to be a holistic metric.

From my results of the fixed effects model, for two public schools with the same characteristics, I expect an additional 100 seniors at one school to result in an additional 0.8 points towards a school performance score. I hypothesize that this also relates to academic tracking, and that a school is more likely to pursue academic tracking if the student body is larger. Not only does the strength of diploma index heavily reward Advanced Placement classes, but differentiated curricula may also help all students perform better on state assessments.

Since Limited English Proficient students are still required to take state assessments as well as standardized assessments, there is no surprise that a smaller ratio of LEP students would result in a better school performance score, given the large weight of assessments. Further, the Strength of Diploma index prefers students who take Advanced Placement classes. As anticipated, a study conducted by Moore and Slate (2008) found that the percentage of Advanced Placement enrollment were relatively low for students who were limited English proficient (2008). Finally, for two public schools with almost identical characteristics, my results suggest

that, on average, the school with a 10% higher minority population will have a SPS that is 0.08 points less. Moore and Slate's (2008) study also found that Hispanic and black student populations are enrolled at a lower rate for Advancement Programs compared to their white counterparts.

Comparisons in Net District Outcomes

Lastly, what prompted this data collection was determining how school choice affects net district outcomes. By choosing a fixed effect model, I now have numerical estimates of how the existence of school choice within a district affects net outcomes, and further, its fitted values. Although I personally felt that using the school performance score as outcome may provide unreliable results given that it itself is a weight of many other metrics, I was surprised with the small size of the residuals. The residuals v. fitted values plot (Figure 4) shows points that are distributed fairly symmetrically, clustered around the lower digits of the y axis, and in general do not have many clear patterns. With the first and third quartile of the residuals being -4.7, and 4.7, respectively, I felt comfortable using my data to estimate the district outcomes if a school choice district were instead a traditional district.

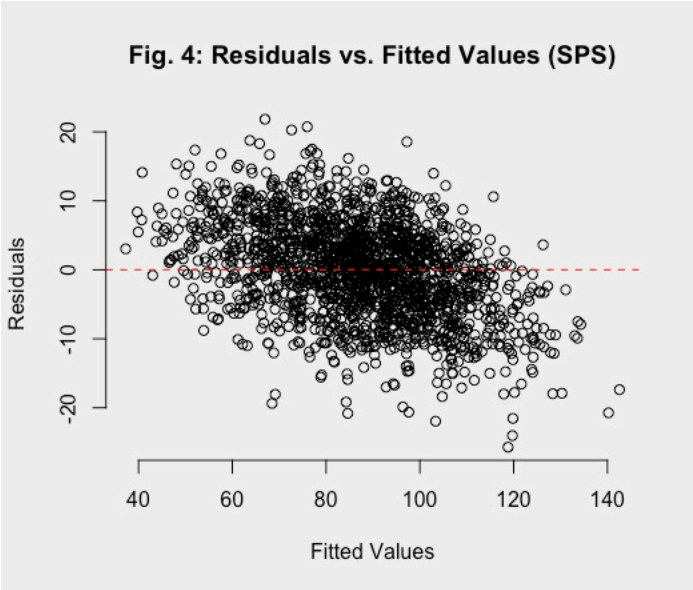


Fig. 4: Residuals vs. Fitted Values (SPS)

While all charter school data is published, Louisiana only provides Scholarship Cohort Indices (which has the same formulae as school performance scores) if there is an average of ten

or more students per grade or 40 or more students enrolled in tested grades. Without the corresponding SPS scores for certain scholarship-approved private schools, I would not be able to properly conduct the net district outcome. Thus, I removed nine school choice districts out of a total of twenty-six for my additional analysis.

Using data from the 2018-2019 school year, I pooled together all public schools, charter schools and scholarship-approved schools of a school choice district. The total number of seniors per school was provided for public schools and charter schools, but I believe, because of privacy concerns, the grade breakdown of voucher students in private schools were hidden. However, I estimated the number of seniors per grade by dividing the total number of voucher students by the total number of grades. Below is one of the school choice districts and its observations from my dataset:

Table 9: The schools of Claiborne Parish during the 2018-2019 year

Site Name	Type	Senior Count	SPS	Fitted Values
Summerfield High School	Public	77	82.9	93.3
Homer High School	Public	139	83.8	91.3
Haynesville Jr./Sr. High School	Public	156	73.2	85.2
Northeast Claiborne Charter	Charter	12	58.8	-

Something important to note is that because my fixed effects model was only on public schools, I only have fitted values only for public schools that cannot be adjusted to predict the expected SPS of charter and voucher-approved private schools. The goal of this analysis is still to compute the net weighted (by student) SPS of a school choice district, and then take the fixed effects results to compute the expected net SPS of the same district if it were to be a traditional district instead. However, computing the fixed effects coefficients for a traditional district scenario would only be comparable to the actual district in the situation of fitted values, and not

actual. Thus, to mitigate this problem, I have used fitted values instead of actual values to compute the real net SPS of school choice districts, as shown in my equation below:

$$netSPS_{school\ choice} = \sum_{i=1}^{k}(\frac{N_i}{N} * \ fitted\_public\_SPS_i) \ + \sum_{i=1}^{m}(\frac{N_i}{N} * actual\_schoolchoice\_SPS_j)$$

Where *k* is the number of public schools in the district and *m* is the number of alternative (charter or private-voucher schools) in the district. Further, *N* is the total number of students in the district and N_i represents the number of students at one school. To clarify, the net district SPS for school choice of Claiborne Parish would thus be:

$$netSPS_{sc} = \frac{77}{384}(93.3) + \frac{139}{384}(91.3) + \frac{156}{384}(85.2) + \frac{12}{384}(58.8) = 88.2$$

Thus, using the fitted values of my fixed effects model for public schools alongside actual SPS grades of alternative schools, the expected SPS of Claiborne Parish would be 88.2, in its current state of school choice. However, I wanted to also compute the scenario in which Claiborne Parish was a traditional district. Thus, I modified the fitted values of the public schools for such.

From Table 8, the results from the fixed effects model suggests that when comparing two public schools of similar characteristics, on average, the public school in a district with charter schools would have an SPS that is 6.65 points higher than the public school in a traditional district. Furthermore, the student count at public schools would have to increase to account for the removal of the charter school, which is why I have added a senior count of 4 to all public high schools. Furthermore, Table 8 suggests that each additional senior would result in a 0.08 increase in SPS. Thus, for Claiborne parish, my hypothesized traditional district would resemble:

Site Name	Type	Senior Count	Fitted Values Adjusted for Change in District
Summerfield High School	Public	77 + **4** = **81**	93.3 **-6.65** + **4*0.008** = **86.682**
Homer High School	Public	139 + **4** = **143**	91.3 **-6.65+4*0.008** = **84.682**
Haynesville Jr./Sr. High School	Public	156 +**4** = **160**	85.2 **-6.65+4*0.008** = **78.582**

And the new district SPS for Claiborne Parish would be:

$$netSPS_{trad} = \frac{81}{384}(86.682) + \frac{143}{384}(84.682) + \frac{160}{384}(78.852) = 82.7$$

Thus, analysis suggests that if Claiborne Parish closed Northeast Claiborne Charter and became a traditional school district, the net district SPS would decline by 6.62 points. However, it must be noted who benefits and who loses in the school choice district. While the analysis suggest Claiborne public schools perform better in a district with school choice, students at the charter school subsequently learn at a lower-quality school.

After running this analysis on the remaining school choice districts, the results are synthesized in a table on the next page. The analysis shows that public schools of school choice districts would perform a weighted average of 10 points worse if in a traditional district. However, another striking finding is that the average SPS of alternative schools (charter and voucher-approved private) are 9 points lower than the average SPS of the public school in the same district. It may seem absurd that over half of the 1,263 students enrolled in alternative schools, whose families had to apply to since these alternative schools were of thought of higher quality, are actually attending schools of lower excellence than their neighborhood public schools. Although there are six districts in which alternative schools outperform their public school counterparts, it is extremely critical to note that these districts did not have scholarship-approved private schools. Friedman's theory does hold, where competition seems to visibly induce higher quality, especially at public schools— but at what cost for those students in alternative schools?

District	# of Charters	# of Private-Vouchers	Seniors at Charter/ Private-Voucher	Seniors in Traditional Public Schools	Total Seniors	Weighted SPS of Traditional Schools	Weighted SPS of Charter/Private Schools	Net SPS of School Choice District	Net SPS of Hypothesized Traditional District	% Change in Net SPS
Ascension Parish	0	1	5	1235	1240	95	52	95	88	-7%
Avoyelles Parish	2	0	118	489	607	85	101	81	75	-12%
Caddo Parish	2	1	68	1760	1828	77	34	79	66	-14%
Calcasieu Parish	1	0	95	1744	1839	91	71	92	79	-13%
Claiborne Parish	1	0	12	372	384	88	59	89	83	-6%
East Baton Rouge Parish	4	0	534	2401	2935	61	67	60	48	-21%
East Feliciana Parish	1	0	52	350	402	75	86	73	67	-10%
Franklin Parish	0	1	16	225	241	58	56	58	52	-11%
Jefferson Parish	2	2	77	1915	1992	77	58	77	71	-7%
Lincoln Parish	1	0	38	534	572	96	60	99	93	-4%
Morehouse Parish	1	0	64	34	98	71	79	54	48	-32%
Rapides Parish	0	1	9	2122	2131	81	65	81	74	-8%
Richland Parish	1	0	57	660	717	76	74	76	70	-8%
St. John the Baptist Parish	0	1	7	397	404	79	61	79	72	-8%
St. Landry Parish	1	0	18	1361	1379	70	89	70	57	-18%
Union Parish	2	1	83	213	296	77	83	74	62	-20%
Vermilion Parish	0	1	10	921	931	103	45	104	97	-6%
State (Weighted)	**19**	**9**	**1263**	**16733**	**17996**	**79**	**70**	**80**	**70**	**-12%**
method of state calculation	sum	sum	sum	sum	sum	weighted avg	weighted avg	weighted avg	weighted avg	weighted avg

Conclusion

Although the fixed effects model and subsequent analysis demonstrate that observed school choice districts have better net outcomes under a school choice structure than a traditional district structure, the current inequity amongst school quality cannot be ignored. Furthermore, the constant reversal in direction of school choice effects amongst outcomes demonstrates that school choice, and its relationship to student achievement, is still relatively unclear.

With the percentage of charter schools relative to public schools linearly growing, I estimate that charter schools will compose half of the public schools by 2030 (Appendix C). Furthermore, EdChoice reported that, as of 2019, over 188,000 students use private school vouchers—which is almost three times the enrollment in 2010. Thus, the problem of school choice is time-sensitive, especially in conjunction with the increasing achievement gap. Given that states have autonomy in how they structure schooling in their districts, national standards must be set to prevent the exacerbation of low-quality schools.

The new existence of school choice that focuses on the privatization of educational resources to improve student outcomes has subsequently led to unintended consequences, as demonstrated in the data analysis. Moreover, the Louisiana Department of Education boasts about the money saved per pupil by use of voucher programs, and schools aligning their mission and objectives to increase appeal to families— but at what cost? While private schools may look promising, especially to parents who prefer that their child receive religious education, the small number of students scattered across different private schools with limited cohesion can lead to the effects of school choice being undetectable, or even worse, ignored.

However, there also exist several limitations of the data collected and used. The validity of observed variables in predicting the outcomes may not be its optimal. There could be

unexplained variation, for example, by not accounting for unemployment rates, which may affect the student's emotional well-being if a family member is without a job, and thus affect outcomes. There also is a validity concern with the outcomes chosen— are they the best measurement of the quality of education a child receives in school? Should states start shifting to collecting data regarding "grit" and other intrapersonal skills, which are proven to be better predictors of lifelong success (Duckworth 2007)? Additionally, there is the question of whether the findings for Louisiana are representative of the whole United States. Given the extreme variation in demographics of other states, as well as policy execution, it is not surprising that much of the existing school choice research is not consistent.

Thus, the ideal study would include student-level data, instead of school-level data, to best account for differences in outcomes. Additionally, it would presume that the policies are consistent across states, in order to be representative of the nation, further stressing the need to outline national standards promptly. Lastly, it is important for states to move forward from using assessments as metrics of success— with such, we become a culture that starts "teaching to the test" and when doing so, we start removing essential parts of a well-rounded education.

Furthermore, charter schools have existed for almost three decades, yet significant improvement in our achievement gap has yet to be seen. Reardon, in 2011, found that the income achievement gap was still growing even after two decades since the first establishment of charter schools and school choice. Figures 6a and 6b, data taken from the 2017 Digest of Statistics of the NCES, demonstrate how traditional public schools have significantly higher populations of white students and charter schools have significantly higher populations of minority students, which aligns with the theory that school choice may lead to racial segregation.

Yet, there are multiple lessons to gain from the existence of school choice, specifically from *The Ambitious Elementary School* (Hassrick, Raudenbush & Rosen 2017). For example, building parent networks, reinforcing collaboration amongst school faculty, and focusing further on a student's socioemotional well-being are all methods that can be replicated. The quality of education in the United States should not be restricted by geographical boundaries or how much social and cultural capital a family has. We must be cautious to avoid instituting policy solutions that further amplify the achievement gap.

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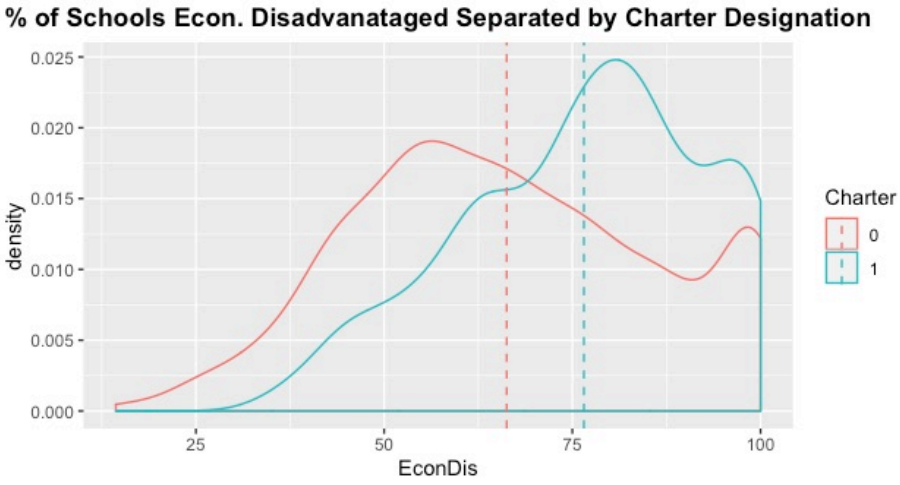
Appendices

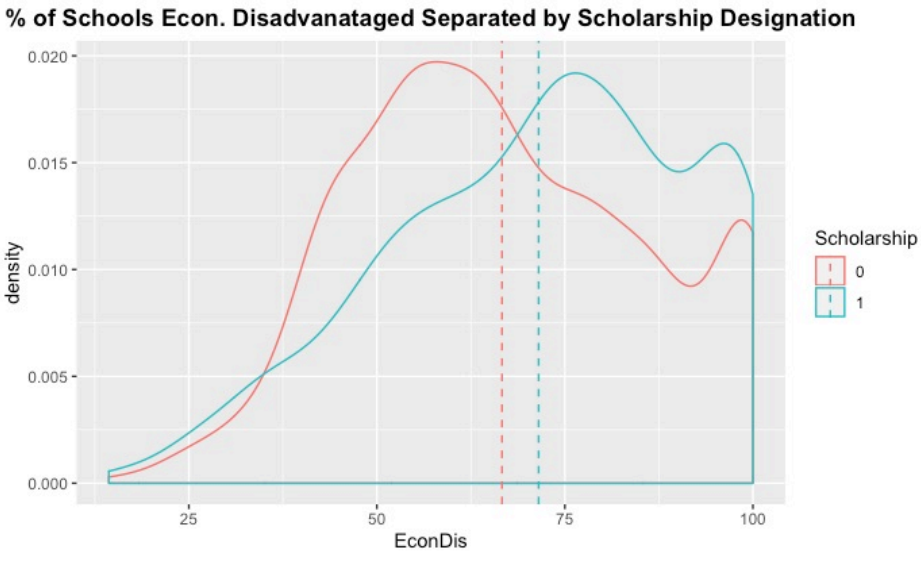
Appendix A (Data from 2017 Digest of Statistics, *National Center of Educational Statistics*)

Geographic Location (out of 100%) for 2016-17 Data		
Locale	**Traditional Public**	**Charter**
City	24.9%	56.0%
Suburban	32.1%	26.2%
Town	13.9%	6.4%
Rural	29.1%	11.3%
Total	100%	100%

Appendix B (Data from Louisiana D.O.E., part of study dataset)

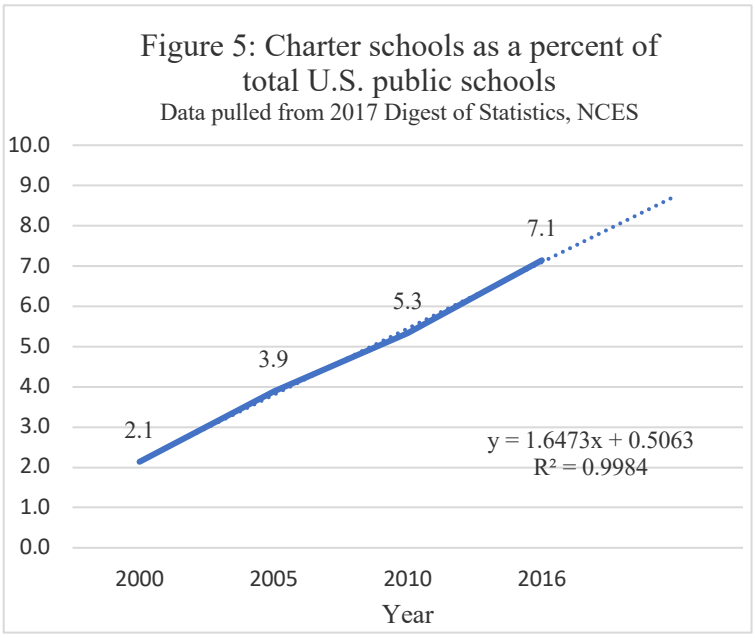


Density plots of economic disadvantage in public schools comparing districts with charter schools (blue) versus traditional districts (red).



Density plots of economic disadvantage in public schools, comparing districts with scholarship programs (blue) versus traditional districts (red).

Appendix C (Data from 2017 Digest of Statistics, *National Center of Educational Statistics*)



Appendix D (Data from 2017 Digest of Statistics, *National Center of Educational Statistics*)