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Participation Patterns in Private School Choice Programs in the U.S.: States, Schools, Students

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Abstract

Private choice programs provide government resources to qualified families to enable them to enroll their children in private schools of their choosing. “Gold standard” experimental studies have found overall mixed impacts of voucher programs, one form of private school choice arrangements, on student academic achievement. Yet, these results face external validity challenges, as both states, schools, and students can choose to participate in private choice programs, generating selection issues.

This dissertation focuses on the decision-making of states, schools, and students in participating in private school choice programs. The first study estimates the effect of state level social factors on private school choice program adoption and expansion. Results indicate that political factors dominate predictions of policy adoption, and once enacted the program expansions tend to be driven by educational needs within states rather than their political environment. Also, individual tax-credits/deduction policies show a different logit in terms of program adoption and expansion than other types of private school choice programs.

The second paper examines private school participation patterns in voucher programs in DC, Indiana, and Louisiana for 2014-15 school year. Results reveal that higher tuition levels and larger cohort enrollments, conditions normally associated with high quality schools, help identify schools that are less likely to participate in voucher programs. Further, private schools in D.C. and Louisiana, the two states that have higher regulatory burdens, are less likely to participate in their voucher programs compared to private schools in less-regulated Indiana.

The last paper focuses on student participation patterns in the Louisiana Scholarship Program (LSP). Specifically, we investigate if there is any systematic pattern regarding program attrition. Little evidence is found that more disadvantaged students, economically and academically, are “cream skimmed” into or “pushed out” of the voucher program. Students with

lower baseline test scores, however, do tend to face a greater risk of leaving the LSP, as do students who were assigned private schools farther from home and schools that serve larger minority populations. Results indicate that in the LSP, students' self-selections into and out of the program are driven more by the program design rather than by their personal demographics.

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Dedication

This dissertation is dedicated to my families and friends, without whom none of my success would be possible.

Table of Contents

List of Tables

Chapter 2 Going Private: Political Factors Shaping the Enactment & Expansion of Private School Choice in the U.S

Chapter 4 Do You Have Your Cream with Your Choice? Characteristics of Students Who Moved into or out of a Private School Choice Program

List of Figures

List of Published Papers

Chapter 2:

Sude, Y., DeAngelis, C. A., & Wolf, P. J. (2018). Supplying choice: An analysis of school participation decisions in voucher programs in Washington, DC, Indiana, and Louisiana. *Journal of School Choice*, *12*(1), 8-33.

Chapter 1

Introduction

Ever since the publication of A Nation at Risk, the unsatisfying public education results in the U.S. have become a major concern of parents, school leaders, and education policy makers. Several attempts have been made to remedy this situation and increasing funding has been a common approach. However, the flat performance on the NAEP test scores, lasting achievement gaps between students of different races, and the discouraging PISA international test scores in the last three decades reveal a regrettable truth: an increase in spending does not necessarily translate into higher student achievement, especially for students in most need (NCES, 2018; OECD Education, 2015; Hanushek, 2003).

Private school choice programs have been enacted and expanded across the States since the 1990's as another remedy for the unsatisfying condition of the public education system. Such programs provide resources to qualified families that allow them to attend a private educational institution of their choice (Wolf, 2008, p. 635). Private school choice arrangements have been considered a policy solution that aims to address education quality and equity concerns by introducing competitive pressures, funding individual students and not schools, and empowering families to control their child's education (Friedman, 1955; Chubb & Moe, 1990). To date, 30 states have enacted at least one form of private school choice arrangements including vouchers, tax-credits, individual tax-credit/deductions, and Educational Saving Accounts (ESAs) (Figure 1.1), enrolling approximately 466,000 students nationwide in the year 2017-18 (EdChoice, 2018, p.7).

With the rapid expansion in both the number of states embracing such policies and the scope of schools and students participating in those programs, the private school choice

arrangements have been heatedly debated in the education reform community. A major question that has been asked is: do private school choice programs improve student performance at all?

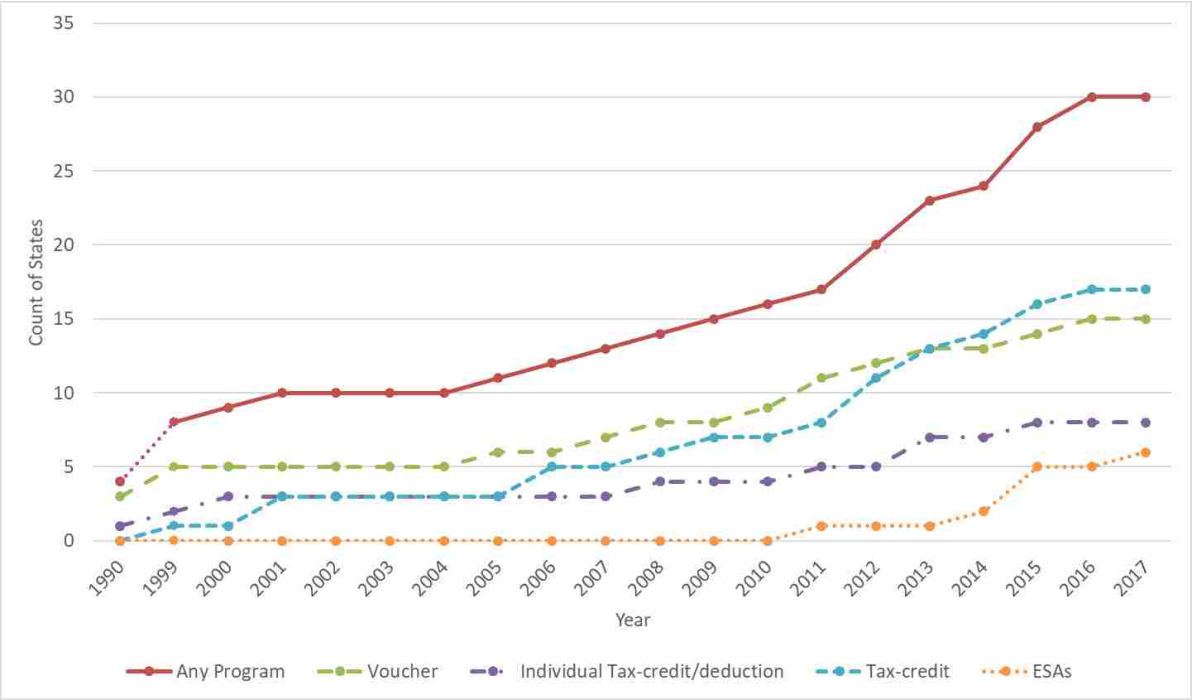

Figure 1.1 Count of States with Private School Choice Programs
SOURCES: Retrieved from http://www.edchoice.org/school-choice/school-choice-in-america.

Lottery-based experimental design is the most appealing approach to estimate the true effect of a school choice program, and these rigorous studies predominantly have focused on voucher programs. The sixteen evaluations of U.S. voucher programs that have used "gold standard" experimental design show mixed results on student achievement at the aggregate "program" level. The Charlotte Children's Scholarship program was found to have significant positive impacts on participating student's reading (Cowen, 2008; Greene, 2000), and the Milwaukee Parental Choice program was found to have significant positive impacts on participating student's math scores (Greene, Peterson, & Du, 1999; Rouse, 1998), while the

Louisiana Scholarship Program, one of the first statewide voucher programs, was found to have negatively influenced participants achievement in both math and reading at least for the first two years (Abdulkadiroğlu, Pathak, & Walters, 2018; Mills & Wolf, 2017). Most of the other experimental voucher evaluations in DC, New York City, and Dayton, Ohio show positive yet insignificant impacts on overall student math and reading achievements (Howell *et al.*, 2002; Wolf *et al.*, 2013). A recent meta-analysis of these randomized controlled trial (RCT) studies finds that voucher programs tend to have significant positive effects for students who remain longer in the program (Shakeel, Anderson, & Wolf, 2016). Effects of private school choice programs on educational attainment tend to be larger and more consistent, as experimental evaluations of both the DC Opportunity Scholarship and New York City private-school scholarship program have found that the programs improve students' high school graduation rates or college enrollment rates by a significant amount (Wolf *et al.*, 2013; Chingos & Peterson, 2015; Chingos & Kuehn, 2017).

The results of evaluations of private school choice programs are not only inconclusive but also ungeneralizable nationwide as they all suffer from selection issues. At a broad level, states select into choice programs. So far, 30 states have adopted at least one type of private school choice arrangement, as Wisconsin has the longest voucher history[1] and Maryland and South Dakota newly joined the private school choice club in 2016; Florida has adopted vouchers, tax-credit/deductions and Educational Saving Account arrangements, while Tennessee only enacted one Educational Saving Account program in 2015 (EdChoice, 2018). The political,

[1] Maine and Vermont have operated "town tuitioning" programs for almost 150 years. I count them as school voucher programs in my studies, because they fit the literal definition of a voucher program, but most people recognize Milwaukee as home to the original school voucher program launched in 1990.

educational, and economic environment of each state at different times influences their policy adoption decision and program design, in terms of what type of private school choice arrangement to adopt, in what scope, and for which subgroups of the population, yet less attention has been addressed to this issue of selectivity in private school choice programs.

Within states, schools choose, too. In the DC Opportunity Scholarship and Indiana's Choice Scholarship Program, over 70% of private schools received voucher using students, while only one third of private schools in the Louisiana program did so (EdChoice, 2018). Since the private schools in a voucher program are, to a significant extent, the program itself, the lack of analyses of school participation into private school choice programs is a hole that cries to be filled.

Within programs, students select too. In the New York City School Choice Scholarship Program, nearly 26% of students failed to use the vouchers to attend private schools within the area during the program's first year (Howell, 2004) and this decline rate is similar in the Charlotte Children's Scholarship Fund (Cowen, 2010) and DC Opportunity Scholarship Program (Wolf *et al.*, 2006). Among students who use their voucher initially, nearly 20% to 35% of them exit from the program annually in later years (Rouse, 1998; Cowen *et al.*, 2012; Carlson *et al.*, 2013; Howell, 2004). Students self-selecting into or out of choice programs makes participants unrepresentative of the overall eligible population of students thus challenging the external validity of program evaluations.

This dissertation focuses on these selection issues. Specifically, I conduct three studies describing the participation patterns of states, schools, and students in private school choice programs in the U.S.

The first study (Chapter 2) provides an exploratory analysis of the state-level factors that predict the adoption and expansion of private school choice policies in 49 states from 2000 through 2015. Results indicate that political, need, and resource factors all appear to play some role in predicting private school choice policy adoption, though political factors, especially the Republican partisan control of the Legislature and Governorship, dominate our predictions. Once enacted, the expansion of private school choice programs tends to be driven more by lower graduation rates and lower NAEP performance rather than political support. Also, the logic of private school choice adoption is different in predictable ways for vouchers and tax-credit scholarships targeted to disadvantaged students compared to individual tax-credits/deductions that mainly benefit higher-income families and therefore are more welcomed in educationally better-off states.

In the second paper (Chapter 3) which was published in the *Journal of School Choice*, my co-authors and I examine private school participation patterns in voucher programs in DC, Indiana, and Louisiana for school year 2014-15. We collect data on school quality and voucher participation status for over 660 private schools across three states, and employ a linear probability model to examine how school quality, as measured by tuition-level, enrollment and Great School Review scores, is associated with program participation decisions. Our results reveal higher tuition levels and larger cohort enrollments, conditions normally associated with high quality schools, help identify schools that are less likely to participate in voucher programs. We also find a consistent negative relationship between Great Schools Review scores and school participation decisions, indicating lower quality schools have a higher tendency of participating in voucher programs in all three states, however these estimated effects not found to be significantly different from zero. State fixed effects reveal that private schools in D.C. and

Louisiana, the two states that have higher regulatory burdens, are less likely to participate in voucher programs.

Finally, the third paper (Chapter 4) focuses on student participation patterns in a voucher program and tests if the voucher program "cream skims" the best students into the program and "pushes out" the most difficult to teach students from the program in the context of the Louisiana Scholarship Program (LSP). Specifically, we investigate if there is any systematic pattern regarding the characteristics of students (1) who do not use a voucher offered to them to attend the private school of their choice, and to (2) do not remain in the choice school in which they initially enroll with the help of a voucher. The LSP shows relatively low voucher initial declining and subsequent attrition rates for the non-kindergarten students participating in the program. Little evidence is found that more disadvantaged students, economically and academically, are "cream skimmed" into voucher use or "pushed out" after initially attended private schools using vouchers at a higher rate after initially attending a private school, with the sole exception of students with special educational needs whom small private schools may be ill-equipped to serve. However, students with lower baseline test scores tend to face a greater risk of leaving the LSP, as do students who were assigned private schools farther from home and that serve a larger minority population. Results indicate that, in the LSP, students' self-selections are driven more by the program setting rather than by their personal demographics.

Taken together, these three studies provide empirical evidence on participation patterns of states, schools, and students in private choice programs in the U.S. This dissertation benefits the literatures on private school choice programs by contributing to an improved understanding of the heterogeneous context setting of these programs.

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Chapter 2 [2]

Going Private: Political Factors Shaping the Enactment & Expansion of Private School Choice in the U.S.

Introduction

Just as European explorers long searched for the source of the Mississippi River, eventually identifying it as Lake Itasca, political scientists have long wondered about the origination and spread of public policies. Variously called "policy adoption," "policy innovation," or "policy diffusion," the question in all cases is why do representative governments enact certain policies at specific times for particular places?

The question of what factors influence policy adoption is particularly intriguing in the case of private school choice programs. Such programs "provide government resources to parents to enable them to enroll their children in independent private schools of their choosing." (Wolf, 2008, p. 635). Private school choice arrangements provide either direct payments, through vouchers, or indirect subsidies, through tax-credit scholarships or personal tax credits or deductions. By 2018, a total of 63 private school choice arrangements were operating or newly enacted in 30 U.S. states plus the District of Columbia (Ed Choice, 2018). Why have some states adopted this politically controversial education reform while others have demurred? That is the central question of this exploratory empirical study.

This chapter proceeds as follows. The next section describes the private school choice programs in the U.S. We then discuss the theory and prior research regarding policy adoption with special emphasis on education reforms and school choice. A brief section after that states

[2] This chapter was co-authored with Patrick J. Wolf.

our formal research questions, proceeds with a discussion of our data and analytic methodology. Then we present our results. The concluding section discusses the results of our analysis and contributions.

Private School Choice in the U.S.

A clear description of "private school choice arrangement" is a key prerequisite of efforts to discuss the policy issue. In our study, the categories of private school choice arrangements are obtained from the Friedman Foundation for Educational Choice's annual publication, *The ABCs of School Choice*. The private school choice arrangements include vouchers, Education Saving Accounts, tax-credit scholarships, and individual tax-credits/deductions.

Broadly speaking, all four private school choice arrangements are designed to increase families' eligibility and affordability for alternative schoolings: voucher programs allow targeted students who are disadvantaged in some respect to use public funding to pay partial or full tuition for their child's private schooling, while the Education Savings Accounts (ESA) allow parents to withdraw a portion of the funds from the account in which the state otherwise would spend on a child's education is placed to direct to the education providers of their choosing (Butcher & Burke, 2016); tax-credit scholarships allow taxpayers to claim a dollar-for-dollar credit when they donate to nonprofit institutions that provide either private school scholarships or public school improving funding; similarly, individual tax-credits/deductions allow parents to receive state income tax relief for their approved educational expenses, such as private school tuition, books, tutors, and other education expenses for their children.

Though all these four types of private school choice arrangements aim at enhancing families' choice and market forces, the program design of each arrangement are quite different. First, the financial support of each private school choice arrangements came from different

sources. Vouchers and ESAs involve reallocation of government educational resources, while tax-credit scholarships and individual tax-credits/deductions are tax benefits of individual families. Second, the voucher funding can only be used to subsidize private school tuition costs, while funding or tax benefits of ESAs, tax-credit scholarships, and individual tax-credits/deductions can be used for a broader range of educational expenses besides private school tuition, such as private tutoring fees and text books, thus providing more secular options than vouchers. As a result, the ESAs, tax-credit scholarships, and individual tax-credits/deductions face less regulatory burdens than vouchers, as well as facing less constitutionals arguments. In the meantime, the four types of private school choice arrangements intend to benefit different populations with vouchers, as ESAs and tax-credit scholarships targeted at middle-and-lower income families, while the individual tax-credits/deductions are intended to benefit higher-income families. Due to these major differences, the four private school choice arrangements face different political controversies and perform differently in terms of policy adoption and expansion.

By the end of 2017, 30 states had at least one private school choice arrangement[3] (Table 2.1). Vouchers and tax-credit scholarships were the most common types of private school choice policy, as 17 states had at least one tax-credit scholarship policy and 15 states offered at least one voucher program by the end of 2017. Only six states had pioneered the new idea of Education Savings Accounts ever since it was introduced in 2012, and eight states offered individual tax-credits/deductions. In the meantime, the individual tax-credits/deductions has the largest student participation, followed by the tax-credit scholarships and voucher programs. As a newly enacted

[3] We exclude Washington DC from our counts and analytic sample from here on because it is not a state and does not develop its own educational policies.

private school choice program, the ESAs had only less than 8,000 participations by the end of 2016.

These four arrangements are not mutually exclusive, and in fact, many states have enacted at least two types of private school choice policies. But there is still much variation across states in terms of the timing of policy adoption and the size of student participation, in regard to these four arrangements. Our study, thus, focuses on recognizing what social factors may account for this variation.

Theory and Prior Research

We are interested in explaining a pattern of education policy adoption in the U.S. A policy is "a definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future actions" (Merriam-Webster, 1983). It is precisely this selection of private school choice from among alternatives "in light of given conditions" that motivates our study.

Policy adoption occurs in the middle of Lasswell's (1936) five-step "policy cycle," after agenda setting and policy formation and before implementation and evaluation. It is also called "policy diffusion" in modern parlance, particularly when discussing decision making at the state and local level in the U.S.[4] Scholars quite naturally ask, "From where do policies come?" As Nelson Polsby (1984, p. 5) aptly puts it:

[4] Technically, policy adoption is distinct from policy diffusion when a state or locality adopts a policy that is unique, such as when Wisconsin launched an urban, means-tested school voucher program in 1990. Once one political jurisdiction has adopted a brand new policy, "policy adoption" and "policy diffusion" become identical terms everywhere else, which is why we use the terms interchangeably here.

Table 2.1
Counts of States with Private School Choice Programs and Student Participation, 1990-2017

School Year Ending	Any Program		Voucher		ESAs		Tax-credit Scholarship		Individual Tax-credits/deductions	
	Enacted State	Student Participation	Enacted State	Student Participation	Enacted State	Student Participation	Enacted State	Student Participation	Enacted State	Student Participation
1990	4	N/A	3	N/A	0	0	0	0	1	N/A
…	…		…		…		…		…	
1999	8	385,901 [a, b]	5	9,759 [a, b]	0	0	1	3207	2	372,935
2000	9	579,610 [a, b]	5	11,413 [a, b]	0	0	1	15,081	3	553,116
2001	10	632,281 [a, b]	5	14,386 [a, b]	0	0	3	18,049	3	599,846
2002	10	689,175 [a]	5	23,855 [a]	0	0	3	36,932	3	628,388
2003	10	731,388 [a]	5	29,833 [a]	0	0	3	55,927	3	645,628
2004	10	766,160 [a]	5	37,475 [a]	0	0	3	58,571	3	670,114
2005	11	795,008 [a]	6	41,450 [a]	0	0	3	59,779	3	693,779
2006	12	769,340 [a]	6	42,390 [a]	0	0	5	68,377	3	658,573
2007	13	819,650 [a]	7	49,327 [a]	0	0	5	83,853	3	686,470
2008	14	888,385 [a]	8	57,733 [a]	0	0	6	104,976	4	725,676
2009	15	995,753 [a]	8	62,958 [a]	0	0	7	112,251	4	820,544
2010	16	1,025,211	9	71,956	0	0	7	108,840	4	844,415
2011	17	1,071,561	11	77,346	1	0	8	127,615	5	866,600
2012	20	1,105,291	12	92,375	1	153	11	142,288	5	870,628
2013	23	1,030,191	13	104,076	1	302	13	157,698	7	768,417
2014	24	1,103,894	13	125,242	2	761	14	202,137	7	776,515
2015	28	1,164,253	14	146,423	5	2,989	16	223,582	8	794,248
2016	30	N/A	15	161,087	5	7,625	17	N/A	8	N/A
2017	30	N/A	15	N/A	6	N/A	17	N/A	8	N/A

SOURCE: "School Choice in America," EdChoice, last modified January 16, 2018. Retrieved from EdChoice website: http://www.edchoice.org/school-choice/school-choice-in-america.

Notes:

[a]: Student participation of Town Tuitioning Program (Maine) of current year is not available thus is excluded from the calculation.

[b]: Student participation of Town Tuitioning Program (Vermont) of current year is not available thus is excluded from the calculation.

N/A: data is not available.

> Yet no sophisticated student of contemporary American policy-making believes that policies normally spring fully formed from the overtaxed brow of the President or even from his immediate entourage.

Policies are not born but made.

Theories of Policy Adoption & Diffusion in the U.S.

Why are certain policies made, or adopted, in a representative democracy such as the U.S.? John Kingdon (1984) argues that policy adoption requires the intersection of three streams of politics, policy, and problem. A social problem must present itself. A specific policy cure must be at hand. Finally, the political circumstances must be favorable for the adoption of the specific policy to address the particular problem.

Nelson Polsby (1984), writing on *Political Innovation in America*, agrees substantially with much of Kingdon's theory but emphasizes the interaction between problem (a.k.a. need) and politics. Polsby views Kingdon's policy stream as a separate process that produces the policy ideas that are later harvested by political actors reacting to perceived needs.

Trinitarian explanations of policy adoption remain all the rage in American politics. Choi, Turner and Volden (2002) claim that policy diffusion in our federal system of government is the product of "Means, Motive, and Opportunity." By "means", the authors are referring to fiscal resources. By "motive" they mean social need. By "opportunity", they mean favorable political conditions.

There is a stunning consensus in the theoretical literature regarding policy adoption in the U.S. that policies are embraced when the three forces of politics, need, and resources intersect, as depicted in the central region of Figure 2.1.

Figure 2.1 Three Factors Contributing to Policy Adoption

Previous Research on Policy Adoption Specifically Involving Education

At the local level, K12 education is a developmental policy (Peterson, 1981). Because the community in general benefits in myriad ways when its members are effectively educated, local policymakers have incentives to optimize their approach to education. The policymaking process surrounding education is likely to be consensual.

Much K12 educational policymaking, however, is made at the state level in the U.S. One step removed from localities, state-level education policymaking can have elements of redistribution in it, as differential funding and varied approaches based on need influence the parameters of public policy. With resource redistribution comes political conflict. As Paul Manna and his colleagues have observed, state-level adoption of education reforms are influenced by the availability of resources and organizational capacity (Manna & Ryan, 2011). The politics surrounding state-level education reforms is often conflictual and partisan, with Republicans supporting reforms that decentralize authority and Democrats supporting policies that centralize it (Manna & Harwood, 2011).

James Q. Wilson (1989, pp. 75-79) agrees with Peterson that most policymaking in the education realm is non-conflictual, focusing on political interests instead of political ideology. Wilson classifies public policies and the agencies charged with implementing them based on the concentration and diffusion of costs and benefits. Interest Group politics is the most fierce, according to Wilson, because concentrated benefits motivate at least one organized interest group to support the measure while concentrated costs motivate at least one other interest group to oppose it. Client Politics also involves policies with concentrated benefits but the politics surrounding it are benign because the costs of the policy are dispersed. When costs are concentrated but benefits dispersed, Entrepreneurial Politics is required, as the power of ideas is required to trump the political interests of policymakers. Finally, policies for which both the costs and benefits are dispersed generate Majoritarian Politics which is both relatively benign and somewhat unpredictable.

If we accept Wilson's policy typology, when a single organized interest group dominates the policy space, Client Politics, typified by consensus and agency capture, will be the norm. According to Terry Moe (2011b, p. 6), "The teachers' unions have more influence on the public schools than any other group in American society." Since a single organized interest, the teacher's union, dominates K12 education policymaking, Client Politics surrounds it. Policies enthusiastically supported by the unions, such as more spending on education, teacher certification, professional development, and smaller class-sizes, will be easily adopted while policies opposed by the unions, such as teacher merit pay based on student test-score gains and parental school choice, will face tough sledding.

The Special Case of Private School Choice

Since education policy involves the relatively benign realm of Client Politics, and the teachers' unions that dominate that field are staunchly opposed to private school choice, we might wonder why instruments of private school choice such as government-run school voucher programs and tax-credit-funded K12 scholarship exist at all in the U.S. More to the point, why have such programs diffused widely across the country during the first 15 years of the new millennium? Has the political power of the teachers' unions weakened or is school choice policy a special type of education policy with its own brand of politics?

Shuls and Wolf (2015) argue that private school choice policies create strange political bedfellows. Politicians face a "school choice dilemma," similar to the notorious "Prisoner's Dilemma," whereby they face incentives to defect by ensuring school choice for their particular constituents while denying it to others. As a result, the ideological wings of both the Democrat and Republican parties have joined forces in support of private school choice arrangements while the establishment wings of those parties, whose constituents are comfortable in their access to school choice, oppose them.

Another way to think of the Shuls and Wolf claim, in Wilsonian terms, is that private school choice brings different politics to the two political parties. For Democrats, private school choice generates Interest Group Politics, not Client Politics. One key element of their political coalition (teachers' unions) opposes choice while another important faction of the party (African Americans) supports it (Moe, 2001a). In the political vernacular, private school choice is a "wedge issue" in the Democratic Party, pitting different Democratic constituencies against each other. Most elected Democrats wish that school vouchers would simply go away.

For Republicans, in contrast, private school choice brings with it Entrepreneurial Politics. The teachers' unions influence the Grand Old Party (GOP) somewhat, though not as much as they sway the Democratic Party. Moreover, the benefits of private school choice tend to be realized by urban minorities who are not part of the GOP political coalition. Ideological commitments to market-based solutions to social problems is what motivates most Republicans to support private school choice. Ideological appeals to the common good are typical of Entrepreneurial Politics.

In sum, theory and prior research suggest that politics, need, and resources all will play significant roles in the adoption of private school choice policies across space and time. They further indicate that political factors might play the greatest role, and that Republican control of state policymaking institutions, in particular, may prove to be crucial. In the remainder of this chapter we explore these possibilities.

Research Questions

In this chapter we examine which state-level factors, recommended to us by theory, predict policy decisions regarding the enactment and expansion of private school choice programs in the U.S. from 2000 through 2015. We begin our time-series analysis at the turn of the millennium for several reasons. First, only 9 states adopted private school choice policies in the 130 years between 1869 and 2000, suggesting that those pioneering choice states and their programs may have been largely the product of idiosyncratic and not systematic factors. In contrast, 20 new states adopted choice policies in the 15 years from 2000 to 2015, indicating that the period was a crucial decision time for states regarding whether or not to join the pantheon of private school choice adoptees. Second, reliable data regarding some of our key explanatory variables were not available prior to 2000 and are not yet available systematically for the years

after 2015. Third, starting a time-series at the beginning of a new millennium is really cool. In sum, the research questions posed below should be understood as applying to the specific period of 2000-2015 in the U.S.

We test the following hypotheses:

Hypothesis 1: Political, Need, and Resource related factors all will have some association with the adoption and expansion of private school choice programs overall and individually;

Hypothesis 2: Political factors will have the most consistent and predictable association with adoption and expansion of private school choice programs overall and individually;

Hypothesis 3: Resource factors will trump Need in the case of ITC-D, which primarily benefit higher-income families.

Data and Sample Description

Our general theoretical frame is dynamic policy decision-making in the U.S. context. We focus on individual U.S. states as the unit of analysis because education is a developmental policy with decision-making subsequently concentrated at the state and local level (Peterson, 1981). We customize that framework for the specific case of private school choice by considering the influence of a variety of social factors in the decision to enact and expand such programs. These factors are categorized as political factors, need factors, and resources factors. All data are collected from public available datasets e.g. EdChoice and Common Core of Data (CCD) from National Center for Education Statistics (NCES).

Political Factors

The theoretical literature is clear that policy adoption in a state is likely to be influenced by political characteristics. In this chapter, we are interested in two dimensions of state-level politics: political identity and institutional support for school choice.

Political parties tend to have clearly defined ideologies and support substantively different programmatic agendas (Ansolabehere, Snyder, & Stewart, 2011). Hassel (1990) suggests that the Republican Party platform is more frequently linked to school choice options. Kenny (2005) states that Republican partisans and political conservatives in general tend to support private school choice because they believe that the competition brought about by choice improves the efficiency of the education system as a whole. Democrats and liberals, in contrast, tend to oppose vouchers because they have a stronger faith in the public sector and are aligned politically with teachers' unions. Other studies, however, find that having a *Republican Governor* does not predict a higher likelihood of consideration or adoption of school choice laws (Mintrom & Vergari, 1997; Witte, Shober & Manna, 2003; Wong & Shen, 2002; Wong & Langevin, 2007).

In our study, we use binary variables indicating whether or not Republicans have majority control of the Legislature (Column 1), whether or not a state's governor is Republican (Column 2), and whether or not Republicans have majority control of both the Legislature and Governorship (State Control, Column 3), see Table 2.2. Mathematically, the variable *Republican-controlled Government* is an interaction of *Republican Governor* and *Republican-controlled Legislature*, that is the value of *Republican-controlled Government* equals to 1 only when both the *Republican Governor* and the *Republican-controlled Legislature* takes value 1. For predicting the adoption and expansion of private school choice arrangements, we conduct

analyses both with and without the *Republican-controlled Government* included, since the interpretation of *Republican-controlled Legislature* and *Republican Governor* would be different when having an interaction term in the model: if there were no interaction term *Republican-controlled Government*, the coefficient of *Republican Governor* and *Republican-controlled Legislature* should be interpreted as the unique effect of Republican partisan control of the Legislature and Governorship on program adoption/expansion, while with including the interaction *Republican-controlled Government*, the coefficient of *Republican Governor* and *Republican-controlled Legislature* should be interpreted as the unique effect of Republican partisan control of the Legislature and Governorship on the program adoption/ expansion when having a divided government, that is when either the *Republican Governor* or *Republican-controlled Legislature* takes value 0.

The annual state partisan control information is obtained from the National Conference of State Legislatures website (Table 2.2).

Another political factor we include in our study is the strength of teachers' unions. Studies have found that interest groups, especially teachers' unions, play important roles in influencing policy outcomes. Moe (2011) argues teachers' unions have more influence on the public schools than any other group in American society, since they can obstruct unwanted educational reform through collective bargaining. Fabella (2017) also found that the expenditures of teachers' unions, which is a proxy for the teacher union strength of the state, is significantly negatively correlated with the number of school reform bills passed at the state level in the U.S. In this study, we use the *Rank of Teacher Union Strength* developed by Winkler, Scull, and Zeehandelaar (2012) to proxy for *Teacher Union Strength* in each states.

Table 2.2
Count of States with Republican Control (N=49)

Year	Rep. Legislative Control (1)	Rep. Governor (2)	Rep. Government (3)
2000	18	29	15
2001	18	28	13
2002	17	26	11
2003	20	25	12
2004	21	27	12
2005	19	27	12
2006	20	28	12
2007	15	21	10
2008	14	21	10
2009	14	21	9
2010	14	23	9
2011	25	28	20
2012	27	28	22
2013	24	29	23
2014	27	28	23
2015	30	30	23

SOURCE: Retrieved from the National Conference of State Legislature (NCSL) website: http://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx#Timelines, year 2000 through 2017.
Notes: Nebraska is excluded from the analysis due to its nonpartisan Legislature nature.

The *Teacher Union Strength* measure that developed by Winkler, Scull, and Zeehandelaar (2012) denotes state ranks of combination of teacher union power scores in the following five dimensions: Resources and Membership, Involvement in Politics, Scope of Bargaining, State Policies, and Perceived Influence (Page 27). A state with a smaller value in the *Teacher Union Strength*, which indicates a higher rank, has teachers' unions that are "stronger" in this state as compared to states with a higher value in this measure. In the report, Hawaii, Oregon and Montana are ranked as the three top states in the *Teacher Union Strength* thus are considered to have the "strongest" teachers' unions, while Arizona, Florida and South Carolina are ranked as the last three states thus are considered to have the "weakest" teachers' unions. Though the raw score of teacher union strength in each state are dynamic and vary from time to time, the relative ranks between states tend to be stable. Thus, we use *Teacher Union Strength* as a state-level time-invariant variable to estimate the effect of teacher union power on state

regarding expending private school choice arrangements. We expect this variable is positively associated with the enactment and expansion of one or more private school choice arrangements: a state with a larger value in the *Teacher Union Strength* (weaker union strength) to be predicted to have a higher probability of enacting and expending a private school choice arrangement.

The last political factor is institutional commitment to school choice. We expect that the greater presence of alternatives to the present system of public education in a state, the more comfortable the public will be with the enactment and expansion of one or more private school choice programs. Two variables proxy for this institutional support for private school choice: the percentage of students enrolled in charter schools and the percentage of students enrolled in public schools in the state during each school year. Enrollment information was collected from the *Digest of Education Statistics* released from the year 2000 to 2016. According to descriptive statistics (Table 2.3), an average of 1.9% of students were enrolled in charter schools across our sample and 10.1% of students attended private schools.

Need Factors

Private school choice is widely viewed as a controversial education reform. Inertia largely characterizes policymaking in the U.S., especially due to its constitutional system of separate powers and checks and balances. It often requires a clear public perception of a serious crisis in order to spur significant policy change even at the state level (Polsby 1984). Therefore, we expect that measures of extreme educational need at the state level will be predictors of private school choice enactments and expansions. The four educational need factors we include in our analysis are: (1) state National Assessment of Educational Progress (NAEP) achievement level in 8^{th} grade math, (2) high school graduation rate, (3) proportion of students that are minority, and (4) poverty rate. All the data regarding education characteristics was obtained from

the *Digest of Education Statistics* annual reports, and the state's Poverty Rate was obtained from the Current Population Survey (CPS) Annual Social and Economic (ASEC) Supplement from U.S. Census Bureau in the corresponding year.

NAEP math achievement level and high school graduation rates measure the quality of a state's K12 education system and provide information to education policymakers on the comparative effectiveness of schools within and across states. We hypothesize that the lower the NAEP[5] achievement level is (smaller portion of students achieving at or above the Basic level) and lower high school graduation rate, the greater the likelihood of the state enacting or continuing a private school choice program. Between 2000 and 2015, 70.3% of 8th grade students achieved at or above the Basic level on the NAEP math test; the average high school graduation rate[6] was 77.2% across states during 2000-2015.

The proportion of minority students indicates the racial composition of the school-age population of the state, and the poverty rate reveals economic need which often manifests itself in educational need. We hypothesize that higher proportions of minority students, and higher poverty rates both will predict a greater likelihood of states embracing private school choice. Summary statistics show that minority students account for 35.2% of the public-school population on average across our sample. The average poverty rate is 12.7% across states and time 2000-2015.

[5] Since the NAEP test is operated at odd years, we assume that the state test scores of the even year is equivalent to the score from the previous year.

[6] We use the Average Freshmen Graduation Rate (AFGR) as indicator of the average high school graduation rate of the state before the 2013-14 school year and use the Public High School 4-year Adjusted Cohort Graduation Rate (ACGR) as indicator of the average high school graduation for school year 2014-15.

Resource Factors

Private school choice policies might be viewed by decision-makers as luxury goods. Since most private school choice policies are designed in ways that cost the state revenue, at least in the short run, the adoption and expansion of such policies is likely to be constrained by state economic conditions. We use (1) per-pupil expenditure and (2) population density as indicators of the availability of resources for private school choice policies. Controlling for the influence of educational need and political factors, we expect the economic characteristics to positively predict private school choice commitments. The yearly *Per-pupil Expenditures* is obtained from the NCES, and the population density of each state were obtained from the 2000 Census. The summary statistics present an average per-pupil expenditure of $10,961 in real 2015 dollars across the states from 2000 to 2015 (Table 2.3).

Table 2.3
Summary Statistics of the Explanatory Variables and their Expected Signs

		Summary Statistics				
VARIABLE	Expected Sign	Mean	Std. Dev.	Min	Max	Obs.
Political Factors						
Share of Charter School Enrollment (%) [a]	+	1.901	2.633	0	34.112	784
Share of Private School Enrollment (%) [a]	+	10.124	3.853	2.599	21.913	784
Need Factors						
NAEP At or Above the Basic Level (%) [b]	-	70.337	8.553	42	86	751
High School Graduation Rate (%) [a]	-	77.197	7.708	54.2	93	784
Proportion of Minority Students (%) [a]	+	35.161	18.234	3.158	86.674	781
Poverty Rate (%) [c]	+	12.684	3.370	4.5	23.1	784
Resource Factors						
Population Density (per square kilometer) [d]	+	185.153	249.251	1.1	1134.4	784
Per-pupil Expenditure (in thousand) [a]	+	10.961	2.802	6.042	20.744	784

Notes:
a: SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2000-01 through 2015-16;
b: SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2000, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 Mathematics Assessments;
c: U.S. Census Bureau, Current Population Survey (CPS) Annual Social and Economic (ASEC) Supplement, 2000 through 2015.
d: U.S. Census Bureau, Current Population Survey (CPS), 2000.

We estimate the model over the entire time-series of 2000-2015 to test our major hypotheses regarding the adoption of voucher, tax-credit scholarship, and individual tax-credits/deductions policies. As we collect data on 49 states across 16 years, our sample contains 784 state-year observations, though missing data on some variables limit the sample to 751-784 observations for our overall model estimations.

Analytic Strategy

This section presents the analytic strategies for examining which state-level factors, recommended to us by theory, predict policy decisions regarding the enactment and expansion of private school choice programs in the U.S. from 2000 through 2015.

Policy Adoption

Since policy decisions were made across time, the decision making of whether to support a private school choice policy is a dynamic process best captured by a longitudinal decision-making model. Additionally, once a state enacts a private school choice program, the state will not be exposed to the risk of readopting this program in later years. Thus, it was determined that survival models, so called event history analysis, are especially appropriate to estimate what kind of and to what extent the various social factors influence an individual state's decisions regarding enacting and continuing private school choice policies from the year 2000 to 2015.

The Survival Analysis is considered as a standard statistical approach for state policy innovation studies. Berry and Berry (1990) first introduced this model for studying policy innovation then became widely accepted as the most effective tool to estimate the causes of policy innovation among states, including school choice policies (Mintrom, 1997; Wong & Langevin, 2007; Holyoke et al., 2009). In this chapter, we employ survival analysis models to

estimate the effect of social factors on individual state adopting private school choice arrangements, using the calendar year as our unit of time.

We assume the state is exposed to the risk of adopting private school choice arrangements in a rate of:

$$\mathrm{h}(t_{ij}) = \Pr(\mathrm{T}_i = \mathrm{j} | \mathrm{T}_i \geq \mathrm{j}) \quad (1)$$

where *h(t)* is the hazard ratio that for individual state *i* the event (adopting a private school choice policy) occurs at time *j* under the condition that individual states were still exposed to the risk just before *j*. Once the state enacted a private school choice policy in the year *j*, the state will no longer be considered at risk.

Mathematically, the estimated hazard function of adopting a private school choice arrangement $\hat{h}(t)$ in year *j* is denoted as:

$$\hat{h}(t_j) = \frac{n\ events_j}{n\ at\ risk_j} \quad (2)$$

Where $n\ events_j$ refers to the number of states enacted a private school choice arrangement in year *j* and $n\ at\ risk_j$ represent the number of states did not have any private school choice arrangement at the beginning of year *j* (Singer & Willett, 2003, p.332). Thus, in the Life Table of enacting a private school choice policy (Table 2.4), we present the risk set as the number of states who had never enacted the targeted policy by the beginning of year *j* in Column 1, and present the number of states who enacted the targeted policy in year *j* in Column 2. Finally we estimate hazard functions $\hat{h}(t_j)$ of each target policy from year 2000 to 2015 to be the rates in Column 5. Hazard ratios of enacting any private school choice policy and hazard ratios of adopting vouchers, tax-credit scholarships, and individual tax-credits/deductions are presented separately.

Since the ESAs hadn't started until 2012 and was unique across the states at the time (five more ESAs have been enacted since), we exclude this policy from our analysis due to low analytical power. The exclusion of the ESAs does not affect our classification of states enacted any type of private school choice arrangement, however, since all the states have operated at least one of the other forms of private school choice arrangements.

To further estimate the effect of social factors on the hazard ratios of private school choice policy adoptions, we incorporate our analysis with the Cox Proportional Hazard model which includes multiple predictors, both continuous and categorical:

$$\mathrm{h}(t_{ij}) = \mathrm{h}_0(t_j)\exp(\boldsymbol{PoliticalFactors}'_{ij}.\boldsymbol{\beta} + \boldsymbol{NeedFactors}'_{ij}.\boldsymbol{\gamma} + \boldsymbol{ResourceFactors}'_{ij}.\boldsymbol{\rho}) \quad (3)$$

Where the dependent variable is the hazard ratio of state *i* at time *j* enacting a private school choice policy, and it is the function of three vectors of risk factors: Political Factors, Need Factors, and Resource Factors.

In all, the Cox Proportional Hazard Model in this case estimates the effect of the state's characteristics on whether or not it has self-selected to enacting one or more private school choice programs. It is important to note that the hazard ratios β_i are not interpreted in the same manner as coefficients in multiple regressions. Since the model is in an exponential form, a variable with a hazard ratio larger than 1 should be interpreted as having a higher probability of being hazard (enact the targeted policy), while a variable with a hazard ratio smaller than 1 should be interpreted as having a lower probability of being hazard.

Table 2.4

Life Table Describing the Number of Years in Having a Private School Choice Arrangement

Year *j*	Risk Set at year *j* [a] (1)	State Adopting in Year *j* (2)	Cumulative Number of Adoptions (3)	Cumulative Proportion of Adoption (4)	Hazard Function $\widehat{h}(t_j)$ (5)
Any Private School Choice Arrangement					
2000	49	9	9	0.184	0.184
2001	40	1	10	0.204	0.025
2002	39	0	10	0.204	0.000
2003	39	0	10	0.204	0.000
2004	39	0	10	0.204	0.000
2005	39	1	11	0.224	0.026
2006	38	1	12	0.245	0.026
2007	37	1	13	0.265	0.027
2008	36	1	14	0.286	0.028
2009	35	1	15	0.306	0.029
2010	34	1	16	0.327	0.029
2011	33	1	17	0.347	0.030
2012	32	3	20	0.408	0.094
2013	29	3	23	0.469	0.103
2014	26	1	24	0.490	0.038
2015	25	4	28	0.571	0.160
Vouchers					
2000	49	5	5	0.102	0.102
2001	44	0	5	0.102	0.000
2002	44	0	5	0.102	0.000
2003	44	0	5	0.102	0.000
2004	44	0	5	0.102	0.000
2005	44	1	6	0.122	0.023
2006	43	0	6	0.122	0.000
2007	43	1	7	0.143	0.023
2008	42	1	8	0.163	0.024
2009	41	0	8	0.163	0.000
2010	41	1	9	0.184	0.024
2011	40	2	11	0.224	0.050
2012	38	1	12	0.245	0.026
2013	37	1	13	0.265	0.027
2014	36	0	13	0.265	0.000
2015	36	1	14	0.286	0.028

(Continued)

Table 2.4 (Continued)

Year *j*	Risk Set at year *j* [a] (1)	State Adopting in Year *j* (2)	Cumulative Number of Adoptions (3)	Cumulative Proportion of Adoption (4)	Hazard Function $\hat{h}(t_j)$ (5)
Tax-credit Scholarships					
2000	49	1	1	0.020	0.020
2001	48	2	3	0.061	0.042
2002	48	0	3	0.061	0.000
2003	48	0	3	0.061	0.000
2004	48	0	3	0.061	0.000
2005	48	0	3	0.061	0.000
2006	46	2	5	0.102	0.043
2007	46	0	5	0.102	0.000
2008	44	1	6	0.122	0.023
2009	43	1	7	0.143	0.023
2010	43	0	7	0.143	0.000
2011	42	1	8	0.163	0.024
2012	41	3	11	0.224	0.073
2013	38	2	13	0.265	0.053
2014	36	1	14	0.286	0.028
2015	35	2	16	0.327	0.057
Individual Tax-credits/deductions					
2000	49	3	3	0.061	0.061
2001	46	0	3	0.061	0.000
2002	46	0	3	0.061	0.000
2003	46	0	3	0.061	0.000
2004	46	0	3	0.061	0.000
2005	46	0	3	0.061	0.000
2006	46	0	3	0.061	0.000
2007	46	0	3	0.061	0.000
2008	46	1	4	0.082	0.022
2009	45	0	4	0.082	0.000
2010	45	0	4	0.082	0.000
2011	45	1	5	0.102	0.022
2012	44	0	5	0.102	0.000
2013	44	2	7	0.143	0.045
2014	42	0	7	0.143	0.000

SOURCE: "School Choice in America," EdChoice, last modified January 16, 2018. Retrieved from EdChoice website: http://www.edchoice.org/school-choice/school-choice-in-america.
Notes: [a]: The risk set presented here exclude the Nebraska and is there for calculated at a baseline year with 49 states.

Policy Expansion

At the second part, we utilize panel data analyses with state and year fixed effects to estimate how various social factors further influence the magnitude of the private school choice programs within states from the year 2000 to 2015. At the state level, the magnitude of the arrangements is hypothesized to be influenced by a similar cluster of factors:

$$Y_{ij} = a_0 + \boldsymbol{PoliticalFactors}_{ij}^{'}.\boldsymbol{\beta} + \boldsymbol{NeedFactors}_{ij}^{'}.\boldsymbol{\gamma} + \boldsymbol{ResourceFactors}_{ij}^{'}.\boldsymbol{\rho} + \theta_i + \delta_j + \varepsilon_{ij} \quad (4)$$

Where Y_{ij} is the magnitude of a given state *i*'s private school choice arrangement in year *j*. It is measured as the ratio of choice program enrollment over the total public school enrollment. The *Political Factors, Need Factors*, and *Resource Factors* are the same as Equation 3. θ and δ refers to state and year fixed effect, respectively, and ε refers to the random error of state *i* in year *j*.

According to the descriptive statistics of the size of each private school choice arrangement (Table 2.5), averagely students in a size equivalent to 7.5% of public school enrollment participated in at least one type of private school choice arrangement, this ratio ranges from 1×10^{-4}% to 41.6%. While fewer states have enacted the Individual tax-credits/deductions, the average size of Individual tax-credits/deductions across states and time period is larger than vouchers and tax-credit scholarships.

Table 2.5
Summary Statistics of Size of Program Enrollment (%)

Variable	Mean	Std. Dev.	Min	Max	*N* State	*T-bar*
All Arrangements	7.555	11.636	0.000	41.619	24	8.708
Vouchers	1.244	1.282	0.000	4.666	13	8.308
Tax-credit Scholarships	1.286	1.171	0.002	5.728	14	6.429
Individual Tax-credits/deductions	21.434	12.671	0.013	39.886	7	8.857

SOURCE: Retrieved from the "School Choice in America," EdChoice, last modified January 16, 2018. Retrieved from EdChoice website: http://www.edchoice.org/school-choice/school-choice-in-america.
Notes: The dependent variable Size=program enrollment/public school enrollment*100.

Results

We examine how state-level social factors, including political factors, educational need factors, and economic resources, influence policy decisions regarding the enactment and expansion of private school choice programs in the U.S. Table 2.6 through Table 2.9 present the estimated marginal effects of the state characteristics on the state's status as an operator of one or more private school choice programs, and Table 2.10 presents the estimated effects of those same factors on the expansion of private school choice initiatives. Table 2.11 compares the signs and significance of the coefficients with our predictions for both program adoption/continuation and program expansion.

Program Adoption

We first estimate the effects of the state factors on the enactment or operation of any type of choice program, then limit the "1" category of our dependent variable to states that operate specific types of private school choice policies. In Table 2.6 through Table 2.9, we conduct a step by step analysis to incorporate Political Factors, Need Factors and Resources Factors individually and then simultaneously. This process also detects the multi-collinearity issues. Results in column 5 and 6 of Table 5 through Table 2.8 are of our main interest. Again, since the survival analysis model we use is in an exponential form, a variable with a hazard ratio larger than 1 should be interpreted as having a higher probability of enacting the targeted policy, while a variable with a hazard ratio smaller than 1, yet always positive, should be interpreted as having a lower probability of adopting the targeted policy.

Adoption/continuation of any private school choice arrangement

The results regarding the mere enactment or operation of one or more private school choice programs paint a clear picture, see Table 2.6. In Column 1 where we only include the time-varying variables of state's partisan control on Legislature and Governorship, shares of enrollment in alternative schools and the time-invariant factor *Teacher Union Strength*. We find the *Republican-controlled Legislature* positively predicts the private school program adoption overall, with a hazard ratio higher than 1 ($p<.10$). After including the interaction *Republican-controlled Government*, the *Republican Governor* also tend to positively predicts the private school choice policy adoption, marginally significant at $p<.10$, while the effect of *Republican-controlled Government* is not significantly different form zero (Column 2). This indicates for states with divided government, having Republican control at either state Legislature or the Governorship is predicted to have a positive impact on promoting private school choice policies.

Model 3 includes only educational need factors, while Model 4 includes only economic resource factors. None of the four educational need factors are significantly predictive of private school choice program enactment, while only the *Per-pupil Expenditure*, a measure of a state's educational investment, is negatively predictive of private school choice program adoption ($p<.05$). This result is contrary to our hypothesis.

In the joint model (Column 6), only the *Republican-controlled Legislature* and the *Per-pupil Expenditure* significantly predict the state adoption of any private school choice policy when including the *Republican-controlled Government*, both are significant at $p<.10$. The *Republican-controlled Legislature* positively predicts the possibility of adopting any private school choice policy when the state Governor are Democratic or Independent. This result aligns with our hypotheses. The *Per-pupil Expenditure* is still negatively predictive of enacting any

private school choice policy when we hypothesized that it would be positively associated (p<.10).

Table 2.6
Effects on Hazard Ratios (based on the Cox proportional hazards models with time-varying effect) of Adopting Any Private School Choice Program

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	1.121*	1.216*			1.102	1.200*
	(0.071)	(0.131)			(0.084)	(0.131)
Republican Governor	1.074	1.205*			1.051	1.158
	(0.060)	(0.118)			(0.061)	(0.122)
Republican-controlled Government		0.874				0.875
		(0.087)				(0.093)
Rank of Teacher Union Strength	1.011	1.013			1.005	1.003
	(0.014)	(0.014)			(0.018)	(0.016)
Share of Charter School Enrollment	0.996	0.993			0.991	0.991
	(0.009)	(0.008)			(0.011)	(0.012)
Share of Private School Enrollment	1.009	1.010			1.005	1.005
	(0.008)	(0.007)			(0.009)	(0.010)
Need Factors						
NAEP On or Above Basic Level (%)			0.997		0.998	0.998
			(0.003)		(0.003)	(0.004)
High School Graduation Rate			1.000		1.000	0.999
			(0.004)		(0.003)	(0.003)
Portion of Minority Students			1.000		1.001	1.001
			(0.001)		(0.001)	(0.002)
Poverty Rate			0.937		0.996	0.997
			(0.056)		(0.010)	(0.010)
Resource Factors						
Per-pupil Expenditure (in thousand)				0.827**	0.986	0.985*
				(0.072)	(0.009)	(0.009)
Population Density				0.999	1.001	1.001
				(0.001)	(0.001)	(0.001)
Observations	570	542	570	542	542	542

Significant level * p<0.1; ** p<0.05; *** p<0.01.
Notes: The dependent variable is a binary indicator of whether the state adopted a private school choice program at the certain year during 2000 to 2015 (n=49, *n events*=28). Coefficients indicate the hazard ratio of adopting a private school choice program at the base line year. Robust standard errors in parentheses, clustered at the state level. Except the *Rank of Teacher Union Strength* and the *Population Density* who are time-invariant variables, all other variables included in the model are considered as time-varying variables.

Adoption/continuation for specific types of private school choice arrangements

The state social factors that predict the operation of any private school choice program tend to perform consistently in predicting state adoption of specific type of private school choice arrangement, with a few notable exceptions.

None of the political factors, educational need factors, nor economic resource factors are significantly predictive of state adopting a voucher program (Table 2.7).

Compared to the voucher adoption, the factors predicting tax-credit scholarships adoption appear to be clearer (Table 2.8). A state with *Republican-controlled Legislature* while having a divided government is predicted to have a higher likelihood of adopting a tax-credit scholarships arrangement, marginally significant at the .10 level. This finding aligns with our hypothesis. Other political factors, *Teacher Union Strength* and share of enrollment of alternative schooling, are not predictive for tax-credit scholarships adoption. None of the *Need Factors* nor the *Resource factors* are significantly predictive.

Table 2.9 presents the effects of social factors on state adoption of individual tax-credits/deductions. When focusing on Political Factors alone (Column 1), we find a state has a *Republican Governor* or has a *Republican-controlled Legislative* tends to face a higher risk of enacting an individual tax-credits/deductions when not including the interaction of *Republican-controlled Government*. These effect fades out when including the interaction of *Republican-controlled Government*, as well as when including other social factors. In joint models (Column 5 and 6), only the *Republican Governor* is significantly predictive of state's adoption of individual tax-credits/deductions in a positive direction when including the interaction of *Republican-controlled Government*, marginally significant at the .10 level. The share of *Charter School Enrollment* is negatively associated with individual tax-credits/deductions in Column 1

and 2 ($p<.10$), while turn to be null after controlling for Need Factors and Resource Factors. Meanwhile, the *Share of Private School Enrollment* is positively associated with the probability of adopting an individual tax-credits/deductions across all models of specifications, significant at the .05 level.

As we hypothesized, the decision-making logic surrounding the individual tax-credits/ deductions is somehow different than that surrounding the adoption of other private school choice policies, as it favors the middle/high income families rather than the disadvantaged families. The larger than 1 hazard ratios of the *Share of Private School Enrollment* in Column 5 and 6 in Table 2.9 reveal these "reimbursements" from the state for self-financing alternative schooling, as states with higher share of students attend private schools are predicted to have higher probability of adopting the Individual Tax-credit/deduction policy. Still, none of *Need Factors* nor *Resource factors* are significantly predictive of individual tax-credits/deductions adoption.

Table 2.7

Effects on Hazard Ratios (Based on the Cox Proportional Hazard Models with Time-varying Effect) of Adopting a Voucher

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	1.126	1.086			1.159	1.114
	(0.096)	(0.142)			(0.141)	(0.179)
Republican Governor	1.067	1.021			1.014	0.961
	(0.095)	(0.150)			(0.092)	(0.156)
Republican-controlled Government		1.066				1.079
		(0.162)				(0.175)
Rank of Teacher Union Strength	1.036	1.036			0.999	1.000
	(0.023)	(0.024)			(0.025)	(0.025)
Share of Charter School Enrollment	1.000	1.000			0.997	0.997
	(0.008)	(0.008)			(0.009)	(0.009)
Share of Private School Enrollment	1.006	1.007			1.015	1.015
	(0.014)	(0.014)			(0.023)	(0.023)
Need Factors						
NAEP At or Above Basic Level (%)			0.996		1.002	1.002
			(0.004)		(0.006)	(0.006)
High School Graduation Rate			0.999		1.000	1.000
			(0.004)		(0.006)	(0.006)
Portion of Minority Students			1.000		1.000	1.000
			(0.001)		(0.002)	(0.002)
Poverty Rate			1.075		1.026	1.026
			(0.093)		(0.019)	(0.019)
Resource Factors						
Per-pupil Expenditure (in thousand)				0.807	0.971	0.972
				(0.130)	(0.032)	(0.032)
Population Density				0.997	0.999	0.999
				(0.002)	(0.002)	(0.002)
Observations	666	635	666	635	635	635

Significant level * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

Notes: The dependent variable is a binary indicator of whether the state adopted a voucher program at the certain year during 2000 to 2015 (n=49, *n events*=15). Coefficients indicate the hazard ratios of adopting a voucher program at the base line year. Robust standard errors in parentheses, clustered at the state level. All variables except the *Rank of Teacher Union Strength* and the *Population Density* are considered as time-varying variables, while the *Rank of Teacher Union Strength* and the *Population Density* are considered as time-invariant variables.

Table 2.8

Effects on Hazard Ratios (Based on the Cox Proportional Hazard Models with Time-varying Effect) of Adopting a Tax-credit Scholarship

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	1.101	1.253*			1.129	1.258*
	(0.080)	(0.154)			(0.113)	(0.179)
Republican Governor	1.062	1.218			1.058	1.183
	(0.071)	(0.148)			(0.073)	(0.125)
Republican-controlled Government		0.832				0.854
		(0.110)				(0.108)
Rank of Teacher Union Strength	1.024	1.023			1.032	1.027
	(0.026)	(0.023)			(0.034)	(0.031)
Share of Charter School Enrollment	0.986	0.987			0.98	0.981
	(0.012)	(0.012)			(0.016)	(0.017)
Share of Private School Enrollment	1.009	1.008			1.003	1.002
	(0.008)	(0.007)			(0.011)	(0.011)
Need Factors						
NAEP At or Above Basic Level (%)			0.995		0.993	0.994
			(0.004)		(0.005)	(0.005)
High School Graduation Rate			1.004		1.004	1.004
			(0.004)		(0.004)	(0.004)
Portion of Minority Students			1.000		1.002	1.002
			(0.001)		(0.002)	(0.002)
Poverty Rate			0.981		0.981	0.983
			(0.077)		(0.013)	(0.013)
Resource Factors						
Per-pupil Expenditure (in thousand)				0.872	0.990	0.990
				(0.084)	(0.015)	(0.016)
Population Density				1.000	1.001	1.001
				(0.002)	(0.002)	(0.002)
Observations	692	692	658	692	658	658

Significant level * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

Notes: The dependent variable is a binary indicator of whether the state adopted a voucher program at the certain year during 2000 to 2015 (n=49, *n events*=16). Coefficients indicate the hazard ratios of adopting a Tax Credit Scholarship program at the base line year. Robust standard errors in parentheses, clustered at the state level. All variables except the *Rank of Teacher Union Strength* and the *Population Density* are considered as time-varying variables, while the *Rank of Teacher Union Strength* and the *Population Density* are considered as time-invariant variables.

Table 2.9

Effects on Hazard Ratios (Based on the Cox Proportional Hazard Models with Time-varying Effect) of Adopting an Individual Tax-credits/deductions

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	1.259***	1.418			1.069	1.028
	(0.077)	(0.449)			(0.127)	(0.139)
Republican Governor	1.425***	1.553			1.605*	1.590*
	(0.140)	(0.459)			(0.416)	(0.443)
Republican-controlled Government		0.884				1.043
		(0.279)				(0.132)
Rank of Teacher Union Strength	1.005	1.005			0.961	0.961
	(0.026)	(0.025)			(0.039)	(0.039)
Share of Charter School Enrollment	0.969*	0.969*			0.98	0.98
	(0.018)	(0.018)			(0.014)	(0.014)
Share of Private School Enrollment	1.050***	1.049***			1.065**	1.065**
	(0.019)	(0.019)			(0.032)	(0.033)
Need Factors						
NAEP At or Above Basic Level (%)			0.993		0.998	0.998
			(0.006)		(0.012)	(0.012)
High School Graduation Rate			0.997		0.990	0.990
			(0.008)		(0.008)	(0.008)
Portion of Minority Students			0.998		0.996	0.996
			(0.001)		(0.003)	(0.003)
Poverty Rate			0.957		1.002	1.002
			(0.125)		(0.022)	(0.022)
Resource Factors						
Per-pupil Expenditure (in thousand)				0.875	0.959	0.959
				(0.074)	(0.067)	(0.067)
Population Density				0.999	0.998	0.998
				(0.001)	(0.002)	(0.002)
Observations	724	724	690	724	690	690

Significant level * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

Notes: The dependent variable is a binary indicator of whether the state adopted a voucher program at the certain year during 2000 to 2015 (n=49, *n events*=8). Coefficients indicate the hazard ratios of adopting an Individual tax-credits/deductions at the base line year. Robust standard errors in parentheses, clustered at the state level. All variables except the *Rank of Teacher Union Strength* and the *Population Density*, two variables that are time-invariant, are considered as time-varying variables.

Program Expansions

Table 2.10 presents the estimated results of the effect of state characteristics on the expansion of private school choice programs across states. The size of a program is measured as the ratio of program enrollments relative to the public-school enrollment in the current year. For predicting the expansion of the targeted private school choice arrangement, we also conduct analyses both with and without the *Republican-controlled Government* included. As different types of programs embrace different levels of financial support, comparisons within specific types of private school choice programs is of higher policy relevance than the overall results for all arrangements, we therefore estimate the expansion of private school choice programs overall, and then estimate the expansion of targeted program, the vouchers, tax-credit scholarships, and the individual tax-credits/deductions separately. Two time-invariant variables, the *Strength of Teacher Union* and *Population Density*, are omitted in our analyses when using state and year fixed effects analysis.

Appendix Table 2.1 through Appendix Table 2.4 in the Appendix present the step-by-step estimations of expansion for each policy arrangement, and the Table 2.10 below presents the preferred full model estimates for each policy arrangement.

Table 2.10
Effects of the Social Factors on the Expansion of Private School Choice Programs

VARIABLE	All Programs		Voucher		Tax-credit Scholarship		Individual Tax-credits/deductions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Political Factors								
Republican-controlled Legislature	0.533	0.290	0.093	-0.228	-0.212	-0.035	-1.835	-1.696
	(0.814)	(0.685)	(0.319)	(0.211)	(0.120)	(0.175)	(1.489)	(1.666)
Republican Governor	-0.312	-0.55	0.241	-0.082	0.119	0.303	-1.435	-1.254
	(0.647)	(1.547)	(0.163)	(0.180)	(0.093)	(0.173)	(0.976)	(1.272)
Republican-controlled Government		0.609		0.608**		-0.463		-1.481
		(2.726)		(0.268)		(0.274)		(2.913)
Share of Charter School Enrollment	-0.019	-0.021	0.007	0.004	0.008	0.01	2.233**	2.240**
	(0.058)	(0.050)	(0.007)	(0.008)	(0.014)	(0.016)	(0.667)	(0.670)
Share of Private School Enrollment	-0.215	-0.146	-0.053	0.021	0.052	0.008	-0.348	-0.488
	(0.844)	(0.694)	(0.158)	(0.149)	(0.072)	(0.073)	(0.463)	(0.320)
Need Factors								
NAEP at or Above Basic Level (%)	0.219*	0.213	0.008	0.014	-0.018	-0.006	0.473*	0.489*
	(0.124)	(0.142)	(0.037)	(0.032)	(0.053)	(0.058)	(0.203)	(0.235)
High School Graduation Rate	-0.054	-0.049	-0.049	-0.045	-0.018	-0.020	-0.093**	-0.093*
	(0.058)	(0.070)	(0.034)	(0.031)	(0.019)	(0.019)	(0.035)	(0.040)
Portion of Minority Students	-0.224	-0.207	0.012	0.036	-0.081	-0.117	-2.571***	-2.615***
	(0.524)	(0.461)	(0.107)	(0.113)	(0.094)	(0.091)	(0.555)	(0.605)
Poverty Rate	-0.133	-0.129	-0.021	-0.015	0.013	0.009	-0.668***	-0.645***
	(0.135)	(0.137)	(0.046)	(0.036)	(0.047)	(0.047)	(0.176)	(0.167)
Resource Factors								
Per-pupil Expenditure (in thousand)	-0.472	-0.428	-0.310**	-0.308**	-0.439***	-0.471***	0.457	0.301
	(0.744)	(0.595)	(0.117)	(0.119)	(0.097)	(0.106)	(1.265)	(1.346)
Constant	7.766	6.137	6.559*	4.353	8.025***	9.392***	58.723***	61.807***
	(29.301)	(23.699)	(3.017)	(3.374)	(2.625)	(2.340)	(15.731)	(14.723)
Observations	198	198	101	101	89	89	59	59
R-squared	0.122	0.124	0.501	0.533	0.766	0.775	0.785	0.787
Number of States	24	24	13	13	14	14	7	7
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES	YES	YES

Significant level * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

Notes: Dependent variable is the ratio of the enrollment of targeted program relative to the public-school enrollment within state in year *t*. Two time-invariant variables the Teacher Union Strength and the Population Density are omitted from the estimation. Robust standard errors in parentheses, and standard errors are clustered at the state level. All models shown here have year and state dummies.

Overall, most of the state characteristics do not significantly predict private school choice program expansion in general (Column 1 and 2 in Table 2.10). Within states, the NAEP achievement is positively correlated with the private school choice program expansion condition on other Need Factors and Resource Factors, however, is not consistent across model specifications. For example, within states, the NAEP achievement is positively associated with the relative size of all private school choice programs when not including the *Republican-controlled Government* ($p<.10$), however turn to be null after adding the *Republican-controlled Government* interaction.

Comparing the effect of social factors on program expansion across all three forms of private school choice, we find that the expansion of different types of private school choice arrangements are driven by different social factors.

Partisan composition only influences voucher expansions. Within states, the relative size of voucher programs (Column 3 and 4) is positively correlated with the *Republican-controlled Government*: a state switch from non-Republican-controlled Government to Republican-controlled Government is predicted to experience an expansion of voucher program in a size equivalent to 0.6 % of students enrolled in public schools that year. The overall insignificant effect of partisan control may have resulted from lack of variation across time within states, that is, only a few states have experienced switching of Legislature and Governor partisan control.

In the meantime, within states, the *Per-pupil Educational Expenditures* tend to negatively associate with voucher and tax-credits relative sizes, significant at $p<.05$, as a higher expenditure on K12 public education is associated with a smaller size of vouchers and tax-credit scholarships ($p<.05$), while none of the Political Factors nor the Need Factors are significantly predictive of tax-credit scholarships expansion, all else equal. Since a higher educational expenditure also

indicates a lower risk of educational crises, this negative associations between per-pupil expenditure and vouchers and tax-credits relative sizes within states are understandable.

Based on theory, we expect that the logic of individual tax-credit/educations expansion will be different from that of the expansion of other types of private school choice programs as it benefits higher income families more. Results largely align with our hypothesis. Within states, the increase of *Share of Charter School Enrollment* is significantly positively associated with individual tax-credits/deductions expansion, as 1 percentage point increase in the *Share of Charter School Enrollment* predicts an expansion of individual tax-credits/deductions participation by a size equivalent to 2.2% of public school enrollment, significant at the .05 level, all else equal. The partisan control is not as predictive as in the Vouchers expansions. Further, different from the expansion of vouchers and tax-credit scholarships, *Need Factors* tend to have a significant impact on individual tax-credits/deductions expansion. For instance, within states, a higher proportion of students achieved at or above the basic level of NAEP 8th grade math test and a higher *High School Graduation Rate* predict a larger size of individual tax-credits/deductions, both are marginally significant at the .10 level. Meanwhile, within states, the minority enrollment and the *Poverty Rate*, two factors indicating states' economic need for supporting public education, tend to be negatively associated with individual tax-credits/deductions expansions: within states, a smaller enrollment of minority students and a lower poverty rate predicts a larger size of individual tax-credits/deductions, both are significant at the .01 level. Increase of *Per-pupil Expenditure* does not appear to significantly influence individual tax-credits/deductions expansions within states, all else equal.

Discussion and Conclusion

We present here the results of an exploratory empirical analysis of state characteristics that predict higher or lower likelihoods of private school choice policy adoption as well as program expansion after enactment. Table 2.11 compares the signs and significance of the coefficients with our predictions for both program adoption/continuation and program expansion.

This study is observational in design. All we can identify is systematic associations between factors. We cannot necessarily confirm that the relationships are causal. We also are limited to 49 political jurisdictions over a 16-year period in which a substantial number of states switched from non-adopters to adopters of private school choice programs. Missing data reduced our sample slightly when including NAEP achievement when 11 states did not report their test score at 2000. Thus, we caution readers to treat our findings with caution.

Our first hypothesis was that political, educational need, and economic resource factors all will influence choice policy adoption and expansion. This hypothesis is partially confirmed by our analysis. At least some measures of each of the three types of characteristics are statistically significant predictors of policy adoption in our model estimations. These three sets of factors appear to interact in dynamic ways in influencing the adoption of education policies such as private school choice initiatives.

Our second hypothesis was that political factors would be the most consistent and predictable factors influencing the adoption and expansion of private school choice programs. That hypothesis of policy adoption is largely confirmed by our statistical analysis in policy adoption, as 4 of 24 results regarding six political factors are statistically significant findings in the forecasted direction in estimating private school choice adoption. Among the six political factors, partisan control tends to be the most consistent predictor of private school choice policy

adoption across all our model estimations, while it is not as clear in private school choice policy expansion. In states with a divided government, *Republican-controlled Legislature* tends to be positively predictive of adoption of private school choice in general and of tax-credit scholarships specifically, and having a *Republican Governor* is also positively associated with the adoption of individual tax-credits/deductions. Partisan control is less predictive in private school choice expansion, as only switching to a *Republican-controlled Government* is significantly predictive of expansion of voucher programs within states. Few of the educational need factors nor economic resource factors are consistently predictive for policy adoption and expansion, especially after we exclude the prediction of adopting individual tax-credits/deductions which is qualitatively different from other forms of private school choice. The *Per-pupil Expenditure* is only predictive for adoption of private school choice in general and for expansion of vouchers and tax-credit scholarships specifically, and these coefficients are in the direction that is opposite to our hypothesis, as the role it plays is more toward an educational need factor rather than educational resource factor. Overall, compared to Need Factors and Resource Factors, the Political Factors, especially the Republican controls, show more consistent and predictable associations with private school choice adoptions. However, the hypothesis that politics would strongly influence private school choice expansion was not confirmed in our study.

The results lead us to our third and final hypothesis that individual tax-credits/deductions would display a different logic surrounding policy adoption and expansion than other private school choice policies. Individual tax-credits/deductions are more beneficial to higher-income families while vouchers and tax-credit scholarships are overwhelmingly targeted at disadvantaged student populations. In a literal sense, that hypothesis is confirmed by our

analysis. Different from the adoption and expansion of vouchers and tax-credit scholarships where the share of enrollment in alternative school are not significantly predictive, the *Share of Private School Enrollment* is significantly positively predictive of individual tax-credits/deductions adoption and the *Share of Charter School Enrollment* is significantly positively predictive of the size of individual tax-credits within states. Moreover, the factors predicting individual tax-credits/deductions expansion also show a different trend to the predictors of expansion of vouchers and tax-credit programs. Need Factors trump Political Factors and Resource Factors in the case of individual tax-credits/deductions expansion while not predictive in the expansion of vouchers and tax-credit scholarships, and three of the four Need Factors are in an opposite direction of our assumption for private school choice arrangement expansion. Less educational crises, indicated by a larger proportion of students achieved at or above the basil level in NAEP test, a lower proportion of minority students, and a lower poverty rate, are positively associated with the expansion of individual tax-credits/deductions.

We think that the ultimate takeaway of this exploratory analysis is that the answer to what factors lead states to adopt private school choice programs is, "it depends." What it depends most clearly upon is politics.

Table 2.11

Summary of the Estimated Impacts

VARIABLE	Expected Sign	ADDOPTION				EXPANSION			
		ALL	VOUCHER	TAX-CREDIT	INDIVIDUAL TAX-CREDITS/DEDUCTIONS	ALL	VOUCHER	TAX-CREDI	INDIVIDUAL TAX-CREDITS/DEDUCTI
Political Factors									
Republican-controlled Legislature	+	+		+					
Republican Governor	+				+				
Republican-controlled Government	+						+		
Rank of Union Strength	+								
Share of Charter School Enrollment	+								+
Share of Private School Enrollment	+				+				
Need Factors									
NAEP at or Above Basic Level (%)	-					+			+
High School Graduation Rate	-								-
Portion of Minority Students	+								-
Poverty Rate	+								-
Resource Factors									
Population Density	-								
Per-pupil Expenditure (in thousand)	+	-					-	-	

Notes:

- : coefficient is negative and significant at $p<0.1$

+: coefficient is positive and significant at $p<0.1$

BLANK: coefficient is not significantly different from 0 at $p<0.1$

GREEN the sign aligns with the hypothesis	ORANGE the sign does not align with the hypothesis

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Appendix

Appendix Table 2.1
Effects of the Social Factors on the Expansion of All Types of Private School Choice Programs

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	-0.021	-0.554			0.533	0.290
	(0.646)	(1.126)			(0.814)	(0.685)
Republican Governor	-0.240	-0.756			-0.312	-0.550
	(0.483)	(1.410)			(0.647)	(1.547)
Republican-controlled Government		1.327				0.609
		(2.863)				(2.726)
Share of Charter School Enrollment	-0.013	-0.019			-0.019	-0.021
	(0.056)	(0.046)			(0.058)	(0.050)
Share of Private School Enrollment	-0.151	-0.045			-0.215	-0.146
	(0.698)	(0.571)			(0.844)	(0.694)
Need Factors						
NAEP On or Above Basic Level (%)			0.241		0.219*	0.213
			(0.144)		(0.124)	(0.142)
High School Graduation Rate			-0.057		-0.054	-0.049
			(0.057)		(0.058)	(0.070)
Portion of Minority Students			-0.109		-0.224	-0.207
			(0.385)		(0.524)	(0.461)
Poverty Rate			-0.122		-0.133	-0.129
			(0.133)		(0.135)	(0.137)
Resource Factors						
Per-pupil Expenditure (in thousand)				-0.282	-0.472	-0.428
				(0.447)	(0.744)	(0.595)
Constant	6.752	5.615	-4.508	8.676*	7.766	6.137
	(8.196)	(6.791)	(7.386)	(4.262)	(29.301)	(23.699)
Observations	209	209	198	209	198	198
R-squared	0.126	0.137	0.101	0.128	0.122	0.124
Number of States	24	24	24	24	24	24
Year FE	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES

Significant level * $p<0.1$; ** $p<0.05$; *** $p<0.01$.
Notes: Dependent variable is the ratio of the enrollment of all private school choice arrangements relative to the public-school enrollment within state in year t. Two time-invariant variables the Teacher Union Strength and the Population Density are omitted from the estimation. Robust standard errors in parentheses, and standard errors are clustered at the state level. All models shown here have year and state dummies.

Appendix Table 2.2

Effects of the Social Factors on the Expansion of Vouchers

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	0.190	-0.236			0.093	-0.228
	(0.216)	(0.264)			(0.319)	(0.211)
Republican Governor	0.219	-0.087			0.241	-0.082
	(0.144)	(0.103)			(0.163)	(0.180)
Republican-controlled Government		0.702				0.608**
		(0.394)				(0.268)
Share of Charter School Enrollment	0.004	0.002			0.007	0.004
	(0.016)	(0.016)			(0.007)	(0.008)
Share of Private School Enrollment	0.080	0.141*			-0.053	0.021
	(0.102)	(0.072)			(0.158)	(0.149)
Need Factors						
NAEP On or Above Basic Level (%)			-0.010		0.008	0.014
			(0.035)		(0.037)	(0.032)
High School Graduation Rate			-0.044**		-0.049	-0.045
			(0.018)		(0.034)	(0.031)
Portion of Minority Students			0.132		0.012	0.036
			(0.141)		(0.107)	(0.113)
Poverty Rate			-0.034		-0.021	-0.015
			(0.042)		(0.046)	(0.036)
Resource Factors						
Per-pupil Expenditure (in thousand)				-0.327***	-0.310**	-0.308**
				(0.086)	(0.117)	(0.119)
Constant	-0.995	-1.567*	1.109	3.713***	6.559*	4.353
	(1.038)	(0.812)	(3.156)	(0.942)	(3.017)	(3.374)
Observations	108	108	101	108	101	101
R-squared	0.446	0.488	0.370	0.517	0.501	0.533
Number of States	13	13	13	13	13	13
Year FE	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES

Significant level * p<0.1; ** p<0.05; *** p<0.01.

Notes: Dependent variable is the ratio of the enrollment of Voucher programs relative to the public-school enrollment within state in year t. Two time-invariant variables the Teacher Union Strength and the Population Density are omitted from the estimation. Robust standard errors in parentheses, and standard errors are clustered at the state level. All models shown here have year and state dummies.

Appendix Table 2.3

Effects of the Social Factors on the Expansion of Tax-credits

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	-0.249*	-0.210			-0.212*	-0.035
	(0.118)	(0.150)			(0.109)	(0.175)
Republican Governor	0.204	0.248			0.119	0.303
	(0.159)	(0.183)			(0.093)	(0.173)
Republican-controlled Government		-0.104				-0.463
		(0.121)				(0.274)
Share of Charter School Enrollment	0.004	0.005			0.008	0.010
	(0.025)	(0.026)			(0.014)	(0.016)
Share of Private School Enrollment	0.039	0.027			0.052	0.008
	(0.110)	(0.118)			(0.072)	(0.073)
Need Factors						
NAEP On or Above Basic Level (%)			-0.000		-0.018	-0.006
			(0.062)		(0.053)	(0.058)
High School Graduation Rate			-0.019		-0.018	-0.020
			(0.018)		(0.019)	(0.019)
Portion of Minority Students			-0.098		-0.081	-0.117
			(0.122)		(0.094)	(0.091)
Poverty Rate				0.009	0.013	0.009
				(0.036)	(0.047)	(0.047)
Resource Factors						
Per-pupil Expenditure (in thousand)				-0.321***	-0.439***	-0.471***
				(0.083)	(0.097)	(0.106)
Constant	-0.744	-0.571	3.901	2.708**	8.025***	9.392***
	(1.343)	(1.424)	(4.450)	(0.916)	(2.625)	(2.340)
Observations	90	90	89	90	89	89
R-squared	0.718	0.719	0.703	0.727	0.766	0.775
Number of States	14	14	14	14	14	14
Year FE	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES

Significant level * p<0.1; ** p<0.05; *** p<0.01.

Notes: Dependent variable is the ratio of the participants of Tax-credit scholarships relative to the public-school enrollment within state in year t. Two time-invariant variables the Teacher Union Strength and the Population Density are omitted from the estimation. Robust standard errors in parentheses, and standard errors are clustered at the state level. All models shown here have year and state dummies.

Appendix Table 2.4

Effects of the Social Factors on the Expansion of Individual Tax-credits/deductions

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
Political Factors						
Republican-controlled Legislature	-3.123	-3.125			-1.835	-1.696
	(2.941)	(2.977)			(1.489)	(1.666)
Republican Governor	-1.666	-1.669			-1.435	-1.254
	(2.197)	(2.532)			(0.976)	(1.272)
Republican-controlled Government		0.041				-1.481
		(3.776)				(2.913)
Share of Charter School Enrollment	1.499	1.498			2.233**	2.240**
	(1.199)	(1.236)			(0.667)	(0.670)
Share of Private School Enrollment	-1.090	-1.088			-0.348	-0.488
	(0.841)	(1.031)			(0.463)	(0.320)
Need Factors						
NAEP On or Above Basic Level (%)			0.835**		0.473*	0.489*
			(0.292)		(0.203)	(0.235)
High School Graduation Rate			-0.143		-0.093**	-0.093*
			(0.096)		(0.035)	(0.040)
Portion of Minority Students			-2.870		-2.571***	-2.615***
			(1.640)		(0.555)	(0.605)
Poverty Rate			0.067		-0.668***	-0.645***
			(0.358)		(0.176)	(0.167)
Resource Factors						
Per-pupil Expenditure (in thousand)				3.042	0.457	0.301
				(1.965)	(1.265)	(1.346)
Constant	32.620**	32.589**	35.987	-11.330	58.723***	61.807***
	(10.574)	(13.199)	(51.289)	(20.447)	(15.731)	(14.723)
Observations	62	62	59	62	59	59
R-squared	0.549	0.549	0.579	0.382	0.785	0.787
Number of States	7	7	7	7	7	7
Year FE	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES

Significant level * p<0.1; ** p<0.05; *** p<0.01.

Notes: Dependent variable is the ratio of the participants of Individual Tax-credits/deductions relative to the public-school enrollment within state in year t. Two time-invariant variables the Teacher Union Strength and the Population Density are omitted from the estimation. Robust standard errors in parentheses, and standard errors are clustered at the state level. All models shown here have year and state dummies.

Chapter 3 [7]

Supplying Choice: An Analysis of School Participation Decisions in Voucher Programs in DC, Indiana, and Louisiana

Introduction

Private school choice programs have proliferated across the United States since the 1990's (EdChoice, 2017). They include three different designs for supporting access to private schooling: school vouchers, tax-credit scholarships, and Education Savings Accounts. From the Milwaukee Parental Choice (pilot) Program, which served 341 students in 1990[8], to the Florida Tax-Credit Scholarship Program, which enrolled almost 100,000 students in the spring of 2017[9], private school choice programs have been considered a policy solution that aims to address educational quality and equity concerns by introducing competitive pressures, funding individual students rather than schools, and empowering families to control their child's educational experience (Friedman, 1955).

The core hypothesis behind private school choice is that market-oriented programs will have positive effects on student achievement by a) providing more opportunities for students to attend high quality private schools, and b) allowing parents to choose the schools that best fit their children's particular needs. The underlying assumption that the average quality of the private schools that accept voucher students would exceed the average of all the local public

[7] This chapter is co-authored with Corey A. DeAngelis and Patrick J. Wolf.
[8] EdChoice: Wisconsin – Milwaukee Parental Choice Program, available at https://www.edchoice.org/school-choice/programs/wisconsin-milwaukee-parental-choice-program/.
[9] EdChoice: Florida Tax Credit Scholarship Program, available at: https://www.edchoice.org/school-choice/programs/florida-tax-credit-scholarship-program/.

schools, and those private schools would be more effective in improving student learning, however, is uncertain. Systematic reviews of the participant effects of private school choice on student test scores suggest that effects tend to be positive but also small and inconsistent, especially in the U.S. (e.g. Shakeel, Anderson, & Wolf, 2016; Epple, Romano & Urquiola, 2015). The answer to the question of what effect school choice has on student test scores tends to be: "It depends." One factor it likely depends upon is the quality of supply of choice schools.

Most empirical studies of private school choice programs have focused on demand side considerations of student achievement and parent preferences. Only a few choice studies have considered the supply side: the schools receiving voucher students (e.g. McShane, 2015). The studies of participating choice schools that do exist are merely descriptive. As a result, little attention has been paid to the supply side of voucher programs; specifically, the supply of schools under differing regulatory environments. The public, scholars, and policymakers have little systematic knowledge regarding what type of schools participate in voucher programs, why they do so, and what the implications might be for student achievement.

This chapter remedies this shortcoming in the literature by analyzing what school characteristics predict participation in private school voucher programs in multiple states. Specifically, we estimate the key factors that drive schools' choices to participate based on cross-sectional data from the 2014-15 school year from the private school voucher programs in the District of Columbia (D.C.), Louisiana, and Indiana. This chapter shows that schools with lower tuition, smaller enrollment, and higher minority-density student populations tend to be more likely to participate in voucher programs. Schools with those features normally are considered "low quality" schools. All else equal, private schools with religious affiliations are more likely to participate in voucher programs.

This chapter makes substantial contributions to both the scholarly and practitioner fields. A better understanding of the supply side of voucher programs will help new and existing school choice programs refine their quality constraints regarding market entry. Our analysis also provides scholars and policymakers with a new approach to understanding how voucher program effects are mediated by the quality of schools induced to participate.

Prior Studies of School Voucher Programs in the U.S.

Hundreds of evaluations have assessed the effect of school choice on various outcomes. School voucher, tax-credit scholarship, and Education Savings Account (ESA) programs, all of which provide public subsidies to families that allow them to choose a private school for their child, have proliferated across the country over the past few decades. Currently, 52 such programs have been enacted in 28 states plus the District of Columbia (EdChoice, 2017).

Dozens of empirical studies focus on the impact of private school choice on student outcomes as defined by student test scores, attainment and college enrollment (e.g. Cowen *et al.*, 2013; Greene, Peterson, & Du, 1999; Howell *et al.*, 2002; Rouse, 1998; Witte *et al.*, 2014; Wolf *et al.*, 2013). A recent meta-analysis finds that choice programs tend to have positive and statistically significant test score effects, especially in math, when they are publicly funded, and when they take place outside of the U.S. (Shakeel, Anderson, & Wolf, 2016). Other, less comprehensive, reviews of the test score effects of school choice (e.g. Epple, Romano, & Urquiola, 2015; Rouse & Barrow, 2008; Wolf, 2008) conclude that results tilt positive but only most clearly for African American students. These reviews all agree that the size and statistical significance of school voucher impacts on test scores vary substantially from place to place, suggesting that the kinds of private schools that compose a given voucher program influence its effects on students.

Frederick Hess (2010) argues that school choice programs have filled seats in existing private schools but have failed to entice new high quality private schools to open. Similarly, John Chubb and Terry Moe (1990) point out that a narrow focus on the demand-side of the educational market will fail to provide parents with abundant high quality choices. In Michael McShane's edited book *New and Better Schools: the Supply Side of School Choice* (2015), private school choice researchers and practitioners summarize the challenges that choice programs face in creating marketplaces to drive improvement in the education sector. The twelve chapters provide a broad discussion of how to improve the scale and quality of the supply of private schools participating in choice programs; however, they are mostly suggestive and theoretical, failing to provide robust solutions to enhance the supply side of private school choice programs. In particular, the literature does not describe the characteristics of participating institutions, how the participating schools are different from their non-participating counterparts, and why specific schools choose to participate in voucher programs.

Some empirical studies fill this gap by providing descriptive information about the types of private schools that decide to participate in school voucher programs. Religiosity plays an important role in enrolling choice students. By 2011, 107 private schools served voucher students in Milwaukee, with 86 percent of them ascribing to one of 10 different religious affiliations (McShane *et al.*, 2012). Moreover, Catholic schools enroll a majority of voucher students in most voucher programs (Wolf *et al.*, 2010; Austin, 2015). Howell *et al.* (2006) find that urban voucher-receiving private schools tend to have small class sizes, minimal facilities, and few special programs for disadvantaged students. Austin (2015) reports that participating schools in the Indiana Choice Scholarship Program (ICSP) have larger enrollments than non-participating schools. Abdulkadiroğlu, Pathak and Walters (2018) find that lower quality private

schools, as measured by declining enrollment and lower tuition rates, are more likely to participate in the Louisiana Scholarship Program (LSP).

Private schools with longer experience participating in a voucher program are more likely to offer special programs for struggling students (Stewart, Jacob, & Jensen, 2012). Ford (2011) analyzes the exit patterns of private schools from the MPCP, finding that the schools with lower enrollment growth rates are more likely to leave. His follow-up study of Milwaukee voucher schools reports that schools experiencing enrollment growth had significantly higher proportions of students achieve proficiency than the schools that experienced enrollment declines, suggesting that private institutions with higher quality tend to attract larger enrollments compared to lower-performing schools. This advantage fades out, however, after controlling for the descriptive characteristics of schools such as years in the program, proportion of the student body made up of voucher students, and religious affiliation (Ford, 2016).

A small number of studies have examined potential barriers to school participation in school choice programs. A recent survey of leaders at participating and non-participating private schools in Louisiana, Indiana, and Florida suggests that program regulation is a major concern (Kisida, Wolf, & Rhinesmith, 2015). Twenty-six percent of the leaders of non-participating private schools in Florida, 62 percent of them in Indiana, and 64 percent of them in Louisiana listed "Future regulation that might come with participation" as their major reason for not participating in the program (Kisida, Wolf, & Rhinesmith, 2015, 17-19). These responses suggest that private schools are highly sensitive to regulatory creep in making participation decisions regarding school choice programs. Stuit and Doan (2013) generate regulatory burden scores for the private school choice programs in the U.S. They find that private school participation rates are lower in more regulated school choice programs. Egalite (2015) suggests

that revenue constraints, shortages of facility space, and state regulations are the major concerns for school leaders in determining whether to participate in a voucher program.

The school voucher research base is a tale of two literatures. The empirical research on the effects of voucher programs on student outcomes is broad, deep, rigorous and causal. The empirical research on what kinds of schools participate in school voucher programs is relatively thin and descriptive. Since the private schools in a voucher program are, to a significant extent, the program itself, the lack of analyses of school participation in private school choice programs is a hole that cries to be filled. We take a step in that direction by examining school participation in three private school voucher programs that operate under different policy contexts**.**

Theory and Hypothesis

Studies examining the effectiveness of private school choice programs are static in that they examine initiatives as they exist. While that approach is sound from a program evaluation standpoint, since a school choice program is what it is, these studies may underestimate the potential effects choice has on students since individual schools choose whether to participate in voucher programs. We customize a decision-making model for the specific case of private schools participating in a voucher program by considering the benefit of additional funding and the costs tied to state-driven regulation.

Benefits of Participating in Voucher Programs

Intuitively, the most obvious economic benefit for schools participating in choice programs is to acquire additional resources by receiving voucher students. Of course, financial benefits will vary across schools based on their specific cost structures and capacities. The further a given school's enrollment is from full capacity, the lower the marginal cost is for accepting an additional student. To the degree that marginal cost exceeds zero, the incentive for

an institution to participate is the voucher amount minus the average cost per student. Almost all schools have a financial incentive to participate in a voucher program so long as they are not at full capacity and have tuition levels at or below the voucher amount. Other than receiving voucher-based revenue, we expect that schools, especially those small schools, will achieve greater economies of scale by participating in a voucher program, even when the maximum voucher amount does not fully cover the average cost of educating a student at that school.

Furthermore, private schools may still elect to participate in voucher programs even if they lose money on each student, since the schools gain the nonfinancial benefit of social responsibility or what organizational theorists call "purposive benefits" (Wilson, 1989). We suspect that religious schools value social responsibility more than secular ones.

Costs of Participating in Voucher Programs

There are two types of costs for schools participating in voucher programs. Participating schools must provide tuition subsidies when per-pupil costs exceed the state-determined voucher amount, as few voucher programs allow schools to charge families top-up fees above the voucher maximum. Thus, schools with higher per-pupil costs have a financial incentive not to participate in voucher programs. The other type of cost is the additional regulatory burden. Many voucher programs require private schools to administer state standardized tests, undergo financial audits, surrender admissions policies to the state, and conform to teacher certification standards. Complying with these requirements costs money.

Regulatory burdens will have an absolute cost and a relative cost for private schools within the same location. Each voucher program has a consistent set of regulations that apply to all private schools within the program's geographic reach. In that sense, the costs of compliance are absolute and only vary across programs. In another sense, the costs of compliance are relative

and vary for individual schools within a given location. Schools that are vastly different from the traditional public school model will face much higher regulatory costs associated with necessary adjustments. For example, if an institution's educational model did not rely on standardized tests before, switching into a voucher program that requires standardized testing would be relatively more costly than it would be for a private school used to testing its students.

School Participation Decision Making Model

As shown in ***Figure 3.1***, schools make their participation decision by comparing the additional costs of tuition subsidization and regulatory compliance associated with participating with the additional benefits of voucher revenue, economies of scale and enhanced social responsibility. Theoretically, schools perceiving benefits exceeding the costs will decide to participate in voucher programs. These schools likely have a lower tuition level and a smaller enrollment size, or are eager for financial support and are willing to sacrifice some school autonomy for additional funding. The private schools that meet those criteria are likely to be lower-quality academically (Stewart, Jacob, & Jensen, 2012). They also are more likely to be religious with an explicit mission to serve disadvantaged students, no matter the cost.

Our theoretical model results in three hypotheses regarding the school voucher participation decision. All else equal:

1. Schools with higher quality will be less likely to participate;
2. Catholic schools will be more likely to participate;
3. Schools will be less likely to participate in more highly-regulated programs;

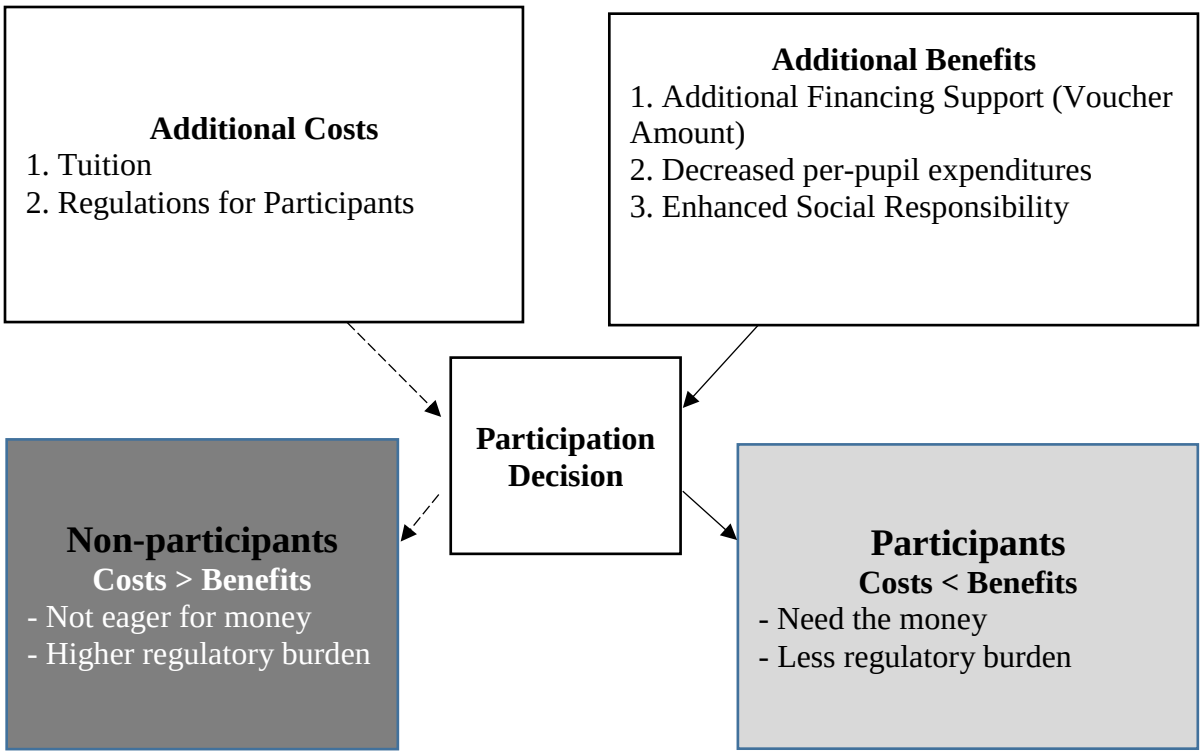

Figure 3.1 Cost Benefit Decision Making Model

Descriptions of Programs

We focus on three school voucher programs: the D.C. Opportunity Scholarship Program, the Indiana Choice Scholarship Program, and the Louisiana Scholarship Program (LSP).

DC Opportunity Scholarship Program

The D.C. Opportunity Scholarship Program (DC OSP) was established in January 2004 as the first federally-funded school choice program in the United States. Students must live in D.C. in families that receive Supplemental Nutrition Assistant Program (SNAP) benefits or be at or below 185 percent of the poverty line ($44,955 for a family of four in 2016-17). Students are given priority in receiving a scholarship if they have a sibling in the program or come from low-quality public school.

The average voucher amount is $8,452 for K-8 students and $12,679 for high school students. Even the higher voucher amount for high school is only about 47 percent of the per pupil funding amount in D.C. public schools. In 2016-17, 1,166 students and 42 private schools participated in the program. The average voucher value in 2016-17 is projected to be $9,472. In order to participate in the DC OSP, private schools must require that teachers in core subjects hold a bachelor's degree. They also must administer a nationally norm-referenced exam to their voucher students.

The initial gold-standard experimental evaluation of the OSP mandated by Congress concluded that participation in the program led to significantly higher graduation rates (Wolf *et al.*, 2013). An evaluation of the cost effectiveness of the DC OSP found a benefit to cost ratio of 2.62, indicating that each dollar spent on the program produced 2.62 dollars in benefits (Wolf & McShane, 2013). On the other hand, a follow-up experimental evaluation of the program reported that student test scores in math were lower one year after receiving an Opportunity Scholarship (Dynarski et al. 2017).

Indiana Choice Scholarship Program

The Indiana Choice Scholarship Program (ICSP) started in 2011 and is now the largest school voucher program in the country. In order to qualify for the program, students must come from a family that earns no more than 150 percent of the federal lunch program limit ($67,433 for a family of four in the 2016-17 school year). Students must be assigned to or be leaving a public school with an "F" grade. If a student comes from a family that earns up to 200 percent of the federal lunch program amount ($89,910 for a family of four in 2016-17), they qualify for the program if they have a disability or if they received a voucher in the previous school year.

In 2016-17, 313 schools and 34,299 students participated in the program. The average voucher value was $4,024 in 2015-16 (less than half of the per-pupil spending in public schools). The ICSP is the most accessible program in our study, as 54 percent of students across the state are income-eligible.

In order to participate in the program, schools must report their graduation rates and ratings based on the Indiana Statewide Testing for Educational Progress (ISTEP). If they are rated a "D" or "F" for two years in a row, they are no longer eligible for the program. Schools must administer the state tests, submit financial reporting and allow the state to have full access to their property in order to observe classrooms. Administering the state test is customary for most private schools in Indiana because the Hoosier State requires state testing for any school, public or private, that wishes to participate in interscholastic extracurricular activities including sports.

Louisiana Scholarship Program

The Louisiana Scholarship Program (LSP) started as a pilot program in New Orleans in 2008 and expanded statewide in 2012. Students must be at or below 250 percent of the poverty line ($60,750 for a family of four in 2016-17) in order to qualify for the program. Students must have attended a public school that was graded as a C, D, F, or T in the previous school year. If the student is entering kindergarten, they must be assigned to a C, D, F, or T[10] school for the current school year. During the admission lottery for oversubscribed schools, students at a D or F school receive priority over other students.

[10] T schools refer to Turnaround schools. These schools are led by operators who took over existing failing schools and maintain all previous grade levels and students. A“T” letter grade indicate the school is in transition.

The voucher amount is equal to the state share of per pupil funding in the student's home public school district or the private school's tuition amount, whichever is less. In 2015-16, 7,110 students and 121 schools participated in the program and the average voucher value was $5,856. Twenty percent of the K-12 students in Louisiana were eligible for the program.

In order to participate in the LSP, private schools must use an open admissions process in enrolling scholarship recipients and administer the same state examinations required by the public school district. The schools must also maintain a "quality" curriculum that is equal to or better than that of public schools, as judged by the state department of education. Private schools are prohibited from charging students a top-up above the voucher amount. Failure to comply with these requirements can lead to the school's removal from the program.

Since the statewide expansion of the program in 2012, there have been several studies of it by the School Choice Demonstration Project (SCDP). Mills and Wolf (2017) find that the LSP had a negative effect on student math achievement after two years. However, Egalite, Mills, and Wolf (2016) report a positive impact of the program on racial integration, especially in public schools previously under court orders to integrate. In addition, Egalite (2016) finds some positive competitive effects of the program on the achievement of public school students in Louisiana. Further, the program saves money for the state and local school districts (Trivitt & DeAngelis, 2016).

Table 3.1 outlines attributes relevant to the participation decisions for private schools within each of the three voucher programs included in this report. In particular, we present the financial benefit for participating private schools within each program and the average funding relative to the traditional public school funding amount. We also show the various regulatory

burdens associated with participation: testing, open-admissions, financial reporting, prohibition of parental copay, and teacher certification requirements.

Table 3.1
Participation Costs and Benefits for Each Voucher Program

Feature	D.C.	Indiana	Louisiana
Date Enacted	2004	2011	2008
Average Funding Relative to Public School	47%	42%	54%
Eligibility Rate	35%	54%	20%
Testing Requirement	Y	Y	Y
Open-Admissions Process			Y
Financial Reporting	Y	Y	Y
Parental Copay Prohibited			Y
Teacher Requirements	Y		
Ranking of State Laws for School Choice Voucher Programs (Center for Education Reform, 2014)	B	A	C
Regulatory Burden Score Ranking (Stuit & Doan, 2013).	7	2	5

Notes: Ranking of State Laws for School Choice Voucher Programs ranges from A to F with A indicating the lowest regulatory burden and F indicating the highest regulatory burden. Ranking of Regulatory Burden Score is taken from Table4 in Stuit & Doan (2013). School choice regulations: Red tape or red herring. Washington, D.C.: Thomas B. Fordham Institute. It ranges from 1 to 13 with 1 indicating the highest regulatory burden and 13 indicating the lowest regulatory burden.

The findings in Table 3.1 mirror those in the 2014 voucher program scorecard released by the Center for Education Reform.[11] The scorecard examines the regulatory freedom experienced by private schools in voucher programs in 15 locations and found that Indiana had the least regulatory burden, scoring an A. Washington D.C. scored a B, while Louisiana scored a C. The findings also align at least somewhat with the Stuit and Doan (2013) ranking of regulatory burden scores for thirteen of the private school choice programs in the U.S., which rank Indiana as least burdensome (ranked 2nd) and DC as the most burdensome (ranked 7th) of the three programs included in this report.

[11] School Choice Today, Voucher Laws across the States (2014). Retrieved from the Link: https://www.edreform.com/2014/08/school-choice-today-voucher-laws-across-the-states-1/

Private schools in Louisiana and DC face the largest costs for participation, while serving voucher students costs private schools in Indiana the least. Thus, we expect a significantly lower probability of participating for schools in Louisiana and DC after controlling for school characteristics.

Specifically, private schools participating in the DC Opportunity Scholarship have additional requirements of state testing, financial reporting, and, as indicated by the low eligibility rate, less-advantaged voucher students. The DC voucher program also has additional teacher certificate requirements; thus we expect DC Catholic schools (which do not require certification) are less apt to participate relative to Catholic schools in Indiana and Louisiana.

Private schools participating in the LSP have additional requirements of state testing, open-admissions, financial reporting, prohibition of parental copay, and, as indicated by the low eligibility rate, the least-advantaged voucher students. On the other hand, private schools participating in the LSP tend to receive slightly more public funding, on average, relative to those in DC and Indiana. Because high-quality private schools appear to have the most to risk in Louisiana, we expect that they will be the least likely to participate in their voucher program.

Private schools in Indiana appear to have much lower costs tied to their participation decision. In particular, they do not have to use an open-admissions process or additional teaching requirements, and are allowed to accept parental funds above and beyond the voucher amount. Additionally, private schools in Indiana can benefit from a large increase in demand from students who are relatively less costly to educate, as indicated by the comparatively high eligibility rate of 54 percent. However, private schools in Indiana seem to experience a slightly lower financial benefit per student, as indicated by an average voucher value that is only 42 percent of the public school funding level. Nonetheless, private schools participating in Indiana's

voucher program are not compelled to accept the voucher amount as full-payment. Because high-quality private schools appear to have the least to risk in Indiana, we do not expect quality levels to be related to program participation decisions in that state.

The decision makers who shaped these three private school choice programs did not operate in a vacuum. State context is important to how choice programs are designed and that context varied across DC, Indiana, and Louisiana. In DC, President Bush and congressional leaders designed the Opportunity Scholarship Program as a pilot project to learn how private school choice might affect low-income families in the nation's capital (Stewart & Wolf, 2014). For Indiana, the Choice Scholarship Program was the state's second private school choice program, building on a limited tax-credit scholarship program launched in 2010. Thus, the Indiana program represented a policy breakthrough long in the works for Hoosiers (Austin 2015).

Louisiana has been home to a large individual tax deduction program since 2008. Up to $5,000 in education expenses, including private school tuition, can be deducted from the family's state taxable income. Private schools in Louisiana benefit from the tax deduction policy whenever the parents of students attending their school claim the tax deduction, as over 100,000 families did in 2012, because it makes private school tuition more affordable to middle class families (EdChoice, 2017). The tax deduction policy does not benefit low-income families in the state, however, because they rarely itemize their tax deductions. In enacting the Louisiana Scholarship Program, policymakers sought an additional private school choice initiative designed specifically and intentionally to serve low-income students whose families did not benefit from the tax deduction policy.

Data and Sample Description

The data used in this report includes participating school lists in three locations for the 2014-15 school year and school-level characteristics linking to the decision of whether to participate in a voucher program. The participation status of each school is obtained from the annual report of the voucher program for each state (Indiana Department of Education, 2016; Louisiana Department of Education, 2014). According to the reports, 492 K-12 private schools received voucher students across the three locations in the 2014-15 school year: 47 in the District of Columbia, 314 in Indiana, and 131 in Louisiana.

Measures of school characteristics were obtained from the publicly available Private School Universe Survey (PSS) database for the most recent school year of 2013-2014. The PSS is a nation-wide survey of all the private schools in the U.S. conducted every two years since 1988-89. Information missing from the PSS was collected from lists provided by nationwide private school associations, state departments of education, and other sources. In the 2013-14 survey, 42 DC private schools, 329 Indiana private schools[12] and 284 private schools in Louisiana were included, for a total of 655 private schools. We used information from the Private School Review website for 12 DC OSP participating schools that were not included in the PSS (2013-14), resulting in 667 schools with information on school characteristics.

In addition to the PSS, we collected 2015-16 school tuition levels by searching school websites and calling the schools, when necessary. We combine the tuition information along with the PSS survey data to describe the school characteristics for both voucher participating schools and non-participating schools. Descriptive statistics of school characteristics are in Table 3.2.

[12] Excludes 168 Amish schools and 9 closed schools.

Program participation rates differed across locations. The rate was 78 percent for DC, 70 percent for Indiana, and 33 percent for Louisiana, indicating that private schools in Louisiana were particularly unlikely to participate in the LSP.

Lastly, we use data from the Great Schools[13] website for our analysis of the relationship between parent reviews and program participation. The original scale takes on integer values from one to five, with five the most positive. We aggregate a school's Great Schools Review score into a continuous variable that ranges from one to five by weighting it on the frequency of parent's rating on each score. The aggregated Great School Review score has a mean of 4.18 with the standard deviation of 0.698, indicating a small variation between schools.

Table 3.3 describes the quality of the data we use to conduct this study. Overall, the private schools that are included in our report represent almost 70 percent of the private school population in the three states, indicating a highly representative sample.

Table 3.2
School Characteristics Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
Overall Tuition ($1,000)	515	7.264	6.102	1.900	49.666
DC	51	18.600	12.246	3.255	49.666
Indiana	224	6.101	2.929	1.90	20.645
Louisiana	240	5.941	3.202	2.000	19.660
Great School Review Score	483	4.186	0.698	1	5
DC	40	4.276	0.561	2.923	5
Indiana	221	4.293	0.749	1	5
Louisiana	222	4.063	0.648	1	5
Average Grade Cohort Enrollment (100)	665	0.351	0.420	0.010	2.828
Catholic School	667	0.496	0.500	0	1
Elementary-Only School	667	0.657	0.475	0	1
Library or Media Center	667	1.895	0.307	1	2
Percent of Minority Students	661	0.284	0.317	0	1
Length of School Day in Total Hours	665	6.997	0.508	5.33	11

[13] Parent review score, weighted on number of reviewers. link: http://www.greatschools.org/

Table 3.3
Sample Descriptive Analysis

	Overall	DC	Indiana	Louisiana
(1) Count of Participating Schools	492	47	314	131
(2) Count of PSS Schools (2013-14)	667	54	329	284
(3) Matched Participating Schools	366	42	231	93
Participating Schools Match Rate= (3)/(1)	74%	89%	74%	71%
(4) Program Participation Rate=(3)/(2)	54.87%	77.78%	70.21%	32.75%
(5) Count of Schools with Tuition Rate	515	51	224	240
Tuition Match Rate = (5)/(2)	77.21%	94.44%	68.09%	84.51%
(6) Count of Schools with Great Schools Review Score	483	40	221	222
Great Schools Review Score Match Rate= (6)/(2)	72.41%	74.07%	67.17%	78.17%

Analytical Methods

To test our hypotheses, we apply linear probability models to estimate the school's participation choice. At the school level, the participation equation is:

$$y = a_0 + \boldsymbol{SchoolQuality_i'}.\boldsymbol{\beta} + \boldsymbol{Catholic_i}'.\boldsymbol{\gamma} + \boldsymbol{SchoolAttributes_i}'.\boldsymbol{\delta} + \rho_i + \sigma_i + \varepsilon_{ic} \quad (1)$$

The dependent variable of interest, the likelihood that school *i* participates in a voucher program in the year 2014-15 is a function of school quality indicators (the amount of the school tuition, average cohort enrollment size, and school revenue), school religious affiliation, and other school characteristics. We conduct the analyses including state fixed effect ρ_i and city fixed effect σ_i, and cluster standard errors at the city level *c*.

Four independent variables of interest are used separately and in combination in the analysis. One set of models disaggregates total revenue into its separate components of tuition level and enrollment level.[14] A second set of models combine school tuition with average cohort enrollment to produce a "revenue" variable that represents both the price and quantity of each school's educational service. A third set of models replaces tuition and enrollment with each

[14] We use average grade cohort enrollment as the variable in our models because key control variables for school level (elementary, middle, and high) are strongly correlated with total school enrollment.

school's Great Schools review score, using reputation as a proxy for school quality. Since we anticipate that schools with higher tuition, larger enrollment, and higher Great Schools review scores, those normally considered higher-quality schools, will be less likely to participate in a given program, we expect that the coefficient estimates for these explanatory variables will be negative, especially in Louisiana and DC.

We first present a model that does not use school-level controls, since including them would deteriorate our treatment of interest. If tuition levels reflect several school-level characteristics, we may not want to include any controls. Theoretically, if everything that the family receives is reflected in the price of the school, a model that controls for all school characteristics purchased by tuition would perfectly remove the coefficient on tuition level. Nevertheless, we also include a model with school-level controls as a robustness check.

The variable *Enrollment* describes school *i*'s average cohort enrollment (in hundreds), which may indicate an economies of scale benefit introduced by accepting additional voucher students. If enrollment is a measure of consumer demand, it is also a quality variable of interest. As we hypothesize schools with smaller enrollment that have lower marginal costs of admitting additional voucher students are more likely to participate in the program, we anticipate that β_2 will also be negative.

Additionally, the school participation decision is influenced by other control variables included as *School Attributes*. These control variables are other educational and environment characteristics that may influence school *i*'s overall quality and expenses. We control for school institutional characteristics, including an indicator of whether school *i* is an elementary-only (below 7th grade), secondary (offering grades between 7 and 12), or combined (all K12 levels).

We also control for percentage of minority students within a school, whether the school has a library or media center, and the average length of a school day.

Catholic is a binary variable that indicates if school *i* is a Catholic school. The coefficient, β_4, is expected to be positive since religious schools generally show a higher willingness to take on social responsibilities. However, we would expect it to be negative for OSP, since DC has strict requirements on teacher certification which set additional barriers for Catholic schools to participate in the program.

Along with all the variables described above, ρ in the Equation (1) denotes the specific program, *j*, that the school *i*, was in, and ε refers to the random errors. At the cross-state level, we conduct a program fixed effect regression with the Indiana Choice Scholarship Program as the default, and would expect a negative sign for the coefficients on the DC and Louisiana indicator variables, which refers to a lower participating tendency of private schools in those two sites.

Results

This section presents the analytical results of estimations on the school's participation decisions in voucher programs in DC, Louisiana, and Indiana.

Tuition and Enrollment

A comparison of means reveals that the tuition levels of participating private schools tend to be lower than those that choose not to participate in DC and Louisiana; however the difference is only statistically significant at the 95 percent level of confidence in Louisiana, where participating private schools have tuition levels that are around $800 lower.

The revenue variable behaves as expected in our main analysis. Higher revenue is negatively associated with the decision to participate in a private school choice program in

models that exclude control variables for school amenities but changes to a positive association with participation controlling for the school features that revenue buys. None of the coefficients on the revenue variable effect are statistically significant.

Our primary results that solely include tuition and average cohort enrollment as separate variables at the cross state level using state and city fixed effects largely confirm our first hypothesis, as shown in Column 2, Table 3.4. We find that schools with higher tuition are less likely to choose to participate in voucher programs: a $1,000 increase in school tuition is associated with a 0.9 percentage point reduction in the likelihood of participating in a voucher program, marginally significant at $p<.1$. Schools with larger cohort enrollment are also less likely to participate in voucher programs, though this association is not statistically significant. The effect of tuition fades out after controlling for school characteristics that are related to the tuition level, as shown in Column 2 through 8, and the effects of cohort enrollment remain negative and insignificant across all the models. Additionally, Column 8 indicates the Catholic schools have a higher tendency of participating in voucher programs than non-Catholic schools, across all three states, statistically significant at $p<.01$.

In the meantime, the coefficients on the state fixed effects of DC and Louisiana are consistently negative across all the models, and the magnitude of Louisiana is significantly larger than DC, indicating that controlling for school characteristics, private schools in Louisiana and DC, the two states that share larger regulatory burdens, are less likely to participate in voucher programs than those in Indiana, with the least participation in Louisiana. These results align with our expectation. Comparisons of school participation decision making across states reveal similar stories, as shown in Appendix A.

Table 3.5 presents the full linear regression model estimation for each of the states. As a result, tuition is negatively associated with school voucher program participation in all three states, and attains statistical significance in DC and Indiana. Specifically, a $1,000 increase in school tuition is predicted to reduce a school's likelihood of participating in the DC OSP by 1.9 percentage points ($p<.05$), and in the ICSP by 3 percentage points ($p<.05$), all else equal. The average cohort enrollment only predicts school participation in the voucher program in Louisiana. Controlling for other school characteristics, an increase of 10 students in average cohort enrollment reduces a school's likelihood of participating in the LSP by 2.8 percentage points ($p<.05$).

Catholic schools in Indiana and Louisiana are 41.1 and 24.2 percentage points, respectively, more likely to participate in voucher programs than their non-Catholic counterparts. Catholic private schools in DC have less likelihood of participating in the DC OSP, though this association is not statistically significant at $p<.05$.

Lastly, private schools with a higher proportion of minority students are more likely to participate in the LSP, statistically significant at $p<.01$. On the other hand, such schools are less likely to participate in the OSP and ICSP, though this association fails to reach statistical significance.

We also adopt *Probit* models with city fixed effects for a robustness check, restricting our analytical samples to schools that have counterparts within the same city. Those schools are largely the urban and high-tuition schools. The results from *Probit* models, as reported in Appendix B, are similar to those we obtained from the linear probability model in Table 3.4 and Table 3.5.

Table 3.4
School Quality on Participation Decision, Across States

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revenue (Ln)	-0.021		-0.020		0.043		0.006	
	(0.039)		(0.037)		(0.032)		(0.038)	
Tuition ($1,000)		-0.009*		-0.012**		-0.006		0.000
		(0.005)		(0.005)		(0.007)		(0.006)
Average Grade Cohort Enrollment (100)		-0.057		-0.093		-0.021		-0.114
		(0.087)		(0.106)		(0.078)		(0.076)
Elementary School			0.052	0.025	0.054	0.018	-0.124	-0.12
			(0.065)	(0.066)	(0.063)	(0.068)	(0.084)	(0.077)
Secondary School			0.047	0.109	0.019	0.052	-0.171*	-0.072
			(0.097)	(0.118)	(0.092)	(0.130)	(0.102)	(0.117)
Length of School Day In Total Hours			0.100	0.060	0.053	0.034	0.044	0.011
			(0.070)	(0.078)	(0.068)	(0.075)	(0.054)	(0.049)
Has Library or Library Media Center					-0.009	0.09	-0.075	0.005
					(0.087)	(0.084)	(0.115)	(0.123)
Percentage of Minority Student					0.458**	0.314	0.410***	0.335***
					(0.222)	(0.219)	(0.113)	(0.102)
Catholic School							0.269***	0.267***
							(0.069)	(0.064)
DC	-0.142**	-0.091*	-0.127*	-0.068	-0.441***	-0.270*	-0.249*	-0.175
	(0.064)	(0.055)	(0.070)	(0.044)	(0.144)	(0.141)	(0.134)	(0.111)
LA	-0.511***	-0.537***	-0.479***	-0.542***	-0.730***	-0.697***	-0.644	-0.596
	(0.021)	(0.021)	(0.070)	(0.072)	(0.158)	(0.155)	(0.400)	(0.401)
Constant	1.278**	1.027***	0.61	0.613	0.012	0.569	0.636	0.762*
	(0.520)	(0.017)	(0.678)	(0.537)	(0.547)	(0.493)	(0.615)	(0.417)
N	514	514	511	511	509	509	509	509
Adjusted R Squared	0.249	0.513	0.26	0.528	0.306	0.548	0.346	0.581

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.
Notes: Linear Probability coefficients. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

GreatSchools Review Score

GreatSchools reviews provide a more direct measure of private school quality. We were able to obtain scores from 40 schools in DC, 217 schools in Indiana, and 221 schools in Louisiana. Table 3.6 indicates a potential negative relationship between Great Schools review scores and school decisions to participate in a voucher program. The coefficient on the effect of a school's review school and the likelihood of participation is negative in DC and Louisiana and indicates that a one-unit increase in Great Schools review score is associated with a 12 percentage point lower likelihood of participating in the LSP and a 5.1 percentage point lower likelihood of participating in the DC OSP. In Indiana, the relationship reverses and a one-unit increase in Great Schools Review score is associated with a 0.3 percentage point higher tendency of participating in the ICSP. However, these effects are not statistically significant. This might be due to the small variance of the Great Schools Review score. More than three quarters of schools in our sample have a Great School Review score larger than 4, meaning there is little variance in the rating and therefore little likelihood of a consistent relationship with the participation decision. Results remain similar after controlling for school characteristics.

State fixed effects indicate that private schools in DC and Louisiana are less likely to participate in voucher programs compared to schools in Indiana. Schools in Louisiana, the state with highest burden of regulation, have the lowest tendency of participating, with the association significant at $p<.01$.

Table 3.5
School Quality on Participation Decision, by states

	DC Participant		Indiana Participant		Louisiana Participant	
	(1)	(2)	(3)	(4)	(5)	(6)
Revenue (*Ln*)	-0.046		0.025		-0.045	
	(0.052)		(0.060)		(0.060)	
Tuition ($1,000)		-0.019**		-0.030**		-0.005
		(0.008)		(0.01)		(0.009)
Average Grade Cohort Enrollment (100)		0.091		-0.021		-0.282**
		(0.082)		(0.09)		(0.122)
Elementary School	-0.183	-0.224	-0.216	-0.223	-0.076	-0.078
	(0.140)	(0.150)	(0.147)	(0.16)	(0.124)	(0.105)
Secondary School	-0.134	-0.129	-0.250	-0.072	-0.140	0.049
	(0.166)	(0.181)	(0.163)	(0.17)	(0.156)	(0.164)
Length of School Day In Total Hours	-0.050	0.015	0.170	0.198	0.019	0.022
	(0.079)	(0.056)	(0.119)	(0.13)	(0.065)	(0.065)
Has Library or Library Media Center	0.185	0.314	-0.182	-0.105	0.043	0.026
	(0.274)	(0.239)	(0.168)	(0.13)	(0.198)	(0.193)
Percentage of Minority Student	0.032	-0.202	-0.042	-0.117	0.617***	0.553***
	(0.193)	(0.191)	(0.177)	(0.13)	(0.155)	(0.137)
Catholic School	0.085	-0.112	0.401***	0.411***	0.210**	0.242**
	(0.114)	(0.122)	(0.108)	(0.11)	(0.105)	(0.098)
Constant	1.649**	0.641	-0.322	-0.290	0.336	-0.273
	(0.627)	(0.626)	(1.182)	(1.01)	(0.896)	(0.513)
N	47	47	223	223	240	240
Adjusted R Squared	0.081	0.194	0.283	0.314	0.235	0.53

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Linear probability in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Table 3.6
Linear Probability of Great Schools Review Score on Participation Decision

	Overall Participant	DC Participant	Indiana Participant	Louisiana Participant	Overall Participant	DC Participant	Indiana Participant	Louisiana Participant
Great Schools Review Score (Weighted)	-0.051	-0.051	0.003	-0.118	-0.018	-0.188	0.024	-0.039
	(0.051)	(0.138)	(0.042)	(0.109)	(0.612)	(0.129)	(0.583)	(0.634)
Catholic					0.276***	0.206*	0.315***	0.284***
					(0.000)	(0.079)	(0.005)	0.000
Elementary School					-0.118	0.07	-0.157	-0.146
					(0.128)	(0.708)	(0.203)	(0.129)
Secondary School					-0.173*	-0.036	-0.068	-0.315*
					(0.078)	(0.857)	(0.631)	(0.050)
Length of School Day In Total Hours					-0.04	-0.13	-0.066	-0.026
					(0.717)	(0.566)	(0.448)	(0.906)
Has Library or Library Media Center					0.347***	0.091	0.016	0.582***
					(0.001)	(0.605)	(0.882)	(0.000)
Percentage of Minority Student					0.032	-0.036	0.155	0.043
					(0.581)	(0.696)	(0.224)	(0.621)
DC	-0.156***				-0.485***			
	(0.006)				(0.000)			
LA	-1.037***				-1.066***			
	(0.037)				(0.000)			
Constant	1.222***	1.067*	0.983***	0.422	1.244***	1.067*	0.008	0.44
	(0.224)	(0.590)	(0.212)	(0.392)	(0.231)	(0.590)	(0.211)	(0.395)
N	478	40	217	221	475	38	216	221
R Squared	0.575	0.006	0.518	0.394	0.643	0.21	0.623	0.52

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Linear probability in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Discussion and Policy Implications

The results in our model without school-level controls largely confirm our hypotheses. The relationship between the level of tuition required of private schools and their decision to participate in a voucher program is negative. The results in our model with school-level controls also show a negative relationship, however statistical significance only remains for the negative effect of tuition levels on participation in the DC and Indiana programs. This is likely because controlling for school-level characteristics diminishes our treatment of interest if these characteristics are reflected in the cost of attending the school. The effect of cohort enrollment, a potential indicator of quality, on school participation decisions appears to vary across the three locations. In DC the effect of enrollment on participation is positive but not statistically significant. In Indiana it is negative but not significant. The relationship between cohort enrollment and school participation is negative and statistically significant in Louisiana. Higher-enrollment private schools are much less interested in participating in the school choice program in Louisiana than in Indiana or DC, where cohort enrollment levels do not clearly factor into the decision.

Our analysis of Great Schools review scores shows a negative, though statistically insignificant, relationship with program participation, likely due to the small variation on Great Schools Review scores among the schools. Catholic schools consistently display a significantly higher likelihood of participating in school choice programs, after controlling for school characteristics. Private schools in DC and Louisiana have a significantly smaller likelihood of participating in voucher programs than in Indiana, with the least participation in Louisiana, which has the highest regulatory burden.

Yet, our analysis is limited by the data availability. First, we only observed school participations in the DC OSP, LSP, and Indiana's Choice Scholarship in the 2014-15 school year. The school participation patterns of those programs might correlate with some external shock during that year, and might change over time. Second, the measure of school quality, including school tuition cost, enrollment size, and the GreatSchool Review Scores were obtained after the program was enacted, thus could be endogenous with the program enactment.

This chapter contributes to the existing literature on understanding the supply side of voucher programs: what kind of schools are receiving the voucher students, and what school characteristics predict the likelihood of participating in a private school choice program. We demonstrate a simple model of rational decision-making to allow us to illustrate what kinds of private schools will and will not choose to participate in a private school choice program. Our chapter contributes to an improved understanding of the supply side of voucher programs that can assist engineers of new and existing school choice programs. In particular, policymakers should be cautious about the consequences of attempting to control the quality of schools within a voucher program. In attempting to control quality through regulation, decision-makers may inadvertently limit the number of high-quality choices available to disadvantaged students across the United States. A second key lesson is that the effects of proxy measures of school quality on private school participation decisions depend at least somewhat on context.

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Appendix A

Appendix Table 3.1
The Effect of School Quality on Participation Decision Using Linear Probability Model, DC

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revenue (Ln)	-0.018		-0.049		-0.04		-0.046	
	(0.036)		(0.033)		(0.053)		(0.052)	
Tuition ($1,000)		-0.005		-0.010*		-0.015**		-0.019**
		(0.005)		(0.005)		(0.006)		(0.008)
Average Grade Cohort Enrollment (100)		0.09		0.092		0.071		0.091
		(0.058)		(0.070)		(0.080)		(0.082)
Elementary School			-0.056	-0.096	-0.142	-0.239	-0.183	-0.224
			(0.127)	(0.138)	(0.127)	(0.151)	(0.140)	(0.150)
Secondary School			0.016	-0.022	-0.076	-0.173	-0.134	-0.129
			(0.160)	(0.158)	(0.146)	(0.173)	(0.166)	(0.181)
Length of School Day In Total Hours			-0.048	-0.027	-0.051	0.003	-0.05	0.015
			(0.068)	(0.047)	(0.083)	(0.051)	(0.079)	(0.056)
Has Library or Library Media Center					0.2	0.273	0.185	0.314
					(0.250)	(0.246)	(0.274)	(0.239)
Percentage of Minority Student					0.079	-0.158	0.032	-0.202
					(0.235)	(0.149)	(0.193)	(0.191)
Catholic School							0.085	-0.112
							(0.114)	(0.122)
Constant	1.091**	0.839***	1.966***	1.178***	1.514**	0.721	1.649**	0.641
	(0.524)	(0.070)	(0.725)	(0.413)	(0.573)	(0.622)	(0.627)	(0.626)
N	51	51	49	49	47	47	47	47
Adjusted R Squared	0.004	0.034	0.037	0.104	0.069	0.18	0.081	0.194

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Linear probability in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Appendix Table 3.2

The Effect of School Quality on Participation Decision Using Linear Probability Model, Indiana

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revenue (Ln)	0.087**		0.085**		0.087		0.025	
	(0.036)		(0.042)		(0.057)		(0.060)	
Tuition ($1,000)		-0.032**		-0.037**		-0.038**		-0.030**
		(0.013)		(0.015)		(0.016)		(0.012)
Average Grade Cohort Enrollment (100)		0.205***		0.142**		0.11		-0.021
		(0.048)		(0.07)		(0.068)		(0.085)
Elementary School			0.039	0.038	0.048	0.047	-0.216	-0.223
			(0.114)	(0.13)	(0.115)	(0.137)	(0.147)	(0.162)
Secondary School			-0.016	0.125	-0.017	0.159	-0.25	-0.072
			(0.116)	(0.129)	(0.127)	(0.141)	(0.163)	(0.168)
Length of School Day In Total Hours			0.174*	0.217*	0.178*	0.223*	0.17	0.198
			(0.103)	(0.127)	(0.100)	(0.125)	(0.119)	(0.128)
Has Library or Library Media Center					-0.105	0.007	-0.182	-0.105
					(0.165)	(0.158)	(0.168)	(0.126)
Percentage of Minority Student					-0.047	-0.184	-0.042	-0.117
					(0.208)	(0.2)	(0.177)	(0.13)
Catholic School							0.401***	0.411***
							(0.108)	(0.109)
Constant	-0.069	1.057***	-1.298	-0.482	-1.149	-0.541	-0.322	-0.29
	(0.438)	(0.029)	(0.840)	(0.911)	(0.813)	(1.051)	(1.182)	(1.011)
N	223	223	223	223	223	223	223	223
Adjusted R Squared	0.103	0.088	0.108	0.109	0.099	0.106	0.283	0.314

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Linear probability in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Appendix Table 3.3

The Effect of School Quality on Participation Decision Using Linear Probability Model, Louisiana

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revenue (Ln)	-0.120**		-0.116**		0.001		-0.045	
	(0.060)		(0.056)		(0.048)		(0.060)	
Tuition ($1,000)		-0.024*		-0.027*		-0.01		-0.005
		(0.013)		(0.015)		(0.008)		(0.009)
Average Grade Cohort Enrollment (100)		-0.256**		-0.365***		-0.178		-0.282**
		(0.103)		(0.136)		(0.150)		(0.122)
Elementary School			0.011	0.028	0.066	0.048	-0.076	-0.078
			(0.087)	(0.092)	(0.084)	(0.088)	(0.124)	(0.105)
Secondary School			-0.026	0.237	0.013	0.151	-0.14	0.049
			(0.149)	(0.202)	(0.136)	(0.216)	(0.156)	(0.164)
Length of School Day In Total Hours			0.076	0.092	0.02	0.037	0.019	0.022
			(0.101)	(0.109)	(0.071)	(0.074)	(0.065)	(0.065)
Has Library or Library Media Center					0.089	0.114	0.043	0.026
					(0.157)	(0.156)	(0.198)	(0.193)
Percentage of Minority Student					0.678***	0.554***	0.617***	0.553***
					(0.161)	(0.142)	(0.155)	(0.137)
Catholic School							0.210**	0.242**
							(0.105)	(0.098)
Constant	1.703**	0.106***	1.145*	-0.554	-0.354	-0.465	0.336	-0.273
	(0.848)	(0.039)	(0.609)	(0.696)	(0.597)	(0.415)	(0.896)	(0.513)
N	240	240	240	240	240	240	240	240
Adjusted R Squared	0.112	0.434	0.102	0.45	0.213	0.506	0.235	0.53

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Linear probability in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Appendix B

Appendix Table 3.4

The Effect of School Quality on Participation Decision Using Probit Model, Full Model

	Cross Sites Participant		DC Participant		Indiana Participant		Louisiana Participant	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revenue (Ln)	0.009		-0.071		-0.02		-0.032	
	(0.030)		(0.050)		(0.024)		(0.046)	
Tuition ($1,000)		0		-0.020***		-0.023***		-0.002
		(0.005)		(0.007)		(0.005)		(0.010)
Average Grade Cohort Enrollment (100)		-0.128		0.357*		-0.16		-0.315**
		(0.085)		(0.216)		(0.130)		(0.137)
Elementary School	-0.121*	-0.144*	-0.213	-0.144	-0.201***	-0.272**	-0.091	-0.099
	(0.069)	(0.074)	(0.147)	(0.107)	-0.062	(0.111)	(0.107)	(0.091)
Secondary School	-0.169*	-0.086	-0.142	0.092	(0.010)	0.12	-0.151	0.029
	(0.086)	(0.120)	(0.155)	(0.141)	-0.123	(0.134)	(0.131)	(0.132)
Length of School Day In Total Hours	0.025	0.022	-0.05	0.023	0.268***	0.372***	-0.023	-0.016
	(0.049)	(0.071)	(0.046)	(0.037)	-0.081	(0.094)	(0.063)	(0.064)
Has Library or Library Media Center	-0.002	0.015	0.166	0.286**	(0.094)	-0.013	0.057	0.042
	(0.118)	(0.104)	(0.169)	(0.129)	-0.078	(0.091)	(0.159)	(0.151)
Percentage of Minority Student	0.465***	0.393**	-0.024	-0.084	0.097	0.037	0.715***	0.618***
	(0.102)	(0.160)	(0.137)	(0.168)	-0.127	(0.120)	(0.127)	(0.124)
Catholic School	0.298***	0.336***	0.064	-0.186*	0.569***	0.604***	0.248***	0.290***
	(0.060)	(0.078)	(0.089)	(0.099)	(0.075)	(0.057)	(0.089)	(0.079)
DC	0.132	0.167						
	(0.200)	(0.108)						
LA	-0.238	-0.234**						
	(0.286)	(0.109)						
N	317	317	47	47	111	111	159	159

* $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$.

Notes: Average marginal effects after *Probit* regressions in coefficients. The dependent variable takes value 1 if school have participated in the targeted program. All models use city fixed effects. Robust standard error in parentheses, clustered at city level.

Chapter 4

Do You Have Your Cream with Your Choice? Characteristics of Students Who Moved into or out of a Private School Choice Program

Introduction

In the U.S., school choice programs have been considered as remedies for the unsatisfying public education system. Supporters of school choice programs state that such programs will help improve student educational achievement, especially for those who come from disadvantaged backgrounds, by (1) providing access to objectively better schools, and (2) allowing parents to choose the school which is most suitable for their child (Chubb & Moe, 1990; Friedman, 1955, 1962).

Critics, on the other hand, argue such choice programs lure the best students away from current public schools and result in a negative "cream skimming effect" on those who remain behind (Altonji, Huang, & Taber, 2015). Even when program applicants were admitted in choice schools under random draws, more disadvantaged students tend to be "pushed out" of programs at a disproportionally higher rate than their more advantaged peers, critics claim (Mincberg, 2003). If they occur, "cream skimming" and "pushing out" undermine the theory that expanded parental school choice will further the goal of educational equity.

This selection issue also raises concerns when interpreting effects of choice programs. Lottery-based school choice programs are the most appealing approach to estimating the true effect of a school choice program. Under random assignment, one would expect to obtain unbiased program effects by simply comparing the outcomes of treatment and control groups. However, families can self-select out of the choice program by either failing to use the choice

when it is offered or failing to remain in the choice school after initially attending using the choice-placement. Such self-selections violate the "random" assumption of field experiments (Barnard *et al.* 2003) thus challenging the internal validity of program evaluation. Though conservative approaches such as intent-to-treat (ITT) analysis and econometric techniques like Instrument Variable (IV) or Complier Average Causal Effect (CACE) models have been adopted to account for selection and therefore preserve the internal validity of experiments, the fact that program effects on non-compliers are never actually observed does limit external validity (e.g. Howell & Peterson 2006; Cowen, 2008).

Notably, in addition to presenting external validity concerns, a systematic pattern of program attrition indicates that the program may not be able to remedy educational failure among a targeted student population. It is critical for policy makers to determine the sorts of students for whom such an intervention is most promising, and if the intervention as implemented indeed covers the targeted groups. Further knowledge about the program non-compliers would also make policy makers aware of the potential barriers that are preventing targeted families from fully participating in the program.

Considerations of choice programs' selection issues are particularly important now when voucher and other school choice programs are experiencing significant expansions. So far, evidence from small-scale privately-funded voucher programs in Charlotte (NC), Cleveland (OH), New York City (NY), and publicly-funded voucher programs in Milwaukee (WI), Washington (DC) and Ohio provide informative yet inconsistent patterns of program "cream skimming" and "pushing out" students based on their demographics (Carlson *et al.*, 2013; Campbell *et al.*, 2005; Cowen, 2010; Cowen *et al.*, 2012; Figlio, 2014; Figlio, Hart, & Metzger, 2010; Figlio and Karbownik, 2016; Fleming *et al.*, 2015; Howell, 2004; Rouse, 1998; and Wolf,

Eissa, & Gutmann, 2006). There is little evidence of consistency in the patterns of students' participation in private school choice programs, demographically and institutionally.

In addressing these concerns, this study identifies the factors that influence students' participation in the Louisiana Scholarship Program (LSP) in school years 2012-13 to 2014-15, which were the first three years of the program. The LSP is one of the first statewide private school choice programs that offers publicly funded vouchers to cover private school tuition for students from low-income families that previously attended low-performing public schools. Initially established in 2008 as a pilot program in New Orleans, the LSP was expanded to a statewide program in the 2012-13 school year. LSP placements are based on school-grade level lotteries while accounting for student priorities. We specifically examine what factors predict LSP participating students' self-selecting out of the program in the form of students who were unable or unwilling to use the voucher even when it was offered and the voucher using students who left the attending private school and returned to the public sector. Those factors include student demographics, attributes of assigned private schools, residential district educational resources, and institutional attributes of the public schools students attended in the baseline year.

The chapter proceeds as follows. In the next section, we review the research literature on student participation patterns in private school choice programs in the U.S., followed by a description of the subject of our study, the LSP. We then present our research methodology, including the data and analytical strategy we use in this study. The following section presents the main findings. Our final section concludes with further policy implications.

Prior Studies on Student Participation in Private School Choice Programs

Empirical studies have examined student participation in voucher and voucher-type scholarship programs that target disadvantaged students in Charlotte (NC), the District of Columbia, Florida, Milwaukee (WI), Ohio, and New York City (NY).

Usage rates of voucher programs vary between programs with different designs as well as between participating families with different backgrounds. In the New York City School Choice Scholarship Program, which was funded privately by the School Choice Scholarship Foundation (SCSF), nearly 26% of students failed to use the vouchers to attend private schools within the area during the program's first year (Howell, 2004). The decline rates are similar in other privately funded programs such as the Children's Scholarship Fund (CSF) in Charlotte, NC, where 24% of the voucher lottery winners declined the voucher when it was initially offered (Cowen, 2010). In the first federally funded voucher program in DC, one fourth of the lottery winners failed to use the voucher in the first year (Wolf *et al.*, 2006).

Who are those decliners? Evidence from New York (Howell, 2004), DC (Wolf *et al.* 2006) and Ohio (Figlio & Karbownik, 2016) suggest that relatively low-achieving students are more likely to decline to use the awarded voucher for attending private schools, while Florida (Figlio, Hart, & Metzger, 2010; Hart, 2014) presents a case where relatively high-performing students are less likely to use the voucher-type tax-credits to attend private schools. No consistent "cream skimming" has been found across these programs based on student achievement.

Student demographics also play important roles in family decision making regarding voucher usage. Males, African Americans, Hispanics, and students with special educational needs tend to be more likely to decline the voucher when offered (Howell, 2004; Campbell *et al.*,

2005; Cowen, 2010; Wolf, Eissa, & Gutmann, 2006; Fleming *et al.*, 2013). Family socioeconomic status also shows a negative association with voucher declining (Howell, 2004; Wolf, Eissa, & Gutmann, 2006; Fleming *et al.*, 2013), as families with a lower household income, a lower maternal educational level, and a larger family size tend to be more likely to give up the chance to attend a private school. Meanwhile, voucher decliners in the DC Opportunity Scholarship Program (DC OSP) and Milwaukee Parental Choice Program (MPCP) tend to have higher residential stability (Wolf, Eissa, & Gutmann, 2006; Fleming *et al.*, 2013). Location is also an important consideration for voucher usage, as parents who decline vouchers in New York City, Dayton (OH), and Washington (DC) claim the inconvenient locations of preferred private schools were a barrier to utilize the voucher (Howell *et al.*, 2006).

Campbell *et al.* (2005) find student residential school district attributes appear to have a strong influence on school choice, as students from districts with higher proportions of minority students, with lower educational expenditure, and with lower private school density tend to be more likely to remain in current public schools and not to switch to private schools using voucher support. Since all three of these indicators refer to lower educational resources, this pattern suggests that students that were unable or unwilling to utilize the voucher in the first place tend to be more educationally disadvantaged.

Another important student participation consideration is students opting out after initially using a voucher. Descriptively, there is substantial evidence that students who attend private schools using a voucher tend to opt out at a high rate in the later years. In Milwaukee, the program drop-out rate has ranged from 22% to 35% every year (Rouse, 1998; Cowen *et al.*, 2012; Carlson *et al.*, 2013). In New York City, this rate was about 22% annually (Howell, 2004). In the most recent statewide voucher program, the Indiana Choice Scholarship Program, 4% of

the voucher users stopped using vouchers over each of the first four years (Waddington & Berends, 2017). The private school attrition rates in voucher programs are similar as student mobility rate in public schools. The National Assessment of Educational Progress reported that in 1998 roughly 33% of 4th graders, 20% 8th graders, and 10% of 12th graders had changed schools at least once in previous 2 years (Institute of Medicine and National Research Council, 2010), and this rate is generally high in large urban districts populated disproportionally by minority students.

Studies of students who opt-out from continuing to attend the private schools of these programs present a clearer pattern. Students who struggle in private schools academically leave the program at higher rates (Rouse, 1998; Cowen *et al.*, 2012; Carlson *et al.*, 2013; Figlio *et al.*, 2014). Those private school leavers are more likely to be minorities, in higher grade levels (Howell, 2004; Cowen *et al.*, 2012; Carlson *et al.*, 2013), with lower residential stability (Howell, 2004), and lower family income (Rouse, 1998; Cowen *et al.* 2012; Howell, 2004). These characteristics which predict voucher attrition also describe students with educationally disadvantaged backgrounds. Those students were originally targeted by those programs in the first place. Cowen *et al.* (2012) further find that students who previously attended private schools with a larger share of minority students or voucher students have a higher likelihood of returning to the public education system.

In sum, students who come from disadvantaged families and in higher grade levels are more likely to decline the voucher for private schooling in the first place. Even after accepting the voucher, those students are more likely to transfer back to public schools. No consistent evidence on school cream skimming based on test scores has been found, however, low-achieving students face a greater risk of leaving private school choice programs. We cannot

know if these patterns of voucher declining and voucher program attrition are because more disadvantaged students are prevented from attending private schools, "counseled out" of them once they are there, or voluntary leave the program. It is at least possible that some families, both disadvantaged and advantaged, have a higher preference for public schooling even when the opportunity for private schooling is offered to them or after personally experiencing private schooling for themselves.

Background: the Case of the Louisiana Scholarship Program

Currently, eighteen states have adopted at least one voucher program, and the Louisiana Scholarship Program (LSP) is one of the first statewide private school choice program that offers publicly funded vouchers to cover the private school tuition for students from low-income families that previously attended low-performing public schools. Initially established in 2008 as a pilot program in New Orleans, the LSP was expanded to a statewide program during the 2012-13 school year. Students with a family income of less than 250% of the federal poverty line that previously attended public schools that were graded as C, D, or F[15] (or incoming kindergarteners) are eligible for LSP vouchers. In the first year of program expansion (the 2012-13 school year), 41% of the K-12 student population was eligible for this voucher, 9,809 eligible students applied for the scholarship, and 5,771 of them (0.82% of the K-12 student population) received a voucher worth on average $5,242. Compare to all students in Louisiana, the applicants were disproportionally African Americans (87% versus 12%[16]). The voucher amount was set as

[15] School Grades in Louisiana's school accountability system at baseline year (2011-12).
[16] SOURCE: The Census 2000 School District Tabulation (STP2) is a special tabulation prepared by the U.S. Census Bureau's Population Division and sponsored by the National Center for Education Statistics. Retrieved from https://nces.ed.gov/programs/stateprofiles/sresult.asp?mode=full&displaycat=5&s1=22.

90% of the combined state and local foundation aid to the student or the tuition amount charged by the chosen private school, whichever was less.

Several features differentiate the LSP from other voucher programs. First private schools must accept the LSP voucher amount as the full cost of educating the child and cannot require that parents "top-up" the voucher value. Further, eligible students are assigned the voucher for school-grade sets under a lottery mechanism accounting for their lottery priorities. Specifically, students with disabilities and "multiple birth siblings" are automatically awarded a scholarship if there was available space at their preferred school. Under such a mechanism, private schools cannot apply admission standards to voucher students based on their family socio-economic status or achievement level. These factors may make it less likely that the school could selectively enroll students based on student backgrounds.

Second, applicants to the LSP could list up to five private schools on a tiered preference in their application. They were placed in a preferred school under random draws at the school-grade level while considering their lottery priorities. This design could increase parents' probability of taking up the voucher because its award coincides with placement in a school requested by the parents, often their first-or second-choice school (Abdulkadiroğlu, Pathak, & Roth, 2005; Abdulkadiroğlu et al., 2005).

Third, students in Louisiana are not limited to only traditional public-school options. There is also a very active charter school sector, especially in school districts like New Orleans (Wolf & Lasserre-Cortez, 2018). Various public school choice programs, including magnet schools and charter schools, pre-dated the LSP and enrolled 30% of LSP applicants. Since parents in Louisiana have more alternate schooling options, they face lower costs of moving out of an unsatisfying private school. One may expect a higher opt out rate in this program,

compared to other voucher programs, especially in the districts with a higher density of charter and magnet schools.

Lastly, studies reveal that the private schools participating in the LSP tend to be below average in school quality. Only one-third of the private schools in Louisiana receive LSP voucher using students, and those schools tend to have lower tuition costs and smaller enrollments than the average Louisiana private school, both of which are indicators of lower quality schools (Chapter 3). Further, Mills and Wolf (2017) show that voucher awarded students fell significantly behind their peers academically in public schools during the first two years of the program, however this difference became statistically null by the third year. This pattern suggests the private schools participating in the LSP failed to improve student academic achievement, especially for the first two years. Thus, we expect many LSP students to have made a strategic move to opt out from the program before the third year, especially those from relatively more advantaged families who are more motivated and able to obtain a quality education for their children.

This study aims to further the literature about student participation in voucher programs by analyzing student participation patterns during the first three years of the LSP: who they are, where they go, and why. Specifically, we test if there is a systematic initial cream skimming or later opting out of students based on their individual demographics, family backgrounds, and academic achievements.

Data and Sample Descriptive

The data we analyze come from the LSP eligible applicant, Student Information System (SIS), and State Assessment files. These student-level restricted use files were provided by the Louisiana Department of Education (LDE) in compliance with our data agreement with the state.

Data Description

The major outcome of interest of our study is student voucher usage status in the Louisiana Scholarship Program. We obtain this information from the LSP eligible applicant file. Voucher usage status is recorded in the unit of fiscal quarters[17] and a student is recorded as "1" in quarter Q for usage if she or he has used the voucher to attend a private school in Louisiana during the time period Q. The LSP eligible applicant file also provides information on student individual demographics (e.g. gender, ethnicity, grade level, and multiple-birth siblings), eligible applicant's school choice sets, and lottery placement at the baseline year. Since parents were not required to report their household income and educational levels for application, we obtain the Neighborhood Average Household Income[18] associated with the applicant's residential zip-code to proxy for family socio-economic status (SES).

Another major consideration is student movement among schools in the education system of Louisiana. We obtain this information from the Student Information System (SIS) files for fiscal year 2011-12 (baseline year) through 2014-15 (year three). These data provide student enrollment records prior to and after participating in the LSP. In using these data, we are able to identify if and when a voucher user has returned to a public school during July 2011 through June 2015.

Moreover, we merge our dataset with students' State Assessment records on math achievement from the school year 2011-12 (baseline year) through 2014-15 to track student annual achievement. Students in Louisiana who are not classified as having a special need are

[17] For instance, in school year 2012-2013, Quarter 1 denotes the time period of July, August, and September 2012, Quarter 2 denotes the time period of October, November, and December 2012, Quarter 3 denotes the time period of January, February, and March 2013, and Quarter 2 denotes the time period of April, May, and Jun 2013.
[18] SOURCE: IRS, Statistics of Income Division, Individual Master File System, July 2014.

required to take state assessments in grades three through eight. The exams given are criterion-referenced tests that align with Louisiana's state standards. The raw test scores are in scale scores between 100 and 500 with a mean of 300 and a standard deviation of 50. To better compare students' test scores over time and grade levels, we convert these scale scores into standardized z scores based on grade level. By including baseline or current student test scores, we restrict our analytical sample to only elementary students in grade three through eight in 2012-13 with test scores.

In addition to the data sets provided by the LDE, we also collect information on the private schools[19] that receive voucher students during school year 2012-13 through 2014-15. The private school characteristics include student ethnicity composition, school tuition cost, and the number of voucher students enrolled in the first year after statewide program expansion. We also estimate the distance between the assigned private school and the student's home by estimating the general distance between school and home zip codes[20] to proxy for the convenience of attending the lottery-assigned private school.

Since the major aim of this chapter is to identify the selection issues of the LSP at the post-lottery period, those students who were not issued vouchers are excluded from our analysis. Our analytic sample only includes the program applicants who were awarded the scholarship in the first year, 2012-13. Furthermore, we assume that parental choices for kindergarteners, who may be entering school for the first time, are different from those for students in higher grades. Most of the rising kindergarten students lack information about their previous public school

[19] Data were collected from the Private School Universe Survey (PSS) (2011-12 and 2013-14).
[20] Zip code distances were obtained from the ZIP Code Tabulation Area (ZCTA) Distance Database, NBER. http://www.nber.org/data/zip-code-distance-database.html

attended, since there was none. Therefore, we exclude the 1,333 kindergarten awardees from our sample, resulting in an analytic sample of 4,426 students.

Sample Description

Table 4.1 presents the descriptive statistics of students 'demographics and characteristics of the public school they previously attended. A majority of non-kindergarten voucher awardees are African American students (88%), in elementary grades (82%), and come from Traditional Public School (TPS) (74%). Only 6% of the voucher awarded students are classified as having a special educational need, 4% of the students have multi-birth siblings, and 38% of them have previously attended the LSP Pilot program. Overall, more than 90% of scholarships are awarded to students' first preference schools.

Table 4.1
Individual and Baseline School Characteristics of Voucher Awarded Students (2012)

	Overall Sample		Students in Grade 3 through 5 (2012)	
Variable	Count	%	Count	%
Student Characteristics	(N=4,426)		(N=1,382)	
Female	2,244	50.7	674	48.8
African American	3,893	88.0	1,228	88.9
Hispanic	109	2.5	29	2.1
Caucasian and Other Races	424	9.6	125	9.0
Special Education Need	270	6.1	102	7.4
Elementary (grade 1-6)	3,616	81.7	1,382	100.0
Middle School (grade 7-9)	668	15.1	0	0.0
High School (grade 10-12)	145	3.2	0	0.0
Multiple Birth Siblings	175	4.0	41	3.0
NOLA Participant	1,673	37.8	503	36.4
Awarded Voucher to 1st Choice School	4,045	91.4	1,262	91.3
Previously Attended School [a]	(N=2,781)		(N=885)	
Charter School	544	19.6	184	20.8
Magnet School	175	6.3	40	4.5
TPS School	2,064	74.1	661	74.7

Notes: Counts based on non-kindergarten students who were awarded LSP voucher in the year 2012-13, with and without restricting to students in Grade 3 through 5 in 2012.
a: SOURCE: IES-NCES national center for education statistics, Common Core of Data (CCD) Local Education Agency (School District) Universe Survey Data, 2011-12, LA.

Table 4.2 presents numerical descriptive statistics of student characteristics including students' baseline achievement, family background, attributes of their lottery-assigned private schools, and the community educational resource of their residential school district. Only 1,953 students have baseline test scores, with an average z-score of -0.54, indicating relatively low-achieving students in our sample compared to the state population. Students' family background information provided by the Scholarship Application Files merely includes family residential address. We connect students' associated zip codes with the Neighborhood Mean Household Incomes provided by the IRS to proxy for their family socio-economic status. On average, non-kindergarten LSP awardees' neighborhood household income in 2012 was around $46,600.

Since not all voucher-using students in our sample have test scores and associated schooling information, we categorize our sample into two groups by restricting it to students in Grade 3 through 5 during the 2011-2012 baseline year or not. Students in Grade 3 through 5 in the baseline year do not pass the 8th grade during the three academic years following the baseline year, thus we have full information regarding their educational backgrounds including baseline test scores, current school year test scores, and the associated schooling information. Also, by restricting the analytical sample to only students in Grade 3 through 5 in the baseline year, we are able to essentially eliminate the transition to high school as a possible explanation for moving to the public sector (Cowen *et al.*, 2012). As a result, the overall sample comprises 4,426 voucher-using students, and the restricted sample includes 1,382 students. Descriptive statistics of the average student characteristics in these two analytical samples are similar in most aspects. The only exception is that we have only elementary students in the restricted sample. The restricted sample is demographically representative of the overall sample for further analysis, except for grade level.

Table 4.2
Family Background, Community Educational Resources, and Awarded Private School Characteristics of Voucher Awarded Students (2012)

	Overall Sample			Students in Grade 3 through 5		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Student Achievement at the Base Line						
Math Achievement	1,953	-0.54	0.94	1,323	-0.54	0.92
Family Background						
Neighborhood Mean Household Income ($1,000) [a]	4,421	46.63	22.84	1,380	47.02	22.68
Awarded Private School						
Count of Voucher Students	3,618	130.13	99.35	1,150	128.91	92.92
Private School Minority Enrollment (%) [b]	3,601	73.81	33.04	1,150	73.68	33.26
Tuition Rate ($1,000)	3,601	5.41	1.67	1,150	5.21	1.59
Distance to Home (mile)	3,585	5.19	5.97	1,144	5.21	6.15
Community Educational Resources [c]						
Per-pupil Expenditure ($1,000)	2,314	12.61	3.82	751	12.70	4.02
Count of Charter School	2,353	2.67	3.24	767	2.30	2.95
District Minority Enrollment (%)	2,340	73.19	20.73	754	72.36	20.50

Notes: Counts based on non-kindergarten students who were awarded LSP voucher in the year 2012-13, with and without restricting to students in Grade 3 through 5 in 2012.
a: SOURCE: IRS, Statistics of Income Division, Individual Master File System, July 2014.
b: SOURCE: PSS Private School Universe Survey data 2012-13 and 2013-2014 school year.
c: SOURCE: Data Source: U.S. Department of Education National Center for Education Statistics Common Core of Data (CCD) "Local Education Agency (School District) Universe Survey" 2012-13 v.1a.

Differences between Voucher Users and Decliners

A *decliner* refers to a student who has never used the awarded voucher for attending a lottery-placed private school during the first three years of the LSP. Table 4.3 compares student characteristics between voucher users and decliners. Results from two-tailed t-tests indicate that, over all, there are statistically higher proportions of decliners who are males, African Americans, with special educational needs, in higher grade levels, who did not participate in the Pilot program, and who did not get their first preference school. The significant demographic differences between voucher users and decliners regarding gender, ethnicity and grade level become null in the restricted sample.

There are also significant differences between voucher decliners and users in terms of assigned private school attributes, educational resources in residential school districts, and the institutional characteristics of schools the student previously attended, and these differences in the restricted sample are similar to those in the full LSP sample. However, average student baseline test scores and family SES between voucher users and decliners are not significantly different from each other, for both the restricted sample and the unrestricted sample. These descriptive statistics suggest that there is some potential evidence of "cream skimming" in the LSP in terms of individual demographics and educational backgrounds, however there may not be evidence of "cream skimming" on student achievement and family income.

Table 4.3
Student Demographic Differences between Voucher Users and Decliners

	Overall Sample			Students in Grade 3 through 5 (2012)		
Variables	Users Mean	Decliners Mean	Mean Diff	Users Mean	Decliners Mean	Mean Diff
Student Characteristics						
Female	0.51	0.46	0.05**	0.49	0.44	0.05
African American	0.87	0.91	-0.04**	0.89	0.91	-0.02
Hispanic	0.03	0.01	0.02**	0.02	0.00	0.02**
Caucasian and Other Races	0.10	0.08	0.02	0.09	0.09	0.00
Special Education Need	0.05	0.11	-0.05***	0.06	0.14	-0.07***
Grade Level	3.96	4.50	-0.54***	4.96	5.03	-0.07
Multiple Birth Siblings	0.04	0.04	0.00	0.03	0.05	-0.02
Neighborhood Mean Household Income($1,000)	46.72	45.99	0.73	47.04	46.94	0.10
NOLA Participant	0.41	0.15	0.26***	0.39	0.17	0.22***
Math Baseline Achievement	-0.53	-0.61	0.08	-0.53	-0.61	0.07
Awarded LSP to 1st Choice School	0.93	0.81	0.12***	0.92	0.85	0.07***
Private School Awarded						
Count of Voucher Students	132.55	113.49	19.06***	130.48	119.08	11.40
Private School Minority Enrollment (%)	73.48	76.11	-2.63	72.79	79.25	-6.45**
Tuition Rate ($1,000)	5.47	4.99	0.47***	5.28	4.77	0.51***
Distance to Home (mile)	4.89	7.28	-2.39***	4.88	7.33	-2.45***
Community Educational Resources						
Per-pupil Expenditure ($1,000)	12.46	13.31	-0.85***	12.60	13.18	-0.58
Count of Charter School	2.61	2.98	-0.38**	2.15	2.99	-0.84***
District Minority Enrollment (%)	72.57	76.11	-3.54***	71.78	74.99	-3.21*
Previously Attended School						
Carter School	0.19	0.24	-0.05**	0.21	0.21	0.00
Magnet School	0.07	0.05	0.01	0.05	0.01	0.04**
TPS School	0.75	0.71	0.04*	0.74	0.78	-0.04

* $p<0.1$, *** $p<0.01$, ** $p<0.05$, two tail *t*-test.

Notes: Analysis sample includes non-kindergarten students who were awarded the voucher, with and without restricting students to only in Grade 3 through 5 in 2012. *Users* refer to students who have ever used the voucher to attend a private school during school year 2012-13 to 2014-15, and *Decliners* refer to students who have never used the voucher placement during school year 2012-13 to 2014-15.

Characteristics Differences between LSP Leavers and Stayers

Student school movement after attending the private school is another major outcome of interest in our study. We use the *leavers* to refer to voucher users who left private schools after initially attending one at any time during the program. The *leavers* comprise two groups of students: those who went back to the public-school system and are recorded as enrolled in one public school in the SIS as *public school returnees*, and those who switched to another private school without using a voucher or left Louisiana and thus are untraceable in the SIS. In our study, we focus both on the general leavers as well as the specific public school returnees.

Simple mean comparison of characteristics between students who have ever left the LSP private schools and those who always remain are provided in Table 4.4. Among the non-kindergarten voucher users, overall, the subgroup that left the LSP private school anytime during the school years 2012-2013 through 2014-2015 contained significantly higher proportions of students who are African American, with special educational needs, in lower grade levels, did not participate in the Pilot program, and were awarded their first preference school. The significant differences on ethnicity composition between stayers and leavers become null for the restricted sample, while other differences remain. Further, voucher users who left LSP private schools on average had lower math achievement scores at both the baseline year ($Test_{t0}$) and the year of switch ($Test_t$), for both the full sample and the restricted sample. These results provide some evidence that the LSP participating schools may have "pushed out" students with disadvantages or the students most struggling in their new private schools tended to leave them voluntarily.

Meanwhile, students attending private schools with smaller voucher enrollments, lower tuition cost and longer distance to home, and students with lower charter school density in

residential school districts tend to be more likely to leave their LSP private school, for both the full LSP sample and the restricted sample. This trend indicates characteristics of students' educational institutions also play a role in students' decisions regarding switching out of this school voucher program.

Table 4.4
Student Demographics by Post-lottery Movement

	Overall Sample			Students in Grade 3 through 5 (2012)		
Variables	Stayer Mean	Leaver Mean	Mean Diff	Stayer Mean	Leaver Mean	Mean Diff
Student Characteristics						
Female	0.50	0.50	0.00	0.49	0.47	0.02
African American	0.86	0.88	-0.02**	0.88	0.89	-0.01
Hispanic	0.03	0.02	0.00	0.02	0.03	-0.01
Caucasian and Other Races	0.11	0.09	0.01**	0.10	0.08	0.01
Special Education Need	0.07	0.06	0.01*	0.10	0.07	0.03**
Baseline Grade Level	8.82	8.33	0.49**	4.90	5.10	-0.20***
Multiple Birth Siblings	0.03	0.03	0.00	0.02	0.03	-0.01
Neighborhood Mean Household Income($1,000)	45.38	45.89	-0.51	45.26	46.52	-1.26
NOLA Participant	0.14	0.26	-0.12***	0.16	0.32	-0.16***
Awarded LSP to 1st Choice School	0.40	0.89	-0.49***	0.33	0.87	-0.54***
Achievement						
Test $_{t0}$	-0.50	-0.57	0.07**	-0.47	-0.56	0.09**
Test $_{t}$	-0.57	-0.65	0.08***	-0.65	-0.72	0.06**
Test $_{t}$- Test $_{t-1}$	-0.01	0.03	-0.03	0.02	0.03	-0.01
Private School Awarded						
Count of Voucher Students	137.08	127.57	9.51***	137.60	126.92	10.68*
Private School Minority Enrollment (%)	73.21	73.68	-0.47	71.33	73.72	-2.39
Tuition Rate ($1,000)	5.63	5.28	0.36***	5.58	5.12	0.46***
Distance to Home (mile)	4.31	5.28	-0.97***	4.09	5.28	-1.18***
Community Educational Resources						
Per-pupil Expenditure ($1,000)	12.51	12.61	-0.10	12.52	12.84	-0.32*
Count of Charter School	3.13	2.78	0.35***	3.29	2.38	0.90***
District Minority Enrollment (%)	74.10	73.54	0.56	73.93	73.55	0.39
Previously Attended School						
Carter School	0.17	0.18	-0.01	0.18	0.19	-0.02
Magnet School	0.06	0.07	-0.01	0.04	0.05	-0.02
TPS School	0.77	0.75	0.02	0.79	0.75	0.04

* $p<0.1$, *** $p<0.01$, ** $p<0.05$, two tail *t*-test.
Notes: Cells indicate percentage of original 2012-13 voucher students of each demographic category in each switching category. *Leaver* refer to students who have ever return to public schools after initially used the voucher placement during school year 2012-13 to 2014-15, and *Stayer* refer to students who have never switch to public schools during school year 2012-13 to 2014-15. Analysis sample includes non-kindergarten students who have used the voucher.

Analytical Strategy

This study focuses on student participation during the first three years in the LSP: How do student backgrounds predict voucher decliners and users? What characteristics are associated with voucher attrition? Addressing these two research questions, our study first compares the characteristics of families and students who declined vouchers when offered to those who accepted, and then we compare the characteristics of families and voucher students who switch to public schools to those who remain. Since our study focuses on (first cohort) students' post-lottery behaviors, this study is purely observational in design, though the LSP is based on lottery assignments.

Voucher Usage

For the first research question, we are interested in students who were unable or unwilling to use the voucher when offered, the decliners. Table 4.5 summarizes LSP voucher usage status during the 2012-13 to 2014-15 school years. The overall take-up rate for the first cohort non-kindergarten voucher-awarded students is 87.5%, indicating only one-eighth of students had never used a voucher-supported placement during the first three years of the LSP. This take-up rate is higher than other lottery-based voucher programs nationwide. The fact that students were simultaneously offered a voucher and placement in a specific preferred private school likely contributed to this high take-up rate (Abdulkadiroğlu, Pathak, & Roth, 2005; Abdulkadiroğlu *et al.*, 2005). The voucher take-up rate for the restricted sample is 86.6%, which is not significantly different from the overall sample rate.

Table 4.5
LSP Voucher Usage of Lottery Awarded Students, years 2012-13 to 2014-15

	Overall Sample (*N=4,426*)		Students in Grade 3 through 5 (*N=1,382*)	
	Count	%	Count	%
Ever Used LSP	3,865	87.3	1,196	86.5

Notes: Counts based on non-kindergarten students who were awarded LSP voucher at the year 2012-13, with and without restricting to students in grade 3 through 5 at the baseline year.

To further account for covariates among student characteristics and educational backgrounds that influence the decliner decision, we use a *Probit* regression to estimate the effect of student background on parent behavior (y_1) of declining (1) or taking (0) the voucher after initially receiving a voucher placement offer:

$$y_1 = \begin{cases} 1 \; if \; Y_1^* > 0 \\ 0 \; if \; Y_1^* \leq 0 \end{cases} \tag{1}$$

Specifically,

$$Y_1^* = \boldsymbol{Student_i'.\beta} + \boldsymbol{Private\ School_i'.\gamma} + \boldsymbol{District_i'.\delta} + \boldsymbol{PublicSchool_i'.\theta} + \varepsilon_{ic} \tag{2}$$

Where student *i*'s likelihood of declining the voucher (Y_1^*) is a function of his/her individual characteristics ($Student_i$), characteristics of the private schools students were placed to ($Private_i$), residential school district educational resources ($District_i$), institutional characteristics of previously attended public schools ($PublicSchool_i$), and random error ε. To account for spatial auto-correlation due to students placed in the same private school having the same private school characteristics and similar community educational resources, robust standard errors are estimated at the assigned private school *c*.

School Movement

Since student sector switching occurs across all three school years, student movement decisions are best captured by a longitudinal decision-making model. More importantly, once a student leaves the private school of choice, she or he will not be exposed to the risk of re-exiting the program at a later time. As a result, survival models are especially appropriate to estimate what kind of and to what extend the students' backgrounds influence their decisions regarding switching back to public schools during the school year 2012-13 through 2014-15.

We first estimate the unconditional hazard of switching sectors. Assuming the student who is using a voucher to attend a private school is exposed to the risk of switching back to a public school at a rate of:

$$\mathrm{h}(t_{ij}) = \Pr(\mathrm{T}_i = \mathrm{j} | \mathrm{T}_i \geq \mathrm{j}) \tag{3}$$

where *h(t)* is the hazard rate of a voucher-using student moving back to the public sector at the time *j* conditional on remaining in the private school before time *j*. Once the student makes a movement in year *j*, the student will no longer be considered to be at risk. On average, the hazard function $\hat{h}(t)$ of returning to public schools in period *j* is calculated as:

$$\hat{h}(t_j) = \frac{n\ events_j}{n\ at\ risk_j} \tag{4}$$

Where $n\ events_j$ refers to the number of students who moved back to public schools during year *j* and $n\ at\ risk_j$ represents the number of students remaining in private schools at the beginning of year *j* (Singer & Willett, 2003, p.332).

We first estimate the unconditional hazard of voucher usage in fiscal quarters during school years 2012-13 to 2014-2015 and graph the probability of staying in the voucher private schools as a Kaplan-Meier survival function in Figure 4.1. The figure clearly shows that the probability of staying in the LSP private schools decreases steadily during the 3-year time period

in our study, with the biggest drops during summer sessions, which is between Quarter 4 of prior fiscal year (April through June) and Quarter 1 of the current fiscal year (July through September). We further code student LSP annual voucher usage as the fall semester usage in Quarter 2 (October through December) of each school year. Any student who is noted as "voucher user" in the Quarter 2 of year *t* while noted as "not using" in Quarter 2 of year *t+1* is recognized as a *leaver* in year *t*.

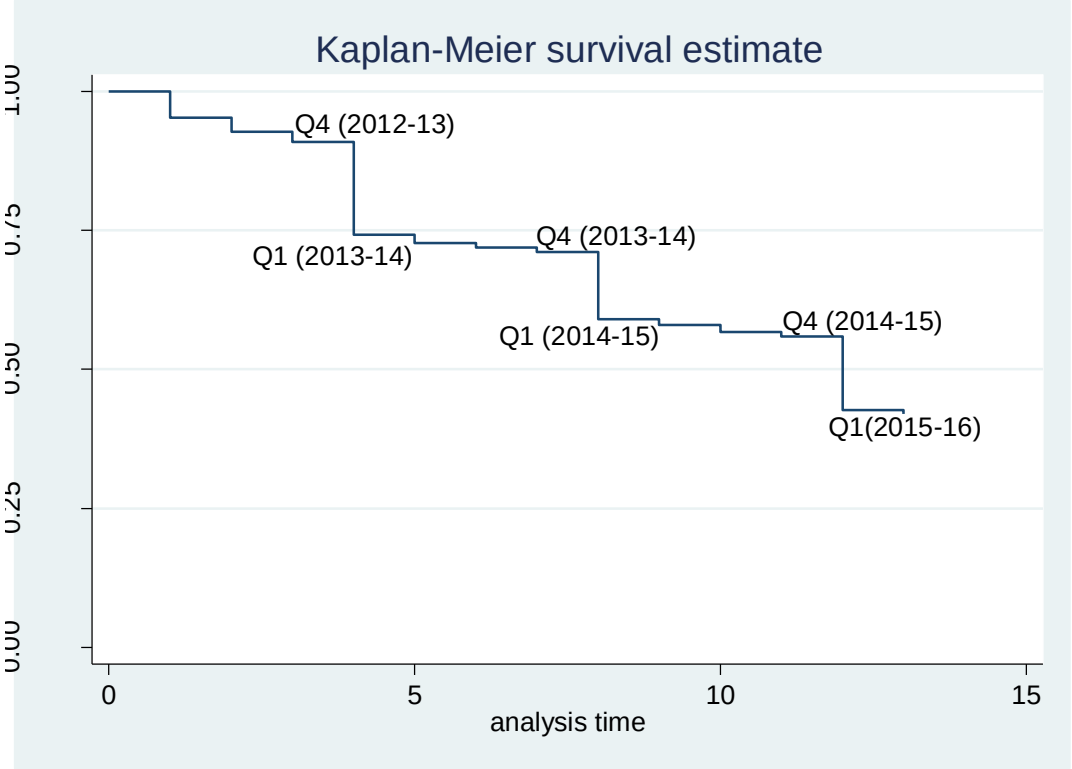

Figure 4.1 Kaplan-Meier survival probabilities, school year 2012-13 through 2014-15, in fiscal year quarters

The hazard rate of annual-leaving among the original voucher users is presented in Table 4.6, including the count of students remaining in private schools at the beginning of each school year in Column 1 ($n\ at\ risk_j$), and the count of students who left the program during each school year (Column 2). Hazard rates for users leaving LSP private schools in each year (Column 3) are

obtained from Equation 4, and the cumulative Survivor Function (Column 4) is the proportion of students who remain in private schools accounting for the overall voucher users. Hazard rates of voucher using students leaving the program are estimated for the overall sample and for the restricted sample, separately. We further counted leavers by school movement type in Column 5 and 6. As student enrollment data are not available for the end of school year 2014-15, the count of sector-switching students for school year 2014-15 is not available.

Table 4.6
Life Table Describing the Count of Students Remaining in their Private School of Choice

Time	Beginning Total (1)	Leaver (2)	Hazard Ratio (3)	Survivor Function (4)	Switched to Public Schools (5)	Moved to Other Private Schools without Using Voucher or Left Louisiana Entirely (6)
Overall Sample (N=3,865)						
School Year 2012-13	3,861	1003	0.260	0.740	799	133
School Year 2013-14	2,858	572	0.200	0.592	429	153
School Year 2014-15	2,286	617	0.270	0.432	N/A	N/A
Students in Grade 3 through 5 (2012) (N= 1,197)						
School Year 2012-13	1,196	318	0.266	0.734	272	46
School Year 2013-14	878	166	0.189	0.595	136	30
School Year 2014-15	712	256	0.360	0.381	N/A	N/A

Notes: Counts based on non-kindergarten students who have ever used LSP voucher during the 2012-13 to 2014-15 school year, with and without restricting to students in grade 3 through 5 at the baseline school year 2012-13. Usage status are obtained from the applicant file and the school movement status are obtained from SIS 2012-13 through 2014-15.

There are three important patterns of LSP participants' post-lottery movements. First, a majority of students have changed schools during the years observed. By the end of the third year, 43% of students who have ever used vouchers remained in their lottery-placed private school, resulting in an overall attrition rate at about 19% of the original sample annually, accounting for 57% over three years. This voucher leaver rate is lower than the MPCP's 22% to 35% every year (Rouse, 1998; Cowen *et al.*, 2012; Carlson *et al.*, 2013) and the New York City school choice program's 22% (Howell, 2004). Second, school switchers are more likely to return

to Louisiana public schools than to leave the state public school system entirely, at least in the first two years. Among voucher users, nearly 74% of them continued attending the private school of choice through the first year, and about 80% of voucher leavers, accounting for 799 students, switched back to public schools by the end of school year 2012-13 (column 5). Of students who remained in private schools at the beginning of the second year, 20% switched back to the public sector by the end of the second year, while 75% of leavers switched to public schools in Louisiana. Lastly, the hazard and survival trends between the full sample and restricted sample are nearly identical. This result indicates the restricted sample has the same attrition patterns as the full sample and is representative of the overall sample in terms of program attrition rate, even though it is restricted to students who started in the elementary grades of 3 through 5.

We first use the Cox Proportional Hazards Model to predict LSP leavers by school year:

$$\hat{h}(t_j) = \exp(\boldsymbol{Student_i'.\beta} + \boldsymbol{Private\ School_i'.\gamma} + \boldsymbol{District_i'.\delta} + \boldsymbol{PublicSchool_i'.\theta}) \quad (4)$$

Where voucher using student *i*'s hazard rate of leaving the LSP private school at year *j* is estimated as a function of his or her individual characteristics ($Student_i$), characteristics of the private school the student was placed in ($Private_i$), residential school district educational resources ($District_i$), and institutional characteristics of their previously attended public school ($PublicSchool_i$). These measures are the same as in Equation 2. To account for spatial auto-correlation due to students placed in the same private school having the same private school characteristics and similar community educational resources, robust standard errors are estimated.

Since there is more than one event that is considered a "failure" of remaining in private schools, we further estimate the effect of student background on the hazard rates of switching to a public school using Competing Risk Regressions as compare to leave the Louisiana public school system entirely, which posit a model for the sub-hazard function of a failure event of primary interest and accounts for covariates of predictive factors. This model is also employed in Cowen *et al.* (2012) for estimating student participation patterns in the Milwaukee Parental Choice Program (MPCP). As student school enrollment status for the end of school year 2014-15 is not available, this analysis is restricted to LSP leavers in school years 2012-13 and 2013-14.

It is important to note that the hazard ratios in both Cox Proportional Hazard Models and Competing-risk Regressions hazard ratios β_i are not interpreted in the same manner as coefficients in multiple linear regressions. Since the model is in exponential form, a variable with a hazard ratio larger than 1 should be interpreted as having a higher probability of experiencing the hazard of leaving the private school, while a variable with a hazard ratio smaller than 1 should be interpreted as having a lower probability of experiencing that hazard.

Results

In this section, we present the estimated results on the characteristics that differentiate the voucher decliners from their voucher-using counterparts (Table 4.7), on characteristics differentiating the voucher using students who left LSP private schools from the ones who remained in private schools (Table 4.8 and Table 4.9), during the first three years of the expansion of the Louisiana Scholarship Program (school years 2012-13, 2013-14, 2014-15). Results are presented using the full sample and the restricted sample, separately. Moreover, we conduct the estimation using the restricted sample with and without controlling for student test

scores and associated educational backgrounds, separately. Model 3 in Table 4.7 and Model 3 through 5 in Table 4.8 and Table 4.9 are our preferred models for interpretation.

Who declines?

Table 4.7 presents the estimated marginal effects of the student individual characteristics and educational backgrounds on the students' decision to decline the voucher when it was offered. Our primary results of Model 3, which focuses only on students in Grade 3 through 5 at the baseline year, indicate that there is little evidence that LSP participating private schools have "cream skimmed" more advantaged students. Different from the simple mean comparisons, results of the *Probit* model reveal no significant differences between voucher decliners and users in terms of student gender, ethnicity, family background, and baseline test scores. Students with a special educational need tend to have a higher likelihood of declining the voucher when it was offered ($p<.10$). These results are consistent across all model specifications.

Students who are more committed to the program tend to have a lower tendency of declining the voucher. In Model 1 and 2 without controlling for student educational backgrounds, students who had participated in the New Orleans Pilot Program are predicted to be about 12% less likely to decline a voucher when offered. This effect fades out after controlling for student educational backgrounds. Meanwhile, students who were assigned to their first-choice schools tend to have a lower likelihood of declining the assigned private school, consistent across all model specifications ($p<.05$).

Table 4.7
Predicting Voucher Decliners

	Overall Sample		Students in Grade 3 through 5 (2012)			
VARIABLE	Model (1)		Model (2)		Model (3)	
Student Characteristics						
Female	-0.014	(0.013)	-0.013	(0.019)	-0.036	(0.031)
African American	0.026	(0.025)	-0.008	(0.034)	0.011	(0.047)
Hispanic	-0.080	(0.056)				
Special Education Need	0.043**	(0.021)	0.058*	(0.032)	0.083*	(0.046)
Baseline Grade Level	0.004	(0.003)	-0.011	(0.013)	-0.010	(0.019)
Multiple Birth Siblings	0.011	(0.036)	0.106	(0.077)	0.069	(0.096)
Neighborhood Mean Household Income ($1,000)	0.000	(0.000)	0.000	(0.000)	0.001	(0.001)
NOLA Participant	-0.124***	(0.030)	-0.129***	(0.039)	-0.059	(0.152)
Awarded LSP to 1st Choice School	-0.101***	(0.020)	-0.065**	(0.035)	-0.122***	(0.044)
Baseline Achievement Score					0.009	(0.020)
Awarded Private School						
Count of Voucher Students	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Private School Minority Enrollment (%)	0.001***	(0.000)	0.001***	(0.000)	0.001**	(0.001)
Tuition Rate ($1,000)	-0.013	(0.009)	-0.022***	(0.007)	-0.045***	(0.012)
Distance to Home (mile)	0.004***	(0.001)	0.005***	(0.001)	0.006**	(0.002)
Community Educational Resources						
Per-pupil Expenditure ($1,000)					0.011**	(0.005)
Count of Charter School					0.020***	(0.007)
District Minority Enrollment (%)					-0.001	(0.001)
Previously Attended Public School						
Charter School					0.096**	(0.051)
Magnet School					-0.106**	(0.048)
Observations	3585		1116		581	

Significance level * $p<0.10$, *** $p<0.01$, ** $p<0.05$.

Notes: Estimates are average marginal effects after *Probit* regressions. Dependent variable equals to 1 if a student has ever declined a voucher after initially offered. Model 1 presents estimates using full sample, and Model 2, Model 3 are estimations for restricted sample. *Hispanic* is omitted in Model 2 and 3. Robust standard errors in parentheses and are clustered at the lottery-assigned private schools.

The awarded private school's attributes tend to play a more important role in voucher usage decision making. All else equal, students who were awarded private schools with lower tuition rates are more likely to decline the voucher: a $1,000 increase in school tuition is associated with a 2-to 5-percentage point reduction in the likelihood of declining a voucher, all else equal, significant at $p<.01$. As school tuition rates are positively correlated with school quality, it is expected that families that were awarded voucher placements in higher quality private schools are more likely to use them and attend the assigned schools. Another significant private school predictor is the distance between the awarded private school and home, as a one-mile increase in the home-school distance is associated with a 0.5 percentage point increase in the likelihood of declining the voucher, all else equal, significant at the .05 level. This result aligns with previous studies and is predicable based on common sense. Furthermore, students who were assigned to private schools with higher proportions of minority students are more likely to decline the voucher when awarded, at the .01 level of significance. These preference patterns are consistent across all model specifications, for both the restricted and full LSP samples.

Notably, students with better educational alternatives have a higher tendency to decline the awarded voucher. Controlling for other factors, students living in school districts with higher educational expenditures and with more charter schools are more likely to decline their LSP placement, significant at the .01 and .05 level, respectively.

Lastly, students who have experienced charter schools have a higher tendency to decline the voucher, while students who attended magnet schools in 2011-12 have a lower tendency to do so. It is predicted that students who were enrolled in charter schools at the baseline year 2011-12 on average are 17.4 percentage points more likely to decline awarded vouchers, compared to

their peers from TPSs ($p<.10$), all else equal, while students who were enrolled in magnet schools in 2011-12 are predicted to be 10 percentage points less likely to decline awarded vouchers, compared to their peers from TPSs ($p<.05$). One explanation for this result would be that families of children who have attended public charter schools are more comfortable staying in a public school while families of children who have attended magnet schools and TPSs are more willing to make the jump to an unfamiliar private school environment.

Overall, student demographics (except special educational needs) and student baseline achievement are not predictive of voucher declines. Families who are more committed to the LSP due to prior experience in the Pilot program tend to be less likely to decline the voucher. Moreover, students who were assigned to private schools with lower tuition costs (lower quality), students who have better alternatives, and students who previously attended charter schools, are more likely to decline the LSP when offered. Voucher decliners are not likely to be more disadvantaged, either educationally or economically, than their voucher user counterparts, except regarding having a special education need. These results are less consistent with a hypothesis that private schools are "cream skimming" certain students into the program as they are with the claim that students are self-selecting to participate in the LSP based on their commitment to this program and their educational alternatives.

Who left LSP private schools?

As suggested by Howell (2004), students who feel socially alienated and families who cannot continue to pay the extra costs of a private school education may opt out from attending voucher-participating private schools. These students are more likely to come from disadvantaged families.

Simple comparisons of student demographics, family backgrounds, and educational backgrounds indicate public school returnees somehow differ significantly from students who persist in private school. To further test if schools tend to push certain students out of the program, we model the relationship between students, residential school districts, and the attending private schools by accounting for the passage of time itself using a Cox Hazards Model. We condition the voucher usage every year on the same student, family, and school characteristics discussed previously.

Table 4.8 reports estimates of Equation 4, where each reported coefficient is the associated hazard ratio of leaving the LSP private school for each factor. Hazard ratios should be interpreted as exponentiated coefficients which is similar to odds ratios in logit regressions: coefficients greater than 1 indicate increases in the likelihood of returning to the public sector, while coefficients smaller than 1 indicate decreases in the likelihood of returning to the public sector. The hazard ratio never shows negative values.

We first provide the estimated effects of student demographics and the characteristics of the private school attended on the hazard of leaving LSP, based on the full sample (Model 1) and the restricted sample (Model 2). We then include student educational backgrounds along with test scores in three specifications based on the restricted sample: with baseline math test score $Test_{t0}$ only (Model 3), math test score at the year of leaving $Test_t$ (Model 4), and with the math achievement gain score of the year of leaving compared to previous year $Test_t$ -$Test_{t-1}$ (Model 5).

Table 4.8
Predicting Leaving LSP Private Schools, Cox Proportional Hazards Model

	Overall Sample	Students in Grade 3 through 5 (2012)			
VARIABLES	(1)	(2)	(3)	(4)	(5)
Student Characteristics					
Female	0.883**	0.806***	0.881	0.856*	0.860*
	(0.046)	(0.067)	(0.070)	(0.072)	(0.071)
African American	1.072	1.01	0.991	0.970	0.998
	(0.100)	(0.122)	(0.131)	(0.143)	(0.145)
Hispanic	0.863	1.335	1.465	1.379	1.403
	(0.167)	(0.313)	(0.376)	(0.390)	(0.391)
Special Education Need	1.172*	1.129	1.028	1.149	1.225
	(0.111)	(0.175)	(0.177)	(0.199)	(0.206)
Baseline Grade Level	1.110***	1.293***	1.180***	1.186***	1.177***
	(0.016)	(0.059)	(0.069)	(0.071)	(0.070)
Multiple Birth Siblings	0.896	1.132	1.29	1.311	1.328
	(0.149)	(0.156)	(0.298)	(0.337)	(0.330)
Neighborhood Mean Household Income ($1,000)	0.999	1.002	0.996	0.995	0.995
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)
NOLA	0.668***	0.732***	0.539	0.642	0.630
	(0.070)	(0.074)	(0.320)	(0.394)	(0.390)
Awarded LSP to 1st Choice School	1.095	1.234	1.790***	1.786***	1.717***
	(0.111)	(0.192)	(0.361)	(0.359)	(0.348)
Achievement					
Test $_{t0}$			0.910**		
			(0.036)		
Test $_{t}$				0.975	
				(0.027)	
Test $_{t}$ -Test $_{t-1}$					1.005
					(0.027)

(Continued)

Table 4.8 (continued)

	Overall Sample	Students in Grade 3 through 5 (2012)			
VARIABLES	(1)	(2)	(3)	(4)	(5)
Awarded Private School					
Count of Voucher Students	0.999	0.999	0.999	0.999	0.999
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Private School Minority Enrollment (%)	1.005***	1.005***	1.006***	1.006**	1.006**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tuition Rate ($1,000)	0.921*	0.911*	0.905	0.910	0.918
	(0.043)	(0.046)	(0.059)	(0.068)	(0.068)
Distance to Home (mile)	1.010**	1.021***	1.021***	1.020**	1.021**
	(0.005)	(0.007)	(0.008)	(0.008)	(0.008)
Community Educational Resources					
Per-pupil Expenditure ($1,000)			1.031**	1.030**	1.027*
			(0.015)	(0.014)	(0.015)
Count of Charter School			1.004	1.004	1.005
			(0.030)	(0.031)	(0.031)
District Minority Enrollment (%)			0.994	0.995	0.994
			(0.004)	(0.004)	(0.004)
Previously Attended School					
Charter School			1.307	1.179	1.189
			(0.291)	(0.269)	(0.276)
Magnet School			0.877	0.874	0.882
			(0.141)	(0.150)	(0.148)
Observations	7,175	2,212	1,080	1048	1045
N Leavers	1,732	613	347	347	359

Significance level *p<.10. **p<.05. ***p<.01.

Notes: Cox Proportional Hazard Models are performed, stating failure as 1 if a student left the LSP private school at year *t*. Model 1 presents estimates using full sample, Model 2 through Model 5 are estimations for the restricted sample. Estimates are hazard ratios. Robust standard errors in parentheses and are clustered at the lottery assigned private school.

Several important trends are found. First, student test scores show a relatively clearer role in deciding to leave the private school a student is attending through the LSP. The relationship between lower baseline test scores and a higher probability of leaving the LSP private school remains after accounting for student demographics and educational backgrounds. This finding aligns with previous studies (Rouse, 1998; Cowen *et al.*, 2012; Carlson *et al.*, 2013; Figlio *et al.*, 2014). The effect of student achievement score and gain score right before leaving the LSP are not significantly different from zero after controlling for student demographics and baseline achievement. That is, there is little evidence that the LSP is pushing out students with lower academic performance while in their chosen private schools.

Second, only a couple student demographics show consistent effects on the hazard of leaving the LSP private school. Male and higher-grade voucher-using students tend to be more likely to leave the LSP private schools, significant at the .10 and .01 level, respectively, for both the full LSP sample and the restricted sample. Students with a special educational need tend to leave the private school at a higher rate, yet this effect is only significant for the overall sample ($p<.10$). This could due to the smaller group of special education students within the restricted sample. The effects of gender, special education status, and grade level are consistent with previous studies (Rouse, 1998; Carlson *et al.*, 2013; Howell, 2004).

Also, students with higher commitment to the program tend to face a lower risk of returning to public schools. The hazard ratio for previously participated in the New Orleans Pilot Program is smaller than 1 across all model specifications, and is statistically significant when only accounting for student backgrounds and the characteristics of assigned private schools, indicating those students tend to have significantly lower tendencies of leaving the attending private schools. After including student test score and educational backgrounds, students who

were awarded their first-choice school face a significantly greater risk of leaving the private school of choice ($p<.01$), which is contrary to our hypothesis.

Characteristics of voucher-assigned private schools show a more consistent and significant effect on the hazards of leaving the LSP. When accounting for only student demographics, students in private schools with higher tuition costs tend to have a lower likelihood of leaving the LSP, significant at the .10 level, for both the full sample and the restricted sample, yet this effect fades out after controlling for student test score and other educational background factors. The effect of student ethnicity composition and the accessibility of attended private schools are not only statistically significant predictors of voucher attrition, they are practically significant as well. Students who attended private schools with higher proportions of minority students and with longer distances from home are at a greater risk of leaving the LSP. These patterns hold across all model specifications.

Finally, the effects of students' residential community educational resources and institutional characteristics of having previously attended public school are not significantly associated with the hazard of leaving the LSP, all else equal, with the only exception that a higher residential district's per-pupil educational expenditure predicts a lower likelihood of leaving the LSP.

In sum, males, students in higher grades, students who did not attend the Pilot program face greater risks of exiting the private school they are attending through the LSP. There is no consistent evidence that the LSP is pushing out demographically more disadvantaged students. Meanwhile, accounting for student demographics, voucher-using students with lower baseline achievement, previously in private schools with a higher proportion of minority students and farther from home tend to be more likely to leave their LSP schools. Also, students residing in

districts with a higher educational per-pupil expenditure tend to leave the attending LSP private schools in a higher rate, perhaps attracted by the greater resources in the public schools.

Who went back to public schools?

The *leavers* comprise two groups of students: those who went back to the public school system because they chose to, and those who left because they were compelled to, for both structural reasons (e.g. graduated) and non-structural reasons (e.g. moved out of state). Since those two groups of leavers are based on a different logic, we further conduct a robustness check of factors predicting LSP students returning to public schools using Competing-risk Regressions, where each reported coefficient is the associated hazard ratio of switching to public schools for each factor, with the competing possibility of switching to another private school or leaving the state. As student public sector enrollment status is not available for the end of the 2014-15 school year, we cannot confirm where the LSP leavers ended up in year 3. As a result, this robustness check only focusses on the public-school returnees in school year 2012-13 and 2013-14.

Table 4.9 presents the estimations from Competing-risk Regressions. Similar as in predicting LSP leavers, voucher using students with lower baseline achievement test scores tend to switch to public schools at higher rates, a result that is statistically significant in Column 4. Current math achievement and achievement gain are not predictive for students returning to public schools in school year 2012-13 and 2013-14. Student demographics perform similar roles as in predicting LSP leavers, as males and higher-grade voucher-using students face higher risks of switching to public schools for the full sample ($p<.05$), yet these effects fade out after restricting the sample to only students in Grade 3 through 5 in 2012. Meanwhile, African American and Hispanic students tend to face a higher risk of switching to public schools in the full LSP sample, however, the result is only statistically significant in some of the model

specifications. Similar as in predicting LSP leavers, students who attended the Pilot program tend to have a significantly lower likelihood of switching to public schools ($p<.01$), significant only when controlling for student demographics and characteristics of attending private schools. Still, students who were awarded their first-choice school tend to leave it at a higher rate ($p<.01$).

Table 4.9
Predicting Switching to Public Schools, Competing Hazard Model

	Overall Sample	Students in Grade 3 through 5 (2012)			
VARIABLES	(1)	(2)	(3)	(4)	(5)
Student Characteristics					
Female	0.849***	0.787***	0.913	0.840*	0.855
	(0.046)	(0.063)	(0.102)	(0.089)	(0.091)
African American	1.269*	1.16	1.163	1.225	1.191
	(0.172)	(0.208)	(0.246)	(0.269)	(0.259)
Hispanic	1.029	1.55	1.621	1.844*	1.838*
	(0.250)	(0.525)	(0.569)	(0.626)	(0.608)
Special Education Need	1.156	1.197	1.024	1.097	1.121
	(0.151)	(0.255)	(0.230)	(0.247)	(0.257)
Baseline Grade Level	1.055***	1.051	0.955	0.929	0.934
	(0.020)	(0.071)	(0.085)	(0.079)	(0.084)
Multiple Birth Siblings	0.918	0.671	0.815	0.881	0.855
	(0.214)	(0.395)	(0.545)	(0.588)	(0.565)
Neighborhood Mean Household Income ($1,000)	1.000	1.000	0.996	0.994	0.994
	(0.001)	(0.002)	(0.004)	(0.005)	(0.005)
NOLA	0.592***	0.616***	0.516	0.626	0.591
	(0.066)	(0.082)	(0.505)	(0.638)	(0.601)
Awarded LSP to 1st Choice School	1.148	1.768**	2.991***	3.938***	3.700***
	(0.153)	(0.453)	(1.044)	(1.482)	(1.425)
Achievement					
Test $_{t0}$			0.900		
			(0.061)		
Test $_{t}$				0.992	
				(0.063)	
Test $_{t}$ -Test $_{t-1}$					1.084
					(0.068)

(Continued)

Table 4.9 (continued)

	Overall Sample	Students in Grade 3 through 5 (2012)			
VARIABLES	(1)	(2)	(3)	(4)	(5)
Awarded Private School					
Count of Voucher Students	0.999	0.999	0.999	0.999	0.999
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Private School Minority Enrollment (%)	1.003*	1.005**	1.006***	1.007***	1.007***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Tuition Rate ($1,000)	0.941	0.940	0.936	0.956	0.954
	(0.053)	(0.036)	(0.054)	(0.059)	(0.060)
Distance to Home (mile)	1.010*	1.029***	1.028***	1.030***	1.030***
	(0.006)	(0.007)	(0.009)	(0.009)	(0.009)
Community Educational Resources					
Per-pupil Expenditure ($1,000)			1.025	1.018	1.023
			(0.025)	(0.029)	(0.031)
Count of Charter School			1.021	1.015	1.019
			(0.040)	(0.043)	(0.042)
District Minority Enrollment (%)			0.989**	0.988**	0.988**
			(0.005)	(0.005)	(0.005)
Previously Attended School					
Charter School			1.317	1.169	1.185
			(0.388)	(0.395)	(0.403)
Magnet School			0.763	0.774	0.782
			(0.299)	(0.307)	(0.308)
Observations	5,377	1,681	821	796	793
N Leavers	1,031	340	201	188	187

Significance level *p<.10. **p<.05. ***p<.01.

Notes: Competing-risk Hazards Models are performed, stating failure as 1 if a student left the LSP private school at year *t* and state competing as 1 if student is untraceable at the current year. Model 1 presents estimates using full sample, Model 2 through Model 5 are estimations for the restricted sample. Estimates are hazard ratios. Robust standard errors in parentheses and are clustered at the lottery assigned private school.

Again, characteristics of voucher-assigned private schools show a consistent and significant effect on the hazards of returning to public schools, as students in private schools with higher proportions of minority students and farther from home are at greater risks of switching to public schools. These patterns hold across all model specifications.

Notably, the residential community educational resources tend to influence students' decision to return to public schools, as students residing in districts with higher proportions of minority students tend to have a lower likelihood of leaving LSP and switching to public schools ($p<.05$).

Conclusion and Discussion

This study investigates the attrition patterns in the Louisiana Scholarship Program during the first three years after the program expanded statewide (school years 2012-13, 2013-14, 2014-15). The LSP is one of the first statewide voucher programs and is based on lottery placement while accounting for an applicant's portfolio of preferred private schools. The data we use in this study are based on all LSP non-kindergarten awardees, giving it high external validity at the state level. However, it is important to note that student enrollment status at the end of school year 2014-15 is not available, so our analysis predicting public school returnees is restricted to the 2012-13 and 2013-14 school years. Further, as we do not have a direct measure of family income or family social-economic status, the measure Neighborhood Mean Household Income can only offer indirect information about variation in family financial resources, and its effects are not consistently predictive for student movement among schools.

We find a high take-up rate (87.5 %) and a low attrition rate (19% regarding the original sample annually) during the first three years among the non-kindergarten students who were offered voucher placements. This high take-up and continuation rate indicates a higher parental satisfaction for the assigned schools, even though their children experienced smaller test-score gains then their peers who lost the placement lotteries during the first two outcome years (Mills & Wolf, 2017).

Little evidence of school "cream skimming" of high-achieving students was found. Student baseline test scores are not significantly predictive of voucher usage. Lower achieving students at the baseline year tend to leave the attending private schools at a higher rate in later years, however this pattern is not significantly predictive for those who switched back to public schools. Other measures of student achievement at LSP private schools, including achievement scores and gain scores before school switching, are not predictive of LSP attrition. These patterns help us clear out concerns of selection bias in interpreting the LSP's Treatment-On-Treated effects on student math test scores in the first three years (Mills and Wolf, 2017). The negative effects of the LSP on math scores in the first two years of the program, and the rebounded effect at the third year, are less likely to have resulted from student compositional change. The non-compliers in the treatment group, those who opted out of the LSP by either declining the offered voucher or leaving the attended private school later on, are not necessarily lower achieving students than the program stayers.

Little evidence of school "cream skimming" based on student demographics was found. Student demographics of gender, ethnicity, and grade level are not predictive of voucher declining, however, students with special educational needs tend to have a higher tendency of declining a voucher. There is some evidence males and higher-grade students face greater risk of opting out from the private school they are attending through the LSP and returning to the public sector. Families with higher commitment to the program, as measured by having previously attended the New Orleans Pilot Program, show higher tendencies of both using the voucher and remaining in private schools. LSP applicants who were awarded the voucher for first-choice schools are more likely to use the voucher, however tend to leave the attending private schools and return to the public sector in later years at a higher rate. In short, there is no significant

evidence that the LSP is “cream skimming” or “pushing out” students based on their demographics.

Furthermore, we find that students assigned to private schools with a larger proportion of minority students, and with further distances between home and school, tend to be more likely to both decline the voucher and leave the LSP and switch to public schools later on. Meanwhile, students residing in better educationally funded districts and with more schooling alternatives have a higher tendency of both declining the voucher and leaving the LSP after initially attended LSP private schools. These results all are consistent with families making rational benefit-cost calculations regarding their school choices.

This study contributes to the existing literature on student participation patterns in publicly funded voucher programs. Previous studies on those patterns in the Milwaukee Parental Choice and the New York City school choice programs show that disadvantaged students were more likely both to refuse to use the voucher when offered and to exit voucher programs early after initially using one. The students from disadvantaged backgrounds were the targeted group for those programs in the first place. Thus, the higher tendency to reject a voucher or quit school choice programs for those students indicates they were struggling in their private school. Our study reveals, however, this is not the case in the LSP: families who decline the voucher and families who exit the program are not necessarily the most disadvantaged groups. There is little evidence that private schools participating in the LSP are “cream skimming” advantaged students based on their characteristics, with the sole exception of students with special educational needs for whom small private schools may be ill-equipped to serve.

There is also no substantial evidence that private schools participating in the LSP "push out" disadvantaged students based on their characteristics and test scores. On the contrary, students tend to self-select themselves out from the program when they attended private schools with a greater share of lower SES students (indicated by higher minority enrollments), with longer distance to home, and with better residential district educational resource. However, since those factors also contribute to attrition in private schools regardless of voucher programs, we cannot confirm if the attrition pattern is uniquely due to the LSP.

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Chapter 5

Conclusion

The three studies within this dissertation describe the participation patterns of states, schools, and students in private school choice programs in the U.S. This work fills several distinct gaps in the study of private school choice initiatives, especially of voucher programs. In this concluding chapter, I recapitulate the key findings from each paper and then state implications for policy analysis and public policy.

Summary of Findings

The first paper looks at state's participation in private school choice programs in the U.S. (Chapter 2). Specifically, we examine which state-level social factors predict policy decisions regarding the enactment and expansion of vouchers, text-credit scholarships, and individual tax-credit/deductions. Based on the private school choice policy adoption and expansion history of 49 states during the years 2000 through 2015, we find that political factors, educational needs, and economic resources all predict private school choice policy adoption and expansion in some ways, and they appear to have a dynamic interaction. The partisan control of policy making institutions shows a relatively more consistent influence on the adoption of private school choice programs than educational need and economic resource factors, as Republican control of a state's Legislature or Governorship positively predicts the adoption of private school choice arrangements over all, and tax-credits and individual tax-credit/deductions individually. Educational needs and economic resource factors are not consistently predictive of policy adoptions. In predicting policy expansions, the educational need and resources factors trump the political factors as the increase of Per-pupil Educational Expenditures negatively predicts the program expansion of vouchers and tax-credits, and the increase in NAEP Achievement tends to

positively predict the expansion of private school choice initiatives overall and for individual tax-credits/deductions specifically. Finally individual tax-credits/deductions show a different logic surrounding policy adoption and expansion than other private school choice policies, as states that face a lower risk of educational crises tend to experience a larger expansion of individual tax-credits/deductions.

In Chapter 3, we compare private school participation decisions in the DC Opportunity Scholarship (DC OSP), the Indiana Choice Scholarship Program, and the Louisiana Scholarship Program (LSP). We find that, overall, voucher programs that enforce a larger regulatory burden on participating schools tend to have a lower participation rate from private schools. Private schools in DC and Louisiana, two sites with relatively higher regulatory burdens for private schools, have a significantly lower likelihood of participating in the DC OSP and LSP than in more lightly-regulated Indiana. The lowest private school participation rate is in Louisiana, which has the largest regulatory burden. Further, controlling for state and school characteristics, higher tuition levels and larger cohort enrollments, conditions normally associated with high-quality schools, identify schools that are less likely to participate in voucher programs. Voucher participating schools average lower GreatSchools parent-review scores than non-participating schools, however this trend is not statistically significant possibly due to a lack of variance in the measure of the score. In a sentence, private school voucher programs with higher regulations tend to have lower participation rates overall, especially from high-quality schools.

The third study (Chapter 4) tests if there are systematic patterns of students opting out of the Louisiana Scholarship Program (LSP) by declining the voucher at the first stage, or leaving the attending private school later on. The LSP is one of the first state-wide publicly-funded voucher programs that subsidizes private school tuitions for low-income students in failing

public schools. A total of 87% of voucher awarded students have ever used the voucher to attend private schools of choice, and less than half the voucher users remain in the program by the end of the third year (Chapter 4). Students who are more committed to the program because they participated in the New Orleans Pilot Program tend to be less likely to decline the voucher when offered and tend to be less likely to leave the attending private school in later years. No consistent evidence indicates the LSP is "cream skimming" or "pushing out" students based on their family social status or test score. However, special needs students tend to have lower likelihood of using the voucher, and students who were placed in private schools farther from home and schools that serve a larger minority population, as well as students with better educational resource in the residential school district, tend to face a greater risk of leaving the LSP.

Discussions and Conclusion

While these three papers fill gaps with empirical evidence regarding private school choice participation, there are several limitations to the generalizability of these findings and the implications that follow. Taken together, all three papers are observational in design, at most quasi-experimental. They do not support direct causal inferences. Other limitations are addressed in individual chapters. In Chapter 2 where my co-author and I estimate the adoption and expansion of private school choice programs in the U.S., we apply state and year fixed effect in detecting the factors that influence program expansions within states over time. Since only half of the states have adopted at least one type of private school choice program, typically with a short time period, our predictions of program expansion are based on only two dozen states with less than 200 observations in total, which provides little analytic power. In Chapter 3, we only observe school participations in the DC OSP, LSP, and Indiana's Choice Scholarship in the

2014-15 school year. The school participation patterns of those programs might correlate with some external shock during that year, and might change over time. In Chapter 4, student voucher program participations are based on fall usage counts, rather than usage across the year. The patterns of students switching back to public school are different from overall program leavers in some cases, however this estimate is only based on a two-year analysis due to the unavailability of enrollment status at the end of the third school year. Further, since we do not have information of attrition patterns in Louisiana private schools in general, we cannot confirm if the student attrition patterns in the LSP are unique due to the program design or due to the private school environment or some combination of both.

Despite these caveats, the research presented in this dissertation fills gaps in the practical evidences regarding what types of states, schools, and students participate in private school choice programs in the U.S., and why. Further, it contributes to an improved understanding of the heterogeneous context of private school choice programs.

The first takeaway from this dissertation refers to the political content of private school choice programs. At the state level, the adoption of private school choice programs, especially tax-credits and individual tax-credits/deductions, are highly impacted by the state's partisan control, as having Republican control of the Governor's Office or the Legislature positively predicts policy adoption. However, the expansion of programs relies more on a state's lack of educational crises rather than political enthusiasm. This conclusion speaks to the ongoing scholarly debate regarding whether the arc of policymaking is driven primarily from need, politics, or economics, and whether that changes over time. It also will inform the decisions of private school choice advocates regarding which states are the best targets for efforts to enact and expand private school choice policies.

The second takeaway refers to the program design of private school choice initiatives, specifically, the program design of the LSP. Has the LSP been "successful"? The success of an educational policy intervention can be assessed in many different ways: improving student test scores for both participants and non-participants, boosting student educational attainment, improving racial integration, enhancing student civic values, serving large numbers of targeted students, and attracting broader and better providers. The LSP, on one hand, serves more than 87% of the targeted students who apply, and its attrition rate is lower than other small-scale voucher programs in the U.S. at 19% (Chapter 4); students have equal access to private schooling, as no "cream skimming" based on student demographics or current achievement was found (Chapter 4). This evidence indicates the LSP is successfully in providing private school access for the targeted disadvantaged student population in Louisiana. Further, Egalite, Mills & Wolf (2016) find that the LSP transfers have successfully reduced racial segregation in the former public schools they attended.

On the other hand, only one third of private schools in Louisiana participate in the LSP. Those participating schools tend to have indicators of lower educational quality than their non-participating counterparts (Chapter 3). Students who transferred to private schools through the program suffered a significant learning loss in the first two years of the program compared to their peers remaining in public schools (Abdulkadiroğlu, Pathak, & Walters, 2018; Mills & Wolf, 2017), although those losses appear to have been erased by year three. This evidence suggests that the LSP attracts more of the lower-end private schooling providers who fail to provide sufficient service to these most-in-need students at least initially.

These findings raise important policy questions about voucher program design in the accountability era, which is the third takeaway. As discussed in Chapter 3 and 4, the LSP is one of the most regulated voucher programs in the U.S. In attempting to control quality and equity through regulation, decision-makers may inadvertently limit the number of high-quality choices available to disadvantaged students. As these lower-quality schools do not provide satisfying services, even many students who were not harmed academically from attending those private schools are lured back to public schools, especially if their public schools have relatively more educational resources. By imposing higher regulations on the private school choice program, policymakers have effectively reduced the availability of private schools to targeted families, both in quality and in quantity. The limited private school participation in the LSP means that it has failed to accomplish the fundamental purpose of vouchers: to provide broader and multi-dimensioned educational models for families with the most need.

Later studies should focus on how participant experiences of schools and students in the LSP differ from those in other voucher programs, and how the participation patterns of schools and students in voucher programs differ from the patterns in other forms of private school choice in the U.S., especially Education Saving Accounts (ESA) and individual tax-credit/deductions. The ESA model is the first policy design considered as a universal voucher arrangement and is experiencing the largest expansion nationwide. The individual tax-credit/deduction model is preferable for middle-to-higher-income populations and therefore operates according to a different logic than private school vouchers. The main conclusion of this dissertation is that, in the case of private school choice, policy design matters.

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Appendix – Institutional Review Board Approval Letter

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

September 26, 2017

MEMORANDUM

TO:	Patrick Wolf	Jay Greene
	Anna Jacob Egalite	Jonathan Mills
	Albert Cheng	Collin Hitt
	Heidi Erickson	Corey DeAngelis
	Sivan Tuchman	Mohammad Danish Shakeel
	Yujie Sude	Matthew Lee
FROM:	Ro Windwalker IRB Coordinator	
RE:	EXEMPT PROJECT MODIFICATION	
IRB Protocol #:	13-02-501	
Protocol Title:	*State Mandated Evaluation of the Louisiana Students Scholarships for Excellence Program and Course Choice Program*	
Review Type:	☒ EXEMPT	
New Approval Date:	09/26/2017	

Your request to modify the referenced protocol has been approved by the IRB. If you wish to make any further modifications in the approved protocol which would change the level of risk to the participants, you must seek approval *prior to* implementing those changes.

Please note that we will no longer be requiring continuing reviews for exempt protocols.

If you wish to make any modifications in the approved protocol that may affect the level of risk to your participants, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.

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