Cream Skimming and Pushout of Students Participating in a Statewide Private School Voucher Program

Joseph Waddington
University of Kentucky

Ron Zimmer
University of Kentucky

Mark Berends
University of Notre Dame

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Joseph Waddington
Associate Professor
University of Kentucky
rjwaddington@uky.edu

Ron Zimmer
Professor of Public Policy
University of Kentucky
ron.zimmer@uky.edu

Mark Berends
Professor of Sociology
University of Notre Dame
mberends@nd.edu

Abstract

A pervasive issue in the school choice literature is whether schools of choice cream-skim students by enrolling high-achieving, less challenging, or less costly students. Similarly, schools of choice may "pushout" low-achieving, more challenging, or more costly students. Using longitudinal student-level data from Indiana, we created multiple measures to examine whether there is evidence consistent with the claims of voucher-participating private schools cream skimming the best students from public schools or pushing out voucher-receiving students. We do not find evidence consistent the claim of cream skimming. However, we find evidence consistent with the claim of private schools pushing out the lowest achieving voucher students.

Keywords: School vouchers, school choice, selective enrollment, cream skimming, pushout

Introduction

Since the inception of educational vouchers, many have argued that allowing students to use public money to attend private schools will theoretically lead private schools to "cream skim" the best students from traditional public schools (TPSs) and "pushout" the weaker students in hopes of lowering costs and improving their academic profile (Berliner & Glass, 2014; Ravitch, 2010, 2013). If these claims are true, then the job of TPSs is more difficult as they are left with educating the challenging and costly students. Previously, there has been little research that has examined these issues within voucher programs.

The best research with implications for the cream skimming debate is by Fleming and colleagues (2015), who examined data of Milwaukee TPS students who used vouchers and found that parents of voucher students had higher educational attainment, but lower incomes. Meanwhile, students remaining in TPSs had higher initial test scores and were more likely to be special education students. While informative, it only indirectly addresses the central issue of the cream skimming claim—whether vouchers lead private schools to attract the best students from TPSs. To examine this issue more directly, it is important to examine whether the students exiting a TPS to attend a private school using a voucher are the highest performing, least challenging, or least costly students relative to all their peers in the *exiting school*.

For the pushout question, the research is even thinner, with only two studies on voucher students in Milwaukee. Cowen and colleagues (2012) examined the characteristics of voucher students who exited a private school to return to a TPS and found that lower performing students are more likely to exit private schools. Subsequently and using math and ELA achievement data on a statewide assessment, Carlson et al. (2013) found that the performance of voucher students

that move out of a private school improved once they entered a TPS. However, neither analysis made comparisons to the likelihood of low-performing students exiting schools in general (including TPSs) or the achievement of students after making other school transitions, which limits the ability to speak to whether these are general trends among all schools or specific to voucher students exiting private schools.

In this study, we used statewide, longitudinal student records to descriptively examine claims of cream skimming and pushout in Indiana's statewide private school voucher program. Specifically, we focused on two research questions:

- Do we have evidence consistent with the claim that private schools "cream skim" high-achieving, less disruptive, or less costly to educate students from TPSs via participation in the statewide voucher program?

- Do we have evidence consistent with the claim that private schools pushout low-achieving or more costly to educate voucher students back to TPSs?

In answering these questions, we cannot prove definitively whether voucher-participating private schools are cream skimming or pushing out students using only administrative data. Administrative data do not allow us to discern the action of the schools (supply side) from the decision-making of families (demand side). Therefore, our analysis focuses on whether we can find patterns in the data *consistent with the claims of cream skimming or pushout behaviors*, which as suggested in the charter literature (Kho, Zimmer, McEachin, 2022), is a necessary, but not sufficient condition, for identifying cream skimming and pushout behaviors by schools. From the TPS's perspective, it does not matter whether a voucher student's move is the result of the private school's behavior or the choice of the family. In either case, the moves create a greater burden on TPSs, which are left educating the most challenging and costly students.

Data, Measures, and Sample

Data Description

To examine the issue of cream skimming and pushout for Indiana's voucher program, we use eight years (2010-11 through 2017-18 school years) of longitudinal student-level records from the Indiana Department of Education. The records contain information about students attending public (traditional, charter, magnet[†]) and private schools (including voucher and non-voucher students), which participate in the Indiana Statewide Testing for Educational Progress Plus (ISTEP+) program.[‡] Although participation in ISTEP+ testing and statewide reporting is a requirement of private schools participating in the voucher program, many private schools took ISTEP+ tests for several years prior to the implementation of the voucher program as part of their accreditation process and to participate in athletics competitions.[§] The availability of longitudinal student records and robust private school participation in statewide testing and other reporting allows us to examine our research questions concerning cream skimming and pushout.

Outcome Measures

The longitudinal student data records contain information about the student's school of record in each year, enabling us to track transitions between schools. For our analyses, we constructed an indicator denoting students who switched schools in between school years. The move is coded in the school year immediately after the switch took place and the student is enrolled

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[†] The handful of magnet programs within the elementary and middle grades in Indiana are magnet programs within a public school. We cannot distinguish which students are part of the magnet program vs. those that are residentially zoned to the public school. We treat all non-charter public school students as traditional public school students.

[‡] The ISTEP+ is aligned to the Indiana Academic Standards and serves as the NCLB-mandated state test for Indiana students in grades 3-8. Testing takes place each spring in mathematics and English/language arts. The test is vertically equated across grades and consists of multiple-choice, constructed-response, and extended-response items that are scored using item response theory methods. Reliability coefficients range from 0.88 to 0.94 in reading and 0.88 to 0.95 in math (Indiana Department of Education, 2011).

[§] Most elite, non-sectarian private schools do not participate in the voucher program.

in their new school (*t*), even though the transition takes place between years *t* and *t-1*.[**] We can determine which students transitioned between school sectors (e.g., moved from public to private). We can also distinguish between students making structural (attained the maximum grade level in their previous school) and non-structural (switched schools for any other reason) moves.

Taken together, these variables enable us to construct our outcomes for the cream skimming and pushout analyses. For the pushout analysis, the dependent variable is dichotomous outcome indicating whether a student makes a non-structural move between school years *t-1* and *t*. We only included non-structural moves because there is little reason to push out a student in the terminal grade of a school. For the cream skimming analysis, the dependent variable is a dichotomous outcome indicating that a student made either a structural or non-structural move between school years *t* and *t-1*. In contrast to pushout, there can be motivation for a school to cream skim a student, regardless of whether the student was at the terminal grade of their previous school, the entry grade for new school, or a grade in between. Therefore, we run the cream skimming analysis both with and without the structural moves.

Independent Variables

Our goal with the cream skimming analysis is to examine whether certain TPS students are more likely to receive a voucher and transfer from a TPS to a private school. Similarly, our goal with the pushout analysis is to examine whether certain voucher-receiving private school students are more likely to transfer out of a private school and into a TPS. We focused on three measures

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[**] The student data is recorded only when students take their statewide ISTEP+ test. Thus, we only observe a student's school of record once within a given year. Although we can denote school transitions between school years, a portion of the school transitions could take place during the middle of the academic year (e.g., after the prior year's state test but before the current year).

of performance: (1) math and English language arts (ELA) achievement, (2) disciplinary infractions, and (3) students' special education and ELL status.

We first focused on achievement as a measure of performance by using each student's standardized ISTEP+ math and ELA scores. We standardized each of the scaled test scores relative to the mean and standard deviation of all test-taking students statewide within each grade and year of testing and describe test scores in standard deviation (SD) units. We also calculated the school-average achievement levels in math and ELA within each year for all schools and using data on all reported students. With the statewide standardization and school averages, we can draw comparisons between students relative to their peers.

For the cream skimming analysis, we created two dichotomous achievement indicators for whether a student has above average math achievement and above average ELA achievement relative to peers in their school each year. As a sensitivity analysis, we also created additional indicators for students who scored above the 75th or 90th percentile in comparison to the statewide distribution of student achievement in each subject each year. Collectively, these are our measures of who are high achieving (HA) students.

For the pushout analysis, we created two dichotomous achievement indicators for whether a student has below average math achievement and below average ELA achievement relative to peers in their school each year. As a sensitivity analysis, we also created additional indicators for students who scored below the 25th or 10th percentile in comparison to the statewide distribution of student achievement in each subject each year. Collectively, these are our measures of low achieving (LA) students.

We next focus on disciplinary infractions to create another measure for use in our cream skimming analysis. We created a dichotomous indicator for whether a student received an out-of-

school suspension or was expelled within a given year.[††] We define the students who did not experience these events as "low discipline". We are unable to use the behavioral measures for the pushout analysis as only public schools report disciplinary infractions in the longitudinal data provided by IDOE. Private schools do not.

As a third measure of performance, we focus on ELL (English-Language Learner) and special education students. We have indicators of each student's ELL and special education status in each year. For the cream skimming analysis, we focus on students who *are not* ELL or special education. For the pushout analysis we focus on students who *are* ELL or special education students. ELL and special education students are not necessarily low-performing students, but because they more costly to educate, they may be less financially attractive to schools. Private schools are also less likely to classify a student as ELL or special education, so private school ELL or special education students in the pushout analyses likely are some of the most exceptional cases.

The IDOE data also contain information about whether a student received a voucher and attended a private school. We use this information to construct an indicator for voucher students in each of our analyses. Using the voucher indicator, we construct interaction terms with each of the cream skimming and pushout measures above to examine whether there is a differential rate in voucher students switching schools as compared to voucher-eligible peers. We describe the voucher students upon which our analyses focus and their relevant counterfactual groups in the section below and a further interpretation of the interactions when presenting the empirical models.

[††] We chose not to include in-school suspensions or other reported disciplinary activity due to the wide variation in reporting across schools. We consider behavior leading to out-of-school suspensions and expulsions an indicator of more serious disciplinary issues.

Analytical Samples and Descriptive Statistics

In our analyses, our goal is to assess the likelihood of voucher students making transitions between schools between year *t* and *t-1* relative to voucher-eligible students who are the most relevant counterfactual. At the outset of the Indiana Choice Scholarship Program, most students could only receive a voucher if they were previously enrolled in a public school and fell below the maximum qualifying income based on their family size. Although eligibility criteria have expanded over time, this remains a primary route by which a student can receive a voucher to attend a private school. By focusing on this group of voucher students, we are also inherently focusing on voucher students who moved from one school type to another.

In the cream skimming analysis, we focus only on students who move from a TPS to a private school in the year that they first received a voucher (whether a structural or nonstructural transition). This group of students specifically aligns with the component of the voucher policy described above. For this analysis, we code each year prior to and up to the voucher student's move to a private school as a voucher student. In comparison, we include all TPS voucher-eligible students who are in the same school and year as a student who leaves a public school with a voucher to attend a private school in the subsequent year. We coded voucher eligibility based on a student's free or reduced-price lunch status, as the income threshold for receiving a "full" voucher (90% tuition at the private school) from the state corresponds exactly to the reduced-price lunch threshold. By focusing only on voucher-eligible students, we must constrain our voucher group to only students receiving a "full" voucher, leaving us with a partial analysis of voucher cream skimming. However, full voucher recipients make up from 70-80% of all voucher students within a given year. The voucher-eligible comparison students may or may not also change schools (whether for structural or nonstructural reasons), either within the public sector (to a different

traditional public, charter, or magnet school), or to the private sector but without a voucher. Like

the voucher students, we include all years leading up to a voucher-eligible student's switch.

In Table 1, we provide a descriptive analysis of voucher and voucher-eligible students who

are part of our cream skimming analysis. Voucher students are more likely to be Latino/a or an

ELL student and less likely to be a special education student than voucher-eligible students making

other transitions or their voucher-eligible peers remaining in a TPS. They are also slightly higher

achieving, on average, though nearly 0.2 SD below the statewide mean. Voucher-eligible switchers

are more likely to be Black than voucher switchers or voucher-eligible stayers. About 69 percent

of voucher switchers made a non-structural transition to a private school while only 36 percent of

voucher-eligible switchers made a non-structural transition to any school.

Table 1: Description of Students in Cream Skimming Analysis

Variable	Voucher Switchers	Voucher-Eligible Switchers	Voucher-Eligible Stayers
Students	9,036	234,956	293,263
Female	0.513	0.492	0.493
Black	0.181	0.235	0.208
Latino/a	0.241	0.175	0.185
Other Race/Ethnicity	0.089	0.088	0.087
English Language Learner	0.155	0.116	0.129
Special Education Student	0.103	0.152	0.151
Average Math Score (SD)	-0.197	-0.347	-0.328
Average ELA Score (SD)	-0.166	-0.368	-0.336
Out-of-School Suspension or Expulsion	0.071	0.085	0.075
Made Structural Move	0.312	0.641	---
Made Non-Structural Move	0.688	0.359	---

Students in cream skimming analysis from 1,044 traditional public schools in Indiana with at least one student who exits to attend a private school after receiving a voucher.

In the pushout analysis, we focus on students enrolled in a private school who are receiving a voucher, some of whom exited a private school to enroll in a public school (whether TPS, charter, or magnet). For this analysis, we code each year a student is receiving a voucher while in a private school as a voucher student in all years available for that student in the data (if the student does not leave a private school) or up to the year in which student leaves the private school for a public school. Once the student exits, they are removed from future years of the analysis. In comparison, we include all voucher-eligible public school students in each year. As before, we coded voucher eligibility based on a student's free or reduced-price lunch status and focus on these voucher-eligible students and their "full" voucher recipient peers. For all students, we focus on those who remain in their school (stayers) or make a non-structural school transition (switchers).

In Table 2, we provide a descriptive analysis of students who are part of our pushout analysis. Voucher students in the pushout analysis who make a non-structural move from a private school are low achieving and much more likely to be Black than their voucher peers who remain in private schools. In contrast, Latino/a and ELL voucher students are more likely to remain in private schools. Voucher students who exit private schools also have low average achievement, nearly 0.5 SD below the state average, though this is comparable to voucher-eligible students in TPS who also make a non-structural exit from their school.

Table 2: Description of Students in Pushout Analysis

Variable	Voucher Switchers	Voucher Stayers	Voucher-Eligible Switchers	Voucher-Eligible Stayers
Students	5,026	15,689	134,406	345,537
Female	0.506	0.511	0.491	0.491
Black	0.229	0.098	0.258	0.143
Latino/a	0.144	0.191	0.127	0.164
Other Race/Ethnicity	0.095	0.075	0.082	0.077
English Language Learner	0.071	0.120	0.080	0.115
Special Education Student	0.109	0.091	0.172	0.165
Average Math Score (SD)	-0.471	-0.046	-0.496	-0.252
Average ELA Score (SD)	-0.311	0.067	-0.491	-0.274

Students in pushout analysis from 323 voucher-participating private schools in Indiana with at least one voucher student who exits to attend a public school.

Empirical Approach

We next describe how we use these data to explore our main research questions. We first investigate whether there is evidence consistent with the claim that students are "cream-skimmed" vis-à-vis their voucher-eligible public school peers. Similarly, we examine whether there is evidence consistent with the claim that students are "pushed out" of a private school as compared to the exit rates of their voucher-eligible public school peers. To answer these questions, we build off the empirical approaches in the literature that have examined the cream skimming and pushout issues in charter schools across several states (Booker, et al., 2005; Zimmer et al., 2011; Zimmer and Guarino, 2013;Winters, 2017; Kho, et al., 2022).

For our formal analyses, we estimate a series of linear probability models (LPM) to determine the probability of a student making a move between years *t-1* and *t*. Our primary models do not include any controls. From a perspective of whether there is cream skimming, student characteristics (e.g., sex, race/ethnicity) may not be important—i.e., one could argue that we want

to know whether the voucher programs are skimming off the higher performing students regardless

of other student characteristics. A similar argument could be made for pushout. Therefore, for this

analysis, we run a simplified LPM with the discrete outcome of whether the student exits his or

her school as a function of a series of key independent variables. As a sensitivity analysis, we

include student characteristics such as sex, race/ethnicity, ELL status, and special education

status[‡‡] for both cream skimming and pushout and compare the results.

Cream Skimming Estimation

For an analysis of student movement patterns consistent with the claim of cream skimming,

we want to assess the likelihood of voucher students making a structural or non-structural move to

a private school by year *t* who are classified as high achieving, low discipline, or not an ELL or

special education student at time *t-1*. We want to compare this likelihood to all other voucher-

eligible students who may make any other structural or non-structural move without a voucher.[§§]

We estimated this using achievement as a measure of performance in model (1) below:

$$Y_{it} = \delta VP_{it} + \theta HA_{it-1} + \gamma VP_{it}HA_{it-1} + \lambda_t + \mu_{it} \tag{1}$$

Here, $Y_{it} = 1$ if student *i* makes a structural or non-structural move from his or her public

school in between years *t-1* and *t*. We identify the differential patterns of mobility across students

through a series of three indicators. The first, (VP_{it}), denotes students who first received a voucher

and transition into a private school as of year *t*. The second, (HA_{it-1}), indicates all students who

are high achieving at time *t-1*. The third, $(VP_{it}HA_{it-1})$, is an interaction between the first two

terms, specifically denoting voucher students who were high achieving in their public school the

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[‡‡] In the models where ELL or special education status is the performance indicator for cream skimming or pushout, the variable is already included in the main part of the model and does not need to be added as a covariate.
[§§] We also examine whether there are differential exit rates among structural and non-structural moves and display the results in Supplemental Table S1.

year prior (t-1) to making a transition to a private school in year t. We also included a series of

year fixed effects (λ_t) to account for unobserved differences in transition rates between years. We

estimated separate models for the different indicators of high achieving students, including being

above the school average, above the state 75th percentile, and above the state 90th percentile.

The coefficient of interest (γ) on the interaction term ($VP_{it}HA_{it-1}$) in model (1) measures

the added difference in the relative likelihood of making a move for a high achieving student who

receives a voucher to attend a private school. A significant and positive γ suggests evidence

consistent with the claim that higher achieving students are more likely to receive a voucher and

attend a private school above and beyond the baseline rate of high-achieving, voucher-eligible

students who make a transition (θ). This analysis does not produce causal estimates, but this

estimate yields descriptive information about patterns in the data consistent with the claim of

private schools cream skimming higher performing voucher students. This can be viewed as a

necessary, but not sufficient condition to prove cream skimming. We also note that in this model

δ is a nuisance parameter, as all students coded as voucher students in this analysis transfer from

a public school, it is only a question of in which year. Thus, δ represents the average share of

voucher students who transfer in a given year.

Using this same structural model, we also examine whether students with below-average

number of discipline infractions, non-ELL, and non-special education students are more likely to

transfer to private voucher schools as a form of cream skimming.[***] For these analyses, a

significant and positive γ would suggest evidence consistent with the claim that less disruptive or

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[***] For the analysis using disciplinary infractions as the indicator of performance of students, all instances of HA_{it-1} in model (1) are substituted with the indicator for below-average disciplinary infractions (LD_{it-1}), both in the main effect term and interaction. For the analysis using ELL or special education status as the indicator of performance of students, all instances of HA_{it-1} in model (1) are substituted with either the ELL (ELL_{it-1}) or special education ($SPED_{it-1}$) or indicator at time t-1 (in separate models), both in the main effect term and interaction.

less costly to educate students are more likely to receive a voucher and attend a private school than for less disruptive or less costly to educate voucher-eligible students are to switch schools.

Pushout Estimation

We follow a similar approach to our cream skimming analysis in our analysis of student movement patterns consistent with the claim of pushout. Here, we want to assess the likelihood of voucher students making a non-structural move to a TPS by year *t* who are classified as low achieving, or a special education or ELL student at time *t-1*. We want to compare this likelihood to all other voucher-eligible TPS students with the same classifications who may make a non-structural move. We estimated this using achievement as a measure of performance in model (2):

$$Y_{it} = \delta VP_{it-1} + \theta LA_{it-1} + \gamma VP_{it-1}LA_{it-1} + \lambda_t + \mu_{it} \tag{2}$$

Here, $Y_{it} = 1$ if student *i* makes a non-structural move from his or her school in between years *t-1* and *t*. We identify the differential patterns of mobility across students through a series of three indicators. The first, (VP_{it-1}), denotes students who are receiving a voucher and enrolled in a private school as of year *t-1*. The second (LA_{it-1}), indicates all students who are low achieving at time *t-1*. The third, $(VP_{it}LA_{it-1})$, is an interaction between the first two terms, specifically denoting voucher students who were low-achieving in their private school at time *t-1*. As with the cream skimming model, we also included year fixed effects (λ_t). We estimate separate models for the different indicators of low achieving students, including being below the school average, below the state 25th percentile, and below the state 10th percentile.

The coefficient of interest (γ) on the interaction term $(VP_{it}LA_{it-1})$ in model (2) measures the added difference in the relative likelihood of making a non-structural transition for a low achieving voucher student who exits a private school for a public school. Because not all voucher

students change schools, we must also consider the baseline transfer rate of all voucher students (δ). A significant and positive linear combination of δ and γ compared to θ would suggest evidence consistent with the claim that lower achieving voucher students are more likely to exit a private school above and beyond the baseline rate of low-achieving, voucher-eligible TPS students who make a transition (θ). We note that unlike the cream skimming analysis, δ is a meaningful term, representing the baseline voucher transition rate. Thus, even if γ is significant and positive, it should be combined with δ to understand if there is a differential overall transition rate of low-achieving voucher students compared to their low-achieving public school peers.

We also produce an estimate that is the linear combination of θ and γ, which indicates the rate at which low-achieving voucher students transition as compared to higher-achieving voucher students. We note that these analyses do not produce causal estimates, but these estimates descriptively yield information about patterns in the data consistent with the claim of private schools pushing out lower performing voucher students. This can be viewed as a necessary, but not sufficient condition to prove pushout. Because we are making multiple comparisons (low-achieving voucher vs. low-achieving voucher-eligible and low-achieving voucher vs. higher-achieving voucher), we adjust our baseline significance levels by $\alpha/2$ in all analyses.

Using this same analytical approach, we also examined whether voucher-receiving ELL or special education students are more likely to transfer out of private voucher schools as a form of pushout.[†††] For the ELL and special education analysis, a positive and significant estimate of the combination of δ and γ compared to θ would be consistent with the claim that more costly to educate voucher students are more likely to exit a private school relative to more costly to educate

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[†††] For the analysis using ELL or special education status as the indicator of performance of students, LA_{it-1} is replaced with either the ELL or special education indicator, both in the main effect term and interaction.

voucher-eligible students enrolled in TPSs. As above, γ should be combined with δ to understand the overall transition rate of ELL and special education voucher students relative to their ELL and special education TPS peers. Similarly, a significant and positive linear combination of θ and γ would suggest evidence consistent with the claim that more costly to educate voucher students are more likely to transition than their less costly voucher peers. We make the same multiple comparison adjustment to our significance levels as above ($\alpha/2$) in each analysis.

For both the cream skimming and pushout analyses, we also estimated models where we controlled for student demographic characteristics (e.g., sex, race/ethnicity, free or reduced-price lunch status) in all models, and academic characteristics (e.g., ELL and special education status) in the achievement and discipline models. We display these results next to our main findings in Tables 3 and 4. For the cream skimming analysis, we also separate out students who make structural vs. non-structural moves in two analyses. The results of this sensitivity analysis are displayed in Supplemental Table S1.

Results

Cream Skimming Results

In Table 3, we display the results of our cream skimming analysis. The coefficient of interest (γ) on the interaction term from model (1) is italicized, denoting the difference in the relative likelihood of making a move for a high achieving/less disruptive/less costly to educate student who receives a voucher to attend a private school as compared to a high achieving/less disruptive/less costly to educate voucher-eligible student who makes any other move (without a voucher). Statistical significance for these estimates is denoted with asterisks. A positive and significant estimate reflects evidence consistent with the claim of cream skimming.

Table 3: Cream Skimming Main Results

	Math Test Scores			ELA Test Scores					
Variables of Interest	**Above Exiting School Average**	**Top 75% of the State**	**Top 90% of the State**	**Above Exiting School Average**	**Top 75% of the State**	**Top 90% of the State**	**Low Discipline Incidents**	**Non-ELL Status**	**Non-Special Educ. Status**
	No Covariates								
Above Test Score Threshold (TPS)	-0.011*** (0.001)	-0.022*** (0.002)	-0.018*** (0.003)	-0.012*** (0.001)	-0.029*** (0.002)	-0.030*** (0.003)			
Voucher Private x Above Threshold	-0.003 (0.008)	0.000 (0.002)	-0.024 (0.017)	0.001 (0.008)	0.028** (0.011)	0.033 (0.017)			
Low Discipline Student (TPS)							-0.063*** (0.002)		
Voucher Private x Low Discipline							-0.091*** (0.014)		
Non-ELL Student (TPS)								0.055*** (0.002)	
Voucher Private x Non-ELL								0.015 (0.010)	
Non-Special Educ. Student (TPS)									-0.011*** (0.002)
Voucher Private x Non-Special Educ.									0.001 (0.013)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	No	No	No	No	No	No	No	No
	With Student Covariates								
Above Test Score Threshold (TPS)	-0.011*** (0.001)	-0.022*** (0.002)	-0.017*** (0.003)	-0.014*** (0.001)	-0.025*** (0.002)	-0.025*** (0.003)			
Voucher Private x Above Threshold	0.002 (0.008)	0.005 (0.011)	-0.016 (0.017)	0.003 (0.008)	0.029** (0.010)	0.032 (0.017)			
Low Discipline Student (TPS)							-0.057*** (0.002)		
Voucher Private x Low Discipline							-0.071*** (0.014)		
Non-ELL Student (TPS)								0.028*** (0.002)	
Voucher Private x Non-ELL								0.019 (0.011)	
Non-Special Educ. Student (TPS)									-0.023*** (0.002)
Voucher Private x Non-Special Educ.									0.016 (0.013)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*$p<0.05$, **$p<0.01$, ***$p<0.001$. Standard errors, clustered by school, in parentheses. Separate analyses conducted for each subject and achievement threshold as well as for the disciplinary, ELL status and special education status indicators.

Overall, we find little evidence consistent with the claim that private schools are cream

skimming higher performing, less disruptive, or less costly to educate students from TPS. Higher

achieving students are less likely to transition schools as evidenced by the consistent negative estimates on the baseline above test score threshold indicator. On the indicator of interest, estimates are mostly null across subjects and achievement thresholds, except for students in the top 75% of all statewide test takers in ELA being 3 percentage points more likely to transition to a private school with a voucher than voucher-eligible students of the same ability. When splitting out students making non-structural vs. structural moves, there is evidence that students in the top 75% statewide in both subjects are 3 to 6 percentage points more likely to transition to a private school with a voucher than voucher-eligible students of the same ability. However, this is not consistent across thresholds and does not hold for structural moves. If cream skimming were pervasive based on measures of academic achievement, we would have anticipated seeing consistent significant and positive estimates regardless of the type of transition.

The other measures we use to assess cream skimming students also yield no evidence consistent with the claims of private schools cream skimming less disruptive or less costly to educate students. Less disruptive voucher-eligible students, denoted as such by not having an out of school suspension or being expelled from their school, are much less likely to transition schools, as expected. Less disruptive voucher students are even *less* likely to make a transition to a private school than their voucher-eligible peers, running counter to a cream skimming hypothesis. In other words, *more disruptive* students are 7 to 9 percentage points more likely to use a voucher to transition to a private school than their voucher-eligible public school peers. The baseline transition rates suggest non-ELL voucher-eligible students are more likely to change schools than ELL students and non-special ed students are slightly less likely to do so. However, non-ELL and non-special ed voucher students are not any more or less likely to transition than their voucher-eligible peers.

Pushout Results

In Table 4, we display the results of our pushout analysis. The coefficient of interest (γ) on the interaction term from model (2) is italicized, denoting the difference in the relative likelihood of a low achieving/more costly to educate voucher student making a non-structural school move from their private school as compared to a low achieving/more costly to educate voucher-eligible student who makes a non-structural move from their TPS. Statistical significance for these estimates is denoted with asterisks. We also produce an estimate that is the linear combination of θ and γ from model 2, which indicates the rate at which low achieving/more costly to educate voucher students transition from private schools as compared to their higher-achieving/less costly to educate voucher peers. Bold estimates in the table indicate when this transition rate is statistically significant, and the transition rate is the sum of the two rows for each model estimate. Taken together, when these two measures are positive and significant, this reflects evidence consistent with the claim of pushout.

Overall, we have evidence consistent with the claim that the lowest achieving voucher students are being "pushed out" of private schools at a modestly higher rate than their similarly low achieving voucher-eligible TPS peers as well as their higher achieving voucher private school peers. The non-structural transition rate for low achieving voucher students is anywhere from 1 to 3 percentage points higher than their low achieving, voucher-eligible TPS peers. Considering that voucher students in general are a percentage point less likely to leave private schools, a higher transition rate of 2 percentage points only holds for the lowest achieving students (below the 10th percentile statewide in both subjects). The low achieving voucher students are also 3 to 9 percentage points more likely to make a non-structural move from a private school than their high achieving voucher peers. This evidence is consistent across all achievement thresholds.

Table 4: Pushout Main Results

Variables of Interest	Math Test Scores			ELA Test Scores			ELL Status	Special Educ. Status
	Below Exiting School Average	Bottom 25% of the State	Bottom 10% of the State	Below Exiting School Average	Bottom 25% of the State	Bottom 10% of the State		
No Covariates								
Voucher Private	-0.018*** (0.002)	-0.013*** (0.002)	*-0.013*** (0.002)*	-0.017*** (0.002)	-0.012*** (0.002)	*-0.011*** (0.002)*	*-0.008*** (0.002)*	-0.011*** (0.002)
Below Test Score Threshold (TPS)	**0.022*** (0.001)**	**0.055*** (0.001)**	**0.067*** (0.001)**	**0.019*** (0.001)**	**0.049*** (0.001)**	**0.059*** (0.001)**		
Voucher Private x Below Threshold	**0.009* (0.003)**	**0.011** (0.004)**	*0.029*** (0.006)*	**0.009* (0.003)**	**0.019** (0.004)**	*0.029*** (0.006)*		
ELL Student (TPS)							**-0.041*** (0.001)**	
Voucher Private x ELL							*-0.018*** (0.004)*	
Special Educ. Student (TPS)								**0.014*** (0.001)**
Voucher Private x Special Educ.								**0.012 (0.006)**
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	No	No	No	No	No	No	No	No
With Student Covariates								
Voucher Private	-0.013*** (0.002)	-0.011*** (0.002)	*-0.010*** (0.002)*	-0.014*** (0.002)	-0.010*** (0.002)	*-0.009*** (0.002)*	*-0.005* (0.002)*	-0.009*** (0.002)
Below Test Score Threshold (TPS)	**0.019*** (0.001)**	**0.046*** (0.001)**	**0.055*** (0.001)**	**0.018*** (0.001)**	**0.044*** (0.001)**	**0.052*** (0.001)**		
Voucher Private x Below Threshold	**0.008* (0.003)**	**0.012** (0.004)**	*0.029*** (0.006)*	*0.009* (0.003)*	**0.020** (0.004)**	*0.029*** (0.007)*		
ELL Student (TPS)							**-0.018*** (0.001)**	
Voucher Private x ELL							*-0.022*** (0.004)*	
Special Educ. Student (TPS)								**0.014*** (0.001)**
Voucher Private x Special Educ.								*0.013 (0.006)*
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*p<0.025, **p<0.005, ***p<0.0005 after adjustment for multiple comparisons. Standard errors, clustered by school, in parentheses. Separate analyses conducted for each subject and achievement threshold. *Italic* estimates represent statistically significant differences in the likelihood of making a non-structural transition at p<0.025 between below test score threshold/ELL/special education voucher students and below test score threshold/ELL/special education TPS students, derived from the sum of the voucher private transition main effect and the voucher-by-below threshold interaction term. **Bold** estimates represent statistically significant differences in the likelihood of making a non-structural transition at p<0.025 between below test score threshold/ELL/special education voucher students and above test score threshold/non-ELL/non-special education voucher students, derived from the sum of the below test score threshold main effect and the voucher-by-below threshold interaction term.

When looking the potential push out of ELL and special education voucher students, there is minimal evidence. Voucher-eligible ELL students are less likely to make a non-structural transition from their TPS, and voucher ELL students are 2 percentage points even less likely to make such a move from their private school. Voucher ELL students are also 4 percentage points less likely to make a non-structural transition from their private school than their non-ELL voucher peers. Meanwhile, special education voucher-eligible students are slightly more likely to make a non-structural move, but there is no difference in the transition rate for special education voucher students. Voucher special education students are 3 percentage points more likely to make a non-structural transition from their private school than their non-special education peers.

Discussion

Since public school vouchers were first popularized by an essay by Milton Friedman in 1955, critics have raised concerns whether private schools would serve all students. Over the years, these concerns have evolved as critics argue that vouchers would create opportunities for private schools to cream skim the highest-achieving, low-cost students from TPSs and pushout the lowest-achieving, high-cost students from private schools, which would lead to inequitable access to private schools and create greater burden for TPS to educate students. In the paper, we provide evidence of whether private schools are more likely to attract high-achieving, low-cost students from TPS using test scores, discipline incidents, and special education and ELL status as measures of achievement and cost. Similarly, we provide evidence of whether low-achieving, high-cost students using a voucher are more likely to exit a private school.

For cream skimming, we find little evidence consistent with the claim of those who argue that vouchers would create an opportunity for private schools to cream skim. While all high-

achieving students are less likely to transition schools when measured by test scores, the differential transition rates for high-achieving voucher students are mostly null across all subjects and achievement thresholds. In addition, our other measures to assess cream skimming students yield no evidence consistent with the claims of private schools cream skimming less disruptive or less costly to educate students.

In examining the claim of pushout, when considering student test scores, we find that lowest achieving voucher students are exiting private schools at a modestly higher rate than their similarly low-achieving voucher-eligible TPS peers as well as their higher achieving voucher private school peers. The transition rate for low-achieving voucher students is higher than their low-achieving, voucher-eligible TPS peers by 1 to 3 percentage points. Considering that voucher students in general are a percentage point less likely to leave private schools, a statistically significant differential transition rate of 2 percentage points only holds for the lowest achieving students (below the 10th percentile statewide) when looking at the linear combination of these two terms. Low-achieving voucher students are also 3 to 9 percentage points more likely to move from a private school than their higher-achieving voucher peers. This evidence is consistent across all achievement thresholds.

When looking at the potential pushout of ELL and special education voucher students, the evidence is mixed. Voucher ELL students are 2 percentage points less likely to move from their private school as compared to voucher-eligible ELL peers who move from their TPS. Voucher ELL students are also 4 percentage points less likely to make a transition from their private school than their non-ELL voucher peers. Meanwhile, voucher special education students are 3 percentage points more likely to move a transition from their private school than their non-special

education peers, though this rate is similar to the rate at which special education students move from a TPS.

There are several aspects of cream skimming and pushout which we were unable to capture in this study. One limitation in this study that private schools are exempt from reporting disciplinary data to the Indiana Department of Education despite all the other required reporting in which voucher-participating private schools complete. This did not allow us to examine evidence consistent with the claims of pushout based on disciplinary incidents as we did with the cream skimming analysis. In addition, all our measures for cream skimming the best students and pushing out the more challenging students are proxies. To address this issue, we conducted several sensitivity analyses using different definitions of high-and low-achieving students. For instance, for high achieving students, in addition to using above average students within the school they exited, we also used students above the 75th and 90th percentile.

In sum, while our analysis does not provide evidence consistent with the claim of voucher-participating private schools cream skimming the best students from TPSs based on ability, disciplinary background, or cost to educate, it raises concerns as to whether voucher programs are creating effective educational opportunities for the lowest achieving students as there is some evidence consistent with the claim of pushout using some proxies for low achieving students. As Indiana invests over $240 million of public funds annually in vouchers for students to attend private schools (Indiana Department of Education, 2022), policymakers should be wary of potential exacerbated educational inequalities and the challenges that low-performing students exiting out of private schools create for TPSs.

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