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Is School Choice a "Trojan Horse?" The Effects of School Choice Laws on Homeschool Prevalence

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ABSTRACT

School choice programs such as vouchers and charter schools expand lower cost schooling options for families. We examine how these expansions affect the prevalence of homeschooling. School choice programs may reduce homeschooling if parents that otherwise would have homeschooled their children instead use a school choice program. Homeschooling may increase if school choice programs act as a "Trojan Horse" by expanding government control in otherwise independent schools, pushing some families away from those options. We empirically examine the legitimacy of such claims by looking at the effects of public and private school choice programs on the market share of homeschooling. We use difference-in-differences to estimate whether voucher programs and charter schools influence homeschooling.

Introduction

Homeschooling is an increasingly important segment of the K-12 education sector (Aurini & Davies, 2005). In 2012, there were an estimated 1,773,000 children homeschooled in the United States (Redford, Battle, & Bielick, 2017), about 3.3% of the population of 5- to 17-year-olds (Digest of Education Statistics, 2015a, Table 201.10). In addition, homeschooling roughly doubled since 1999 (Digest of Education Statistics, 2015b, Table 206.20).

A small literature explores why parents educate their children at home. The majority report their motivation as educational reasons such as wanting to provide a better education to their children (Isenberg, 2007). Cross-sectional analyses suggest that parents homeschool when public schools display more economic diversity and when mothers have more education (Houston & Toma, 2003). The right to homeschool and fewer regulations on homeschooling correlate with higher rates of homeschooling as well (Bhatt, 2014; Houston & Toma, 2003).

We consider another factor likely to influence the propensity to homeschool: the availability of alternatives to one's assigned public school. During this same period of increased home education, other educational choices have spread across the United States, including private school vouchers and public charter schools. We examine how increases in the programs expanding school choice--charter school laws and voucher programs--affect the likelihood of being homeschooled. These added options may diminish the likelihood of homeschooling by providing additional educational options that may more closely fit families' preferences. On the other hand, school choice programs--particularly voucher programs--expand the reach of government regulation by bringing taxpayer funds into previously independent schools. This possibility of school choice programs acting as a "Trojan Horse" implies changes in the characteristics of existing schooling options that may push some families into homeschool. There are also fiscal implications to the relationship between homeschooling and school choice programs. If school choice programs bring homeschool students

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into a taxpayer-funded program, allowing homeschool families to access school choice benefits could increase educational costs to taxpayers; however, it is also possible that the net fiscal effect of a school choice program open to homeschool families would be to decrease average per-pupil spending while keeping overall costs the same or even reducing them.

Literature review

Much of the literature at the intersection of school choice programs and the supply of schooling options is theoretical. Chubb and Moe (1990), Hess (2010), and McShane (2015) each discuss how the success of school choice programs relies on the ability of institutions to enter the educational market. Hess (2010) argued that while the historical focus on the funding of programs is important, it is not sufficient for the educational market to function as theorized. Many of the theorized benefits of school choice programs accrue in the long-run, when prices fall and quality levels rise as a result of market entry and the ensuing competitive pressure.

Empirical studies of the supply side of school choice programs largely examine how schools respond to the regulatory burden. Sude, DeAngelis, and Wolf (2018) found that higher quality schools––as measured by tuition and enrollment levels––were less likely to participate in more heavily regulated programs. Only one-third of private schools decided to participate in the highly-regulated voucher program in Louisiana (Abdulkadiroğlu, Pathak, & Walters, 2018; Mills & Wolf, 2017), while over two-thirds of the private schools decided to participate in the more lightly regulated voucher programs in District of Columbia and Indiana (Sude et al., 2018). The regulatory burden was a major concern for private schools in Louisiana, Indiana, and Florida (Kisida, Wolf, & Rhinesmith, 2015); private schools are less likely to participate in more heavily regulated voucher programs (Stuit & Doan, 2013). In addition to leading to lower rates of participation, more heavily regulated voucher programs led to a more homogenous and less specialized supply of private schools (DeAngelis & Burke, 2017, 2019). The highly-regulated voucher program in Louisiana generated the first experimental evaluation in the world to find statistically significant negative effects on student test scores (Abdulkadiroğlu et al., 2018; Mills & Wolf, 2017). Two survey experiments have found that regulations reduce the quantity of private school leaders that expect to participate in hypothetical voucher programs in the United States (DeAngelis, Burke, & Wolf, 2018, 2019).

Similarly, regulations on homeschooling affect homeschool participation. Bhatt (2014) considers the effect of clarifying regulation on homeschool participation. These state laws explicitly declared that parents had the right to homeschool their children, reducing uncertainty as to whether homeschool families were violating truancy laws. She estimates that the passage of homeschooling rights legislation within a state leads to a 1.4 percentage point increase in the likelihood that a child is homeschooled within the same state.

A growing literature explores factors influencing homeschool participation including religion, urbanization, public school quality, and income. Religiosity increases the likelihood of homeschooling (Knowles, Marlow, & Muchmore, 1992; Stevens, 2001; Taylor-Hough, 2010). Isenberg (2003) shows that parents in small towns are more likely to homeschool when traditional public schools have lower math test scores. Isenberg (2007) finds that families choose to homeschool when the quality levels of their residentially assigned public schools are low and the tuition levels of their private schooling options are high. Dahlquist, York-Barr, and Hendel (2006) examine a sample of 600 home educators in Minnesota and conclude that reasons for homeschooling include religious beliefs and dissatisfaction with public school performance. Isenberg (2006) finds that, above $13,000 of non-maternal income, households with more income are less likely to homeschool and more likely either to choose to live in a district with a high-quality public school or to send their children to private school.

We explicitly consider how changing educational options affect the propensity to homeschool. Specifically, we ask how voucher and charter school laws change home education rates.

The intersection between school choice programs and homeschooling is unexplained. In his systematic review of the evidence on homeschooling as a school of choice, Ray (2017) finds that the majority of peer-reviewed empirical studies estimate positive effects on student achievement and social development. However, none of the reviewed studies examined the effect of school choice programs on homeschool supply.

Voucher programs have an ambiguous effect on home education. Vouchers may decrease homeschooling due to lower relative prices of private schools and improved school quality in traditional public schools. Vouchers subsidize private school attendance, lowering the relative price of private schooling relative to home education. In some states, vouchers may not change the relative price of private schools and home education; when parents may spend voucher money on educational materials such as books and curricula, vouchers similarly subsidize homeschooling and private schools, leading to little effect on relative prices of the two.[1] The theoretical literature suggests that improved public school quality stemming from a voucher program would lead to declines in homeschooling (Watson, Maranto, & Bell, 2018). On the other hand, voucher programs may increase homeschooling. Many homeschool advocates view school choice programs as a "Trojan Horse," leading to increased government control of schooling as otherwise independent schools receive public funds. Indeed, the Home School Legal Defense Association (HSLDA) has repeatedly made the claim that voucher programs would cause private schools to become public (HSLDA, 2002a). The theoretical ambiguity of the effect of voucher programs on homeschooling leads to an empirical question, which we address below.

Charter school programs can only negatively impact homeschool rates. Charter school laws add zero price educational options for families. The presence of new choices may lead some families considering homeschooling to enroll their children in a charter school. Homeschool groups point out that while public charter schools are "free," parents give up much of the freedom to educate their children as they see fit when they accept educational funding from the government (HSLDA, 2002b). Note, too, that some charter schools are virtual charter schools serving students who remain at home during the school day.

We add to the literature by providing the first empirical analysis of the effect of private school voucher programs and charter school laws on the prevalence of homeschooling. Some private schools provide services to homeschool students. We also examine the effect of voucher program enactment on the likelihood of existing private schools to focus on providing homeschooling services.

Methods and data

We estimate the effect of school choice programs on the prevalence of homeschooling using difference-in-differences. We estimate the following for a given state, s, at year t:

$$percent\ homeschooled_{st} = \beta_0 + \beta_1\, voucher_{st} + \beta_2\, charter_{st} + X'\theta + \delta_s + \gamma_t + \varepsilon_{st}.$$

The outcome variable of interest, *percent homeschooled*, is measured in two separate ways: (1) state-reported figures of the homeschool share of the school-aged population and (2) the percent not enrolled in public or private schools for each state and year observation. First, we use the percent of the school-aged population that is home educated. We define the school-aged population as those aged 4 to 17 plus two-thirds of the 3-year-olds and one-third of the 18-year-olds using population statistics from the Surveillance, Epidemiology, and End Results (SEER) Program. The available state-years are shown in Appendix Table 1. Second, we use the percent of school-aged children not in public school. For states

[1]More recently, some states have adopted Education Savings Accounts (ESAs). An ESA directly provide education funding for students not currently enrolled in public schools; these funds may be spent on private school tuition as well as curriculum and educational materials for homeschooled students. Only two states adopted educational savings account during our sample period: Arizona and Florida. We do not have homeschooling data for Arizona. Florida adopted the law in summer 2014, at the end of the sample period; we omit these two observations from the sample: Florida in 2014 and 2015.

with data on public school enrollment and private school enrollment, we calculate the percentage of children not in school as a measure of home education. Public school enrollment is available for all state-years from the National Center for Education Statistics Common Core of Data. Private school enrollment estimates are available from the Private School Universe survey conducted roughly every other year from 2001 to 2012. The available state-years for the sample used with non-school students are shown in Appendix Table 2.

The explanatory variables of interest are *voucher* and *charter*. The indicator variable, *voucher*, takes on the value of one if a given state and year observation has a voucher program, and zero otherwise. The indicator variable, *charter*, takes on the value of one if a given state and year observation has a charter school law in place, and zero otherwise. If voucher programs are a "Trojan Horse," we would expect $percenthomeschooled_{st} = \beta_0 + \beta_1\, voucher_{st} + \beta_2\, charter_{st} + X'\theta + \delta_s + \gamma_t + \varepsilon_{st}$ to be positive, indicating that these programs push families away from private schools and into homeschooling.

We include state (δ_s) and year (γ_t) fixed effects. State fixed effects control for time-invariant characteristics of the state correlated with homeschool participation. The state fixed effect might include such characteristics as religiosity and urbanization. Year fixed effects control for sample-wide annual variation in the propensity to homeschool. The year fixed effect accounts for factors such as sample-wide variation in economic well-being and overall trends in support for homeschooling.

We cluster standard errors at the state level to allow for serial correlation. In some specifications, we weight by the population of school-aged children in the state. We control for vector X which includes the percent of the school-aged population that is white, the percent Hispanic, and the percent black. We control for the unemployment rate and real per capita personal income. We control for whether a state has adopted a right to homeschooling, a factor shown to increase homeschooling in Bhatt (2014).[2]

We also include the state average score on the National Assessment of Educational Progress (NAEP) for fourth grade math as a control variable. Because the NAEP is not administered every year, we interpolate values between testing years. Previous research establishes dissatisfaction with public schools as a motivation to homeschool.

A typical concern with the above difference-in-differences estimation strategy is endogenous policymaking. Endogenous policymaking occurs when the adoption of a state's policy adoption coincides with changes in the outcome variable. For example, if states experiencing increasing rates of homeschooling are more likely to adopt vouchers or charter schools, the school choice policies are endogenous and the estimated effects of vouchers and charter schools are biased upwards. Bias might also occur due to omitted variables. For example, if declining public school quality (not captured by included variables) leads both to more homeschool and to the adoption of school choice programs, this omitted variable biases the estimated effects of school choice programs upwards. Similarly, if a factor such as increased labor force participation leads to less homeschooling and to the adoption of school choice programs, the estimated effects of school choice programs are biased downwards.

State fixed effects control for time-invariant state characteristics that are correlated with propensity to homeschool and with the adoption of school choice programs. We include mean NAEP scores to control for a measure of performance in traditional public schools. To further address potential sources of bias, in some specifications, we include state-specific linear time trends. These linear time trends capture any secular state trend that may affect the adoption of school choice laws and homeschooling.

Adding these linear time trends, however, possibly confounds the effects of the school choice programs with the average annual changes in homeschooling (Wolfers, 2006). This confound could occur if, for example, as more parents become aware of school choice programs and more schools participate in the programs, the effects of voucher and charter school laws change over time. Because of this possibility, we also allow the effects of school choice laws to change over time, estimating the following equation:

[2]Rachana Bhatt generously provided her data on home school legislation.

Table 1. List of sample states and school choice years.

	Charter school date	Voucher date	Homeschooling enrollment sample	Percent of children not in school sample
Arkansas	1995	2016	1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
California	1992		1993–1997	2001, 2003, 2005, 2007, 2008, 2010, 2012
Colorado	1993	2011	1995–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Connecticut	1996			2001, 2003, 2005, 2007, 2008, 2010, 2012
Delaware	1996		1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Florida	1996	2000	2000–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Indiana	2002	2012		2001, 2003, 2005, 2007, 2008, 2010, 2012
Iowa	2004		2004, 2012	2001, 2003, 2005, 2007, 2008, 2010, 2012
Kansas	2000			2001, 2003, 2005, 2007, 2008, 2010, 2012
Maine	2012		1996–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Maryland	2003	2016	1993–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Massachusetts	1993		2010–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Michigan	1994		1992–2014	2001, 2003, 2005, 2007, 2008, 2010, 2012
Minnesota	1992		2000–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Mississippi	1997, 2013	2013	2009, 2010	2001, 2003, 2005, 2007, 2008, 2010, 2012
Montana			1999–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Nebraska			1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Nevada	1997			2001, 2003, 2005, 2007, 2008, 2010, 2012
New Hampshire	2004		1999–2013	2001, 2003, 2005, 2007, 2008, 2010, 2012
North Carolina	1996	2014	1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Ohio	1997	1995		2001, 2003, 2005, 2007, 2008, 2010, 2012
Oregon			2000, 2002–2012	2001, 2003, 2005, 2007, 2008, 2010, 2012
Pennsylvania			1992–2006	2001, 2003, 2005, 2007, 2008, 2010, 2012
South Dakota			2000–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Utah		2006	2002–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Vermont			2002–2014	2001, 2003, 2005, 2007, 2008, 2010, 2012
Virginia			1994–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Washington			1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
West Virginia			2002–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012
Wisconsin		1990	1992–2015	2001, 2003, 2005, 2007, 2008, 2010, 2012

Table 2. Summary statistics.

	N	Mean	Std Dev
Percent homeschool enrolled	426	1.52	0.90
Percent not-in-school	357	13.09	3.67
Control variables summary statistics for homeschool enrolled sample			
Homeschool statute	426	0.86	0.35
NAEP 4th grade math	426	233.42	7.97
Percent white	426	73.73	12.69
Percent Hispanic	426	9.20	7.50
Percent black	426	12.38	10.27
Unemployment rate	426	0.54	0.02
Real per capita personal income	426	37,944	6,377

$$percent\ homeschooled_{st} = \beta_0 + \beta_1\, voucher_{st} + \beta_2\, years\ since voucher_{st} + \beta_3\, charter_{st} + \beta_4\, years\ since charter_{st} + X'\theta + \delta_s + \gamma_t + \sigma_s t + \varepsilon_{st}$$

We continue to include indicators for having a voucher program and having a charter school law. The specification includes the same vector of controls, X, as above: demographics, homeschool rights legislation, economic factors, and NAEP test scores. We control for time-invariant state characteristics (δ_s), year dummies (γ_t), and state-specific linear time trends ($\sigma_s t$).

This specification allows the effect of vouchers and charter schools to change as the program matures. For example, if the more years a voucher program is in place, the more homeschooling increases, we would expect β_2 to be positive; this might occur, for example, if regulations follow a voucher program, pushing students into homeschooling. Alternatively, over time more schools may open in response to school choice laws, reducing homeschooling more the more years a program has existed; in this case, we would expect β_2 and β_4 to be negative. This specification allows the effect of the school choice laws to grow or diminish as the laws mature.

To obtain state-reported figures, we searched each state's department of education for data on home education. Our search yielded data from 26 states for an average of 18 years for each state. Among these states, we observe homeschool enrollment before and after adopting a voucher program in four states--Colorado, Florida, North Carolina, and Utah. These states provide useful variation in estimating the difference-in-differences effect of a voucher program on homeschooling. When we allow the effect of voucher programs to change over time, as in equation (2), we use the additional variation provided by states adopting vouchers prior to the observed homeschooling figures. These states include Maine's and Vermont's long running voucher programs as well as Wisconsin. We observe 19 states adopting charter school laws during the sample.

Availability of data on non-school students is primarily constrained by the years of the Private School Universe Survey. The Private School Universe Survey is administered in 2001, 2003, 2005, 2007, 2008, 2010, and 2012. We have data on non-schooled students for surveyed states in these years. Table 1 summarizes the states and years of the sample and the dates of passage of voucher and charter school laws.

Table 2 presents summary statistics. The state-reported home education figures average 1.5% of students educated at home. We calculate the percent homeschooled by dividing the registered enrollment by the population aged 3 to 18 from SEER. The non-schooled estimates average 13% of children educated outside of public or private schools. We calculate the number non-schooled by subtracting public school enrollment and private school enrollment from the population aged 3 to 18. We then divide the number non-schooled by the population aged 3 to 18. For the sample of state-years where we observe both measures of home education, the percent non-schooled is typically larger.[3] The percent non-schooled is larger than the percent homeschooled not least because many three- and four-year olds are not enrolled in school. The correlation between the two measures for the 150 shared state-years is 0.21 (p-value = 0.01).

[3]For this sample of 150 state-years, the mean of percent homeschooled is 1.7% and the mean of percent non-schooled is 13.3%.

Results

Table 3 presents estimates using the percent homeschooled. Column 1 suggests that vouchers decrease homeschooling and charter school adoption increases homeschooling. The point estimates are large. A voucher law decreases homeschooling by an average of 0.11 percentage points, a 7% decrease, although this estimate is not statistically significant. Charter school adoption increases homeschooling by an average of 0.506 percentage points, a 33% increase; this estimate is both large and statistically significantly different from zero.

We may be concerned that an omitted variable influences the adoption of school choice programs as well as homeschooling prevalence. To address this issue, in column (2), we add state-specific linear time trends to the specification. These trends account for any state-specific factors that influence school choice adoption or homeschooling with a constant trend. Adding the linear trends leads to smaller and statistically insignificant effects of school choice laws.

Column (3) allows the effect of the law to change the longer the law has been in place. These are our preferred estimates because the state-specific linear time trends help address potential policy endogeneity and the added policy variables allow for more flexibility in how school choice programs affect homeschooling prevalence over time. These estimates suggest that vouchers initially increase homeschooling and that this increase diminishes over time. The effect of a voucher law becomes negative and statistically significant at the 10% level in the seventh year after adoption. The estimated effect of charter school laws is positive, small, and statistically insignificant.

Columns (4) through (6) repeat the specification in the first three columns while weighting observations by the number of school-aged children. Weighting the observations slightly reduces the size of the standard errors, suggesting that population weights are improving the efficiency of the estimates (Solon, Haider, & Wooldridge, 2015); the larger standard errors suggest that the preferred estimates are the weighted ones. The results are similar.

Table 3. Effects of school choice laws on home schooling.

	(1)	(2)	(3)	(4)	(5)	(6)
	percent homeschooled (mean = 1.52)					
$Voucher_{t-1}$	−0.108	0.0961	0.0900	−0.0308	0.0560	0.0631
	(0.147)	(0.0807)	(0.0695)	(0.140)	(0.0705)	(0.0668)
Years since voucher			−0.0607**			−0.0671*
			(0.0269)			(0.0351)
$Charter_{t-1}$	0.506***	0.0493	0.0599	0.542***	0.0120	0.0187
	(0.151)	(0.0552)	(0.0533)	(0.135)	(0.0476)	(0.0438)
Years since charter			0.0263			0.0217
			(0.0436)			(0.0574)
Homeschool statute	−0.110	−0.0456	−0.0708	−0.425*	−0.143	−0.162
	(0.405)	(0.156)	(0.144)	(0.209)	(0.116)	(0.139)
NAEP 4th grade math	−0.245**	−0.125***	−0.107	−0.340**	−0.172**	−0.161**
	(0.0936)	(0.0446)	(0.0655)	(0.122)	(0.0660)	(0.0761)
Percent white	0.360*	−0.104	−0.0767	0.447**	−0.196	−0.190
	(0.209)	(0.256)	(0.244)	(0.216)	(0.276)	(0.265)
Percent Hispanic	0.375	−0.193	−0.185	0.515*	−0.314	−0.327
	(0.266)	(0.279)	(0.270)	(0.270)	(0.296)	(0.289)
Percent black	0.104	−0.0191	0.0364	0.0875	−0.144	−0.111
	(0.189)	(0.242)	(0.238)	(0.197)	(0.262)	(0.273)
Unemployment rate	3.750	1.411	1.527	6.853*	1.309	1.588
	(3.565)	(2.152)	(2.253)	(3.786)	(2.278)	(2.335)
per capita income	4.17e-05	−6.30e-06	−6.02e-06	5.44e-05	−1.82e-05	−1.57e-05
	(4.54e-05)	(2.27e-05)	(2.26e-05)	(6.02e-05)	(2.61e-05)	(2.39e-05)
linear time trends	NO	YES	YES	NO	YES	YES
Weighted by pop?	NO	NO	NO	YES	YES	YES
R-squared	0.882	0.983	0.983	0.918	0.989	0.989

All regressions include state fixed effects and year dummies. There are 426 observations. Robust standard errors, clustered by state, in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0..1$

Estimates on the control variables are primarily in the expected direction. Homeschooling is less common when public school test scores are higher and unemployment rates are lower. Our results confirm previous work showing that displeasure with the public-school system leads families to educate children within the household.

Table 4 presents results using the percent of school-aged children not enrolled in public or private school. These estimates suggest that vouchers lead to less non-schooling initially, but that, within a couple of years, the initial decline is offset and non-schooling increases. The estimated effects of voucher laws are always statistically insignificant. Charter schools may increase non-schooling, although any initial increase appears to fade out over time. Weighting the observations again reduces the standard errors of the estimates; we prefer the weighted estimates and the most complete specification presented in column (6). Here, the initial effect of charter schools is to slightly and insignificantly reduce homeschooling; by the third year after charter school adoption, homeschooling significantly decreases by a large amount.

As a step towards resolving the differences between Tables 3 and 4, we estimate the regressions using the sample of state-years for which we observe both the percent registered homeschooled and the percent not-in-school. The smaller sample provides less variation and makes it more likely to find statistically insignificant effects. Table 5 presents these estimates.

We first compare this sample's estimates to the fuller sample. For the percent homeschooled (Panel A), the results for vouchers are similar to the results in Table 3: vouchers decrease homeschooling and decrease homeschooling more the longer the policy is in place. In the smaller sample, we estimate negative and statistically significant effects of charter schools the longer they are in place, on homeschooling prevalence (column 3). The charter school effect contrasts with the statistically insignificant and positive estimated effect in Table 3. For the percent non-schooled (Panel B), the estimated effects of voucher laws continue to be statistically insignificant as in Table 4. Both samples suggest, however, that charter schools reduce homeschooling–-at least after a number of years of the policy. In the smaller sample used for Table 5, homeschooling prevalence significantly decreases after six years of charter schools.

Table 4. Effects of school choice laws on not in school.

	(1)	(2)	(3)	(4)	(5)	(6)
	percent not-in-school (mean = 13.09)					
$Voucher_{t-1}$	−1.000	−0.329	−0.307	−0.190	0.107	0.190
	(0.683)	(0.732)	(0.717)	(0.388)	(0.568)	(0.531)
Years since voucher			0.0679			0.192
			(0.265)			(0.179)
$Charter_{t-1}$	0.0316	0.578	0.122	0.478	1.031	0.230
	(0.854)	(0.540)	(0.437)	(0.902)	(0.628)	(0.555)
Years since charter			−0.524**			−0.709***
			(0.223)			(0.254)
Homeschool statute	1.633	8.218*	8.168*	0.777*	5.126*	5.112*
	(1.476)	(4.204)	(4.221)	(0.423)	(2.629)	(2.566)
NAEP 4th grade math	−0.640***	−0.208	−0.208	−0.363	−0.461	−0.481
	(0.237)	(0.422)	(0.423)	(0.262)	(0.569)	(0.557)
Percent white	0.234	−0.0555	−0.147	0.332	−1.896	−2.149
	(0.513)	(1.534)	(1.537)	(0.321)	(2.112)	(2.087)
Percent Hispanic	0.347	−0.415	−0.481	0.430	−2.420	−2.645
	(0.540)	(1.579)	(1.581)	(0.361)	(2.115)	(2.084)
Percent black	0.729	0.150	0.0546	0.511	−2.059	−2.341
	(0.582)	(1.682)	(1.691)	(0.370)	(2.376)	(2.265)
Unemployment rate	−0.624	−1.721	−1.690	23.51	9.459	9.918
	(5.543)	(3.066)	(3.041)	(18.21)	(12.37)	(12.70)
Per capita income	−9.02e-05	−0.000182*	−0.000183*	−9.78e-05	−0.000175	−0.000184
	(6.53e-05)	(0.000103)	(0.000103)	(0.000108)	(0.000179)	(0.000177)
linear time trends	NO	YES	YES	NO	YES	YES
Weighted by pop?	NO	NO	NO	YES	YES	YES
R-squared	0.872	0.924	0.924	0.826	0.889	0.891

There are 356 observations. All regressions include state fixed effects and year dummies. Robust standard errors, clustered by state, in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. Effects of school choice laws on homeschooled and not in school, same sample.

	(1)	(2)	(3)	(4)	(5)	(6)
			percent homeschooled (mean = 1.67)			
$Voucher_{t-1}$	−0.178	0.118*	0.0380	−0.0941	0.0901	0.00456
	(0.106)	(0.0685)	(0.0710)	(0.111)	(0.0758)	(0.0821)
Years since voucher			−0.0807***			−0.0881***
			(0.0212)			(0.0251)
$Charter_{t-1}$	0.183*	0.0598	0.0123	0.315**	0.178	0.130
	(0.103)	(0.150)	(0.135)	(0.119)	(0.130)	(0.130)
Years since charter			−0.102**			−0.0716
			(0.0382)			(0.0429)
R-squared	0.968	0.995	0.995	0.977	0.997	0.997
			percent not-in-school (mean = 13.3)			
$Voucher_{t-1}$	−0.661	−3.684*	−3.856	−0.209	−2.115	−1.560
	(0.770)	(2.095)	(2.346)	(0.776)	(2.322)	(2.552)
Years since voucher			−0.262			0.268
			(0.696)			(0.372)
$Charter_{t-1}$	0.905	1.290	0.741	1.464**	2.626***	1.673**
	(1.290)	(1.271)	(1.054)	(0.687)	(0.787)	(0.654)
Years since charter			−1.114*			−1.152***
			(0.601)			(0.405)
R-squared	0.725	0.795	0.798	0.768	0.853	0.858
linear time trends	NO	YES	YES	NO	YES	YES
Weighted by pop?		NO			YES	

There are 150 observations. Robust standard errors, clustered by state, in parentheses. All regressions include state fixed effects and year dummies. Regressions also include the set of controls listed in Tables 3 and 4. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We then compare the estimates across dependent variables, comparing Panels A and B of Table 5. Both suggest declines in homeschool prevalence following a few years after the adoption of charter schools. The registered homeschool prevalence declines following the adoption of a voucher program although vouchers' effect on the non-schooled is not always statistically significant.

Private schools and their role in home education

One concern when measuring home education as separate from private schools is that a private school may serve to support homeschooling, blurring the line between the two types of schools. For example, in states without homeschool rights, parents can use a private school option to homeschool their children (Bhatt, 2014). Perhaps for this reason, HSLDA publicly announced (HSLDA, 2018) that while their organization does "not currently oppose vouchers or education savings accounts … HSLDA opposes any government money to homeschool families … [since they believe such money] will eventually lead to regulations that will restrict homeschool freedom." We explore this possibility using data from the Private School Universe Survey with data from Indiana, Louisiana, and Washington, D. C. We explore this possibility using data from the Private School Universe Survey (PSS) with data from Indiana, Louisiana, and Washington, D.C. In other words, each of these locations allows us to examine the effects of voucher programs on the likelihood that private schools focus on homeschooling services. Summary statistics for these data appear in Table 6.

Table 6. Summary statistics for PSS.

	N	Mean	Standard Deviation
Homeschool supported	5,750	0.02	0.15
Voucher indicator	5,750	0.37	0.48
Percent white	5,750	76.53	30.83
Regular education school	5,750	0.84	0.37
Religious school indicator	5,750	0.42	0.49
Coeducational school indicator	5,750	0.97	0.17

We employ private school and year fixed effects regression of the following form:

$$home\ school\ focus_{it} = \beta_0 + \beta_1 voucher_{it} + X'\theta + \delta_s + \gamma_t + \varepsilon_{st}.$$

We estimate a school and year fixed effects regression to examine how a voucher law affects the likelihood of private school leaders to state that a major role of their institution is to support homeschooling. The dependent variable of interest, *homeschool focus*, takes on the value of one for a given school and year observation if the school leader reports that a major role of their institution is to support homeschooling, and zero otherwise. Specifically, the private school leaders are asked "is a major role of this school to support homeschooling?" We include controls for the percent of students in the school who are white and indicators for whether the school is identified as a regular education school, a religious school, or coeducational.

These estimates appear in Table 7. We estimate that a voucher law leads private schools to be around 2 percentage points less likely to agree with that statement, about a tenth of a standard deviation decrease. This change can come from a supply change or a demand change. On the supply side, schools may respond to the voucher program by using resources previously used by homeschoolers to support enrolled students. On the demand side, the voucher may encourage some families to switch to a private school as it becomes more affordable.

It may be that regulations involved with voucher program participation limit the abilities of private schools to focus on specialized services for homeschool students. After all, recent evidence suggests that voucher program regulations may lead to a decrease in private school specialization in these same areas (DeAngelis & Burke al., 2017). Furthermore, since private schools participating in all three of these voucher program locations are required to administer the state standardized tests, they are more likely to focus on those exams than to have a strong focus on assisting homeschool students.

Discussion

We estimate the effects of charter school and voucher programs on rates of homeschooling. The theoretical effect of vouchers on homeschooling is mixed compared to that for charter schools; private school choice programs could either: (1) increase homeschooling market share by allowing families to use voucher funding to homeschool, or (2) decrease homeschooling market share by enticing homeschooling families to send their children to private schools. On the other hand, because charter school laws do not increase funding for homeschooling, charter school laws should only reduce homeschool market share, in theory, by offering "free" alternatives to residentially

Table 7. Effect of choice programs on private school support for homeschool.

	(1)	(2)	(3)
	Homeschool Support (FE Regression)	Homeschool Support (RE Regression)	Homeschool Support (RE Probit)
Voucher	−0.024*	−0.016*	−0.018**
	(0.010)	(0.008)	(0.009)
White	0.00007	−0.0002*	−0.0001*
	(0.0001)	(0.0001)	(0.000)
Regular school	−0.016	−0.006	−0.005
	(0.009)	(0.006)	(0.005)
Religious	0.004	−0.002	−0.002
	(0.006)	(0.005)	(0.005)
Co-ed	−0.013	−0.013	−0.009
	(0.034)	(0.015)	(0.012)
Year FE	Yes	Yes	Yes
R^2 Within	0.0134	0.0073	
Schools	1,591	1,591	1,591
N	5,750	5,750	5,750

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Column one results are from school fixed effects linear regression, column two results are from random effects linear regression, and column three results are from random effects probit regression. All models include year fixed effects. All coefficients are average marginal effects.

assigned public schools. Across most specifications and both measures of homeschooling, we observe decreases in homeschooling post-charter school laws, at least once the program has been in place for a few years. The effects for vouchers in our preferred specification are either statistically insignificant or suggest declines in home education once the voucher has been in place for a few years. The mixed results for vouchers may be a result of private schools moving away from supporting homeschooling in the wake of the adoption of a voucher program.

Our analysis of the effect of school choice programs on school specialization is in accord with the findings from DeAngelis and Burke (2017), indicating that publicly funded private school choice programs induce homogenization of the supply of schools. However, while we find that the publicly funded private school choice programs in Indiana, D.C., and Louisiana reduce the likelihood that schools provide services promoting homeschooling by around 2 percentage points, the detected effects are relatively small. Various stakeholders may differ in their views on decreasing involvement of private schools in providing homeschooling services.

Our study has a few important limitations. First, because the identification in our analyses is limited to the variation generated from a minority of the states, the study is not representative of the United States. Second, the models examine the effects of the existence of school choice laws on the homeschool market; we are unable to determine whether there are differential effects based on smaller or larger school choice programs. Importantly, the lack of information regarding the dosage of each school choice law could limit study variation and, therefore, inhibit our models' abilities to detect effects. Finally, school choice laws may be endogenous. If omitted variables influence both homeschool and school choice program adoption, the estimates are biased. Our models include state fixed effects, year fixed effects, and, in some cases, state-specific linear time trends. These sets of variables help account for trends in homeschooling across space and time that may correlate with the adoption of school choice laws. The potential for lingering endogeneity bias leads us to urge readers to interpret these results with caution. Of course, more research on this topic is necessary for stronger policy implications and recommendations to the homeschool community. For example, taxpayer-funded programs could lead to a negative overall fiscal effect if enough homeschoolers decide to use a school choice program.

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